SLR-ND – 176

Seat No.	

M.E. (E and TC) Digital Electronics and Communication System
(Semester – I) Examination, 2014
Paper – II : CMOS VLSI DESIGN

Day and Date : Thursday, 23-1-2014 Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*

*2) Figures to the **right** indicate **full** marks.*

SECTION – I

1. a) With the help of physical structure of NMOS enhancement transistor explain accumulation, depletion and inversion modes. **6**

   b) Explain MOS device design equations. **5**

2. a) Define noise margin and explain how it can be obtained from voltage transfer characteristic of CMOS inverter. **6**

   b) Explain static power dissipation of CMOS inverter. **5**

3. a) Design half adder using CMOS logic. **6**

   b) Explain signal integrity issues in dynamic design. **6**

4. Write notes on **any three** of the following : **(4×3=12)**

   a) Technology scaling

   b) Power and energy delay

   c) Dynamic logic : basic principle

   d) Leakage in dynamic circuits.

P.T.O.

SECTION – II

5. a) Explain master slave positive edge triggered register using multiplexers. **6**

   b) Explain C^2MOS register. **5**

6. a) Explain any two timing classification methods of digital systems. **5**

   b) Explain sources of skew and jitter. **6**

7. a) How PLL can be used for clock synchronization ? **6**

   b) Explain designing of SRAMS. **6**

8. Write notes on **any three** of the following : **(4×3=12)**

   a) Latch based clocking

   b) TSPCR

   c) Clock distribution

   d) Designing arithmetic building blocks.

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SLR-ND – 177

Seat No.	

M.E. (Electronics and Telecommunication Engg.) (Digital Electronics and Communication System) (Semester – I) Examination, 2014
MODERN DIGITAL SIGNAL PROCESSING (Paper – III)

Day and Date : Saturday, 25-1-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) Assume suitable data ***if required****.*

SECTION – I

1. 1) Explain the design of FIR differentiator. **6**

   2) Explain in detail with condition, design of optimum equi ripple linear phase FIR filter. **6**

2. 1) Explain the Levinson Durbin algorithm for computation of LPC's. **6**

   2) Determine impulse response of FIR filter that is described by the lattice coefficient $K_1 = 0.6$, $K_2 = 0.3$, $K_3 = 0.5$ and $K_4 = 0.9$. **6**

3. 1) Explain the relationship between the auto correlation and the model parameter. **6**

   2) Explain the Burg method for AR model parameter. **5**

SECTION – II

4. 1) An IIR digital low pass filter is required to meet following specification.
   Passband ripple $\leq$ 0.5 dB
   Passband edge : 1.2 KHz
   Stop band attenuation $\geq$ 40 dB
   Stop band edge : 2.0 KHz
   Sample rate : 8 KHz
   Use design formulas to determine the order for digital butterworth filter. **6**

   2) Give the relation between LPF and other filters by use of frequency transformation. **6**

P.T.O.

5. 1) Explain the method of sampling rate conversion by a factor I/D. Explain the design of interpolator and decimeter filter. **6**

   2) Consider the signal $x(n) = a^n u(n)$, $|a| < 1$. Determine the spectrum X(w). The signal x(n) is applied to decimeter that reduces the rate by a factor of 2. Determine the output spectrum. **6**

6. 1) Explain in detail the three level decomposition in case of multi resolution analysis of wavelet system. **6**

   2) Describe the characteristic of discrete wavelet transform. **5**

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Seat No.	

M.E. (E&TC) – Digital Electronics and Communication Systems (Sem. – I) Examination, 2014
Paper – IV : PROBABILITY AND RANDOM PROCESS

Day and Date : Monday, 27-1-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) ***Assume*** *suitable data if required.*

SECTION – I

1. a) State and explain Bay's theorem along with the concept of total probability. **5**

   b) A well known National Corporation ABC produces workstation and test equipment. A recent survey by the site manager revealed that over the last 5 years, 35% of the electrical engineers hired had a Masters of Science in Electrical Engg. (MSEE). Of these, 80% are supervising special projects within the company. Of those electrical engineers who were hired without MSEE, 10% also supervise special projects. Suppose that the site manager holds a special projects supervisor conference involving supervisors who have been with the company no longer than 5 years, what is the probability that a randomly selected person at the conference will hold an MSEE ? **6**

2. a) Define characteristic function and obtain the characteristic function for Gaussian random variable with zero mean and unit variance. **4**

   b) Derive the moment generating function for a Rayleigh random variable. **4**

   c) Suppose a source sends symbol from a three letter alphabet with $X \in \{a, b, c\}$ and $p_a = 1/2$, $p_b = 1/4$, $p_c = 1/4$ are the source symbol probabilities

      i) Determine the entropy of this source. **4**

      ii) Give a source code that has an average code word length that matches the entropy.

      OR

   c) A discrete random variable X has possible values $x_i = i^2$, i = 1, 2, 3, 4, 5 which occur with probabilities 0.4, 0.25, 0.15, 0.1 and 0.1 respectively. Find the mean value $\overline{X} = E[X]$ of X. **4**

P.T.O.

3. a) Define Cumulative distribution function. State its properties.

   Which of the following could be the CDF of some random variable ? State with reason.

   i) $FX(x) = \frac{1}{2} + \frac{1}{\pi}.\tan^{-1}(x)$

   ii) $FX(x) = e^{-x^2}$

   iii) $FX(x) = [1 - e^{-x}]\, 4(x)$. **5**

   b) Define the PDF of uniform random variable and Gaussian random variable. Derive the expression for obtaining mean and variance of these random variables. **5**

   OR

   b) Define n^{th} central moment of a random variable X. Obtain the first and second order central moments of X. **5**

   Also obtain the second order central moment of binomial random variable.

   c) Find a constant b>0 so that the function **2**

$$f_X(x) = \begin{cases} e^{3x/4} & 0 \le x \le b \\ 0 & \text{elsewhere} \end{cases}$$

   is a valid probability density.

SECTION – II

4. a) Define Poisson random process. Give examples of Poisson processes. Explain how to obtain mean and autocorrelation function of a Poisson random process. **6**

   b) A random process is defined by $X(t) = e^{-At}\, u(t)$ where A is a random variable with PDF, $f_A(a)$

   i) Find the PDF of X(t) in terms of $f_A(a)$

   ii) If A is an exponential random variable with $f_A(a) = e^{-a}\, u(a)$, find $\mu_X(t)$ and $R_{X,X}(t_1, t_2)$. Is the process WSS ? **5**

   OR

   b) i) Find the mean, variance and root mean square value of the process whose autocorrelation function is **3**

$$R_{XX}(\tau) = 2 + 4\, e^{-2|\tau|}$$

   ii) Define autocovariance function and cross correlation function. **2**

5. a) Consider a Poisson counting process with arrival rate λ.
   i) Suppose it is observed that there is exactly one arrival in the time interval $[0, t_o]$ find the PDF of arrival time.
   ii) Now suppose there were exactly two arrivals in the time interval $[0, t_o]$.
   Find the joint PDF of those two arrival times. **6**

   OR

   a) For positive constants a and b , a pair of random variables has a joint PDF specified by
   $f_{X, Y}(x, y) = abe^{-(ax+by)} u(x) u(y)$ **6**
   i) Find the joint CDF, $F_{XY}(x, y)$
   ii) Find the marginal PDFs $f_X(x)$, $f_Y(y)$
   iii) Find Pr(X>Y)

   b) Define joint CDF. State its properties. **3**

   c) Write note on : Complex random variables. **3**

6. a) For a linear transformation of vector random variables of the form Y = AX + b, given the relationship between
   i) means of X and Y
   ii) autocorrelation of X and autocorrelation of Y
   Prove these relations. **5**

   b) Define following for set of random variables $X_1, X_2....X_n$
   i) Joint PMF, CDF and PDF
   ii) Conditional PMF, CDF and PDF **4**

   c) Let X and Y be random variables with joint PDF

$$f_{XX}(x, y) = \begin{cases} \frac{4}{225} xy & 0 \le x \le 3, 0 \le y \le 5 \\ 0 & \text{elsewhere} \end{cases}$$

   find $f_X(x/y)$, $f_Y(y/x)$ **3**

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Seat No.	

M.E. (E & TC – Digital Electronics and Communication Systems)
(Semester – I) Examination, 2014
Elective – I : OPTICAL COMMUNICATION AND NETWORKS (Paper – V)

Day and Date : Wednesday, 29-1-2014 Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

N.B. *: 1) Figures to* ***right*** *indicate* ***full*** *marks.*

2) ***Assume*** *suitable data* ***if necessary****.*

SECTION – I

1. Attempt following : **(7+6 =13)**

   1) Derive an approximate expression for the cavity gain of an SOA in limiting case of a 3 dB peak through ratio.

   2) Calculate the ratio of the stimulated emission rate to spontaneous emission rate for an incandescent lamp operating at a temperature of 1000 K. Assume $\lambda = 0.5\ \mu m$.

2. Attempt **any two** : **(6×2=12)**

   1) Explain in brief difference between WDM and other techniques.

   2) What are the different components of communication system in optical communication ? Explain in brief.

   3) Explain pumping requirements in EDFA.

3. Write a short note on **any two** : **(5×2=10)**

   1) Channel multiplexing

   2) Repeaters

   3) Modulation techniques in OC.

P.T.O.

SECTION – II

4. Attempt following : **(7+6=13)**

   1) Explain in detail fiber absorption loss measurement.

   2) An optical fiber link consist of multimode step index fiber which has numerical aperture of 0.3 and core refractive index 1.5. The Rayleigh scattering coefficient for fiber is 0.7 km^{-1}. When light pulses of 50 ns duration are launched into fiber, calculate the ratio in dB of back scattered optical power to forward optical power at fiber input if velocity of light in vacuum is 2.998×10^8 m/s.

5. Attempt **any two** : **(6×2=12)**

   1) Explain in detail storage area network.

   2) Explain in detail FDDI network model with reference to OSI.

   3) Explain different performance aspects in presence of model noise and mode partition noise.

6. Write a short note on **any two** : **(5×2=10)**

   1) SDH

   2) Rise time budget

   3) Broadcast networks.

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SLR-ND – 180

Seat No.	

M.E. (Electrical Engineering) (Semester – I) Examination, 2014
POWER ELECTRONICS (Paper – I)

Day and Date : Tuesday, 21-1-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

1. Explain the role of power electronics in different engineering applications. **10**

2. Explain the inter digitization technique and anode shorting technique in GTO.

   OR

2. Explain the reverse recovery phenomenon of power diode. Compare reverse phenomenon of SCR and GTO. **10**

3. Explain the behaviour of half controlled converter with R-L-E load if :
   a) I_L is continuous
   b) I_L is discontinuous.

   OR

3. In the as shown in fig. 1 average of I_L = 1.8A Triggering angle is maintained at 110°, current seems to be zero at 50° beyond the zero crossing. Find the value of E and sketch the load current as well as applied average voltage waveform ? **15**

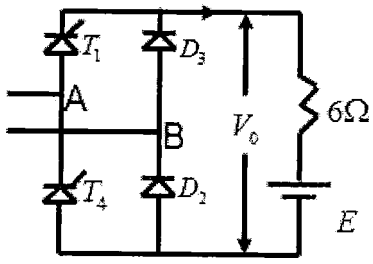

Fig. 1

P.T.O.

SECTION – II

4. Explain the output voltage control method of three phase inverter.
   I) PWM
   II) Stepped modulation
   III) Sinusoidal PWM
   IV) Harmonics elimination
   V) Third harmonic injected modulation. **15**

5. In the circuit as shown in fig. 2, if $r_a = 0$, Total "L" in circuit = 50mH. Switching frequency = 500Hz and d = 0.5 average current drawn by the motor = 10A. Assume that I_L is continuous. Determine I_{MAX} and I_{MIN}.

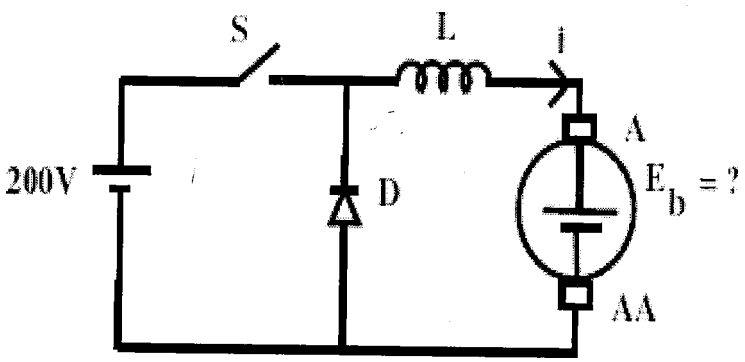

Fig. 2

OR

5. Explain buck boost converter in detail with a neat circuit diagram and waveforms. **10**

6. Explain single phase AC voltage controller and derive its output voltage. **10**

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Seat No.	

M.E. (Electrical Engineering) (Semester – I) Examination, 2014
POWER SYSTEM DYNAMICS AND CONTROL (Paper – II)

Day and Date : Thursday, 23-1-2014 Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.* ***However*** *some internal options are provided.*

2) Assume suitable data ***wherever*** *necessary and mention the* ***same****.*

SECTION – I

1. Attempt **any two** : **12**

   a) Explain loss of synchronization of synchronous generator related to power system stability.

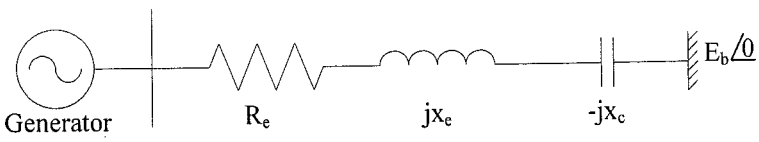
   b) Explain mechanical-electrical system interaction instability related to power system.

   c) Explain the concept of equilibrium related to power system.

2. Attempt **any two** : **12**

   a) Find the level of series compensation that will maximize the received power in a single machine system shown in Fig. The generator impedance is assumed to be $Z_g = R_g + jx_g$.

   Assume $E_g = E_b = 1.0$, $R_e = 0.1$, $x_e = 1.0$, $x_g = 0.1$, $R_g = 0$,



P.T.O.

b) Explain the behaviour of synchronous machine connected to infinite bus bar.

c) Derive Park's transformation.

3. With the help of dynamics model of system explain small and large disturbance stability of single machine connected to infinite bus. **11**

SECTION – II

4. What is meant by modelling of electrical component ? Why it is required ? Explain modelling of induction machine. **12**

5. Attempt **any two** : **12**

a) Explain DC excitation system with necessary diagram.

b) What are torsional oscillations ? Explain.

c) What is the effect of change in excitation on stability ? Explain.

6. What is the necessity of prime mover control ? And also explain the basic structure of prime mover and energy supply system. **11**

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Seat No.	

M.E. (Electrical Engineering) (Sem. – I) Examination, 2014
DC DRIVES (Paper – III)

Day and Date : Saturday, 25-1-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: Answer* ***all*** *the questions sequentially.*
Figure on the ***right*** *square bracket indicate max. marks.*
Assume *suitable data* ***if required*** *giving reason.*

SECTION – I

1. a) With suitable block diagram enlist essential components of modern electric drive. Discuss on different types of power modulators available for DC drives. Compare their merits and demerits. **[9]**

2. a) Explain the statement "Tracative effort should be less than frictional force for linear motion of vehicle". What is the difference between structure of main line traction and suburban traction ? **[8]**

OR

a) With a neat diagram discuss concept of motor-load interaction. What is equilibrium point of operation ? Derive the condition for stability of equilibrium point. **[8]**

b) Comment on stability of drive on following operating points, A, B, C and D shown in Fig.1 **[5]**

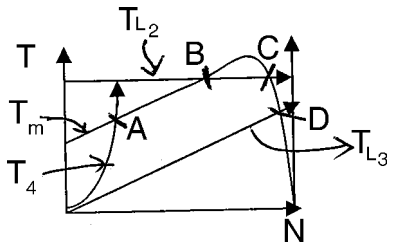

Fig. 1

P.T.O.

3. a) Draw the equivalent circuit of a separately excited DC motor and derive the expression for motor torque and armature voltage. State its application. **[8]**

OR

a) Discuss on merits and demerits of electric braking. With neat schematic explain the dynamic braking of a DC shunt motor. **[8]**

b) A 50HP 440V DC shunt motor running at 600 rpm on full load having armature current of 100 A and Ra = 0.1 Ω is to be braked by plugging. Calculate the value of resistance to be inserted in series with the armature circuit to limit the initial braking current to 150 A. Calculate the braking torque so obtained. **[5]**

SECTION – II

4. a) With suitable diagram explain the construction and operation of full converter fed DC shunt motor for continuous mode of operation. Obtain the expression for average armature current. **[8]**

OR

a) What are the problems associated with use of PCC for DC drive control ? Explain how commutation problems can be overcome in PCC based DC drive. **[8]**

b) An 80 KW, 440 V, 800 rpm DC motor is operating at 600 rpm developing 60% rated torque is controlled by 3-φ, 415 V, 50 Hz, six pulse converter. If the back emf at rated speed is 410 V, determine the triggering angle of the converter. **[4]**

5. a) With neat block diagram and necessary wave form explain different control strategies used for control chopper. **[8]**

OR

a) Derive expression for commutating components L and C for voltage commutated chopper. Discuss on assumptions made for designing the components. **[8]**

b) A DC motor of Ra = 0.25 Ω and L = 1mH is connected to 110 V supply through type A chopper with switching frequency of 2.5 msec. If on time of chopper is 1msec, find whether load current is continuous or not for a back emf of 11V. Compute minimum value of E_b to make load current continuous. **[4]**

6. a) With neat circuit schematic and relevant waveforms explain closed loop control of a dual converter fed DC drive. **[7]**

b) Obtain peak value of circulating current for 3 φ circulatory current type duel converter consisting of two three phase fully controlled bridges for give data : per phase supply RMS voltage = 230 V, ω = 315 rad/sec, L = 12mH, α_1 = 60°. **[4]**

OR

b) With necessary diagram explain concept of torque control drive and speed control drive. **[4]**

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SLR-ND – 183

Seat No.	

M.E. Electrical Engg. (Sem. – I) Examination, 2014
(Paper – IV) CONTROL ENGINEERING

Day and Date : Monday, 27-1-2014 Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

1. Attempt **any four** : **(4×6=24)**

   a) Explain the basic structure of feedback control system.

   b) Derive an expression for the transfer function of an armature controlled dc servo motor.

   c) Explain using appropriate diagrams, the construction and operation of the following transducers :

      i) AC tachogenerator

      ii) DC tachogenerator

   d) Explain the effect of feedback on system sensitivity in control systems.

   e) Explain the characteristics of the proportional controller.

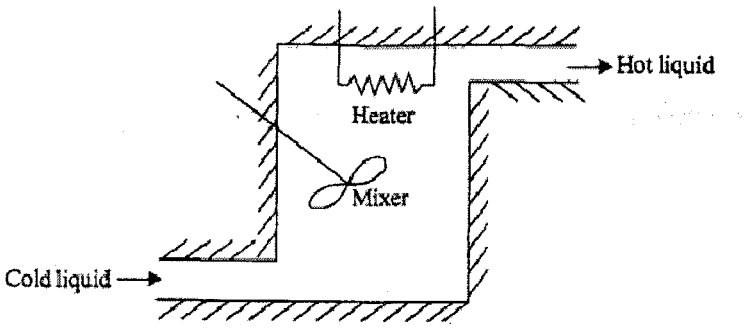
2. Attempt **any one** : **(1×11=11)**

   a) In the thermal system shown, heater coil is used to heat the liquid entering the insulated tank at temperature θi to hot liquid at temperature θ. The liquid is thoroughly mixed to maintain uniform temperature of the liquid in the tank. If M is the mass of the liquid in the tank in Kg, C is the specific heat of liquid in J / Kg / °K, W is the steady state liquid flow rate in kg/sec and h_i is the heat input rate in J/sec, obtain the transfer function of the system when,

P.T.O.

i) Heat input rate is changed, with inlet temperature of liquid kept constant and

ii) Inlet temperature is changed with heat input rate held constant. Also write the differential equation when heat input rate and inlet liquid temperatures are changed.



b) Using appropriate diagrams, give the constructional and operational features of a hydraulic actuator. Derive the transfer function of the actuator.

SECTION – II

3. Attempt **any four** : **(4×6=24)**

a) State space representation of speed control system.

b) Explain the performance specifications in frequency domain.

c) Obtain the state equation and output equation of electric network as shown in fig. 1

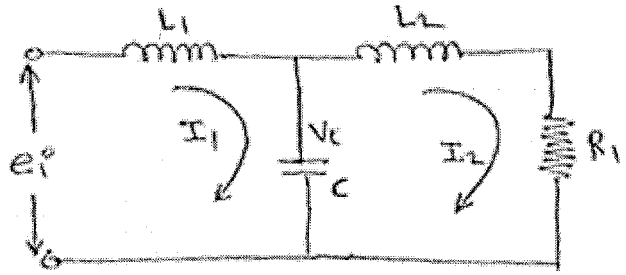


Fig. 1

d) A unity feedback system is characterized by the open loop transfer function

$$G(s) = \frac{1}{s(0.5s+1)(0.2s+1)}$$

i) Determine the steady state errors to unit step, unit ramp and unit parabolic inputs.

ii) Determine the rise time, peak time, peak overshoot and settling time of the unit step response of the system.

e) Sketch the Bode plot for the following system and determine the value of K for which the magnitude plot crosses the 0 db line at ω=15 rad/sec.

$$G(s) = \frac{k(s+2)}{s(s+4)(s+10)}$$

4. Attempt **any one** : **(1×11=11)**

a) The block dia. of fig. shown below represents a position control system. The open-loop transfer function of the uncompensated system is

$$G(s) = \frac{k}{s(s+1)(s+4)}$$

The specifications of the system are as follows :

Damping ratio, $\xi = 0.5$, undamped natural frequency, $\omega_n = 2\,\text{rad/sec}$, velocity error constant, $K_v \geq 5\ \text{sec}^{-1}$

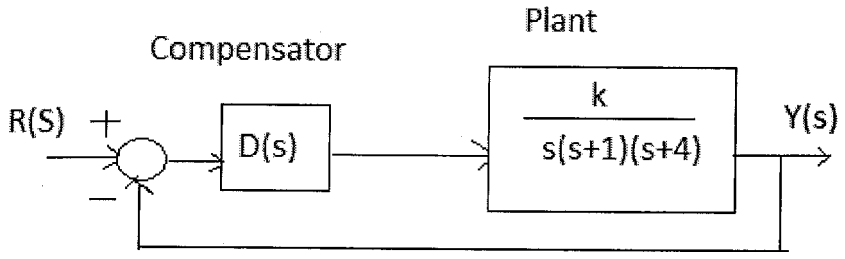


Fig.

b) Obtain the state space representation in

i) Companion form or bush form

ii) Diagonal or Jordon form for the following systems :

a) $\dddot{x} + 9\ddot{x} + 23\dot{x} + 15 = u$ b) $\dddot{x} + 9\ddot{x} + 23\dot{x} + 15 = \ddot{u} - 2\dot{u} + 2u$.

SLR- ND – 184

Seat No.	

M.E. (Electrical Engineering) (Semester – I) Examination, 2014
Paper – V : EXTRA HIGH VOLTAGE TRANSMISSION SYSTEMS
(Elective – I)

Day and Date : Wednesday, 29-1-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Necessary data **whereever** required is given. If such data is not given it means that the knowledge of that data is a part of examination.*
*2) If you have assumed **any** data then mentioned it **clearly** with reasons.*

SECTION – I

1. Answer **any one** question from the following : **12**
   a) A power of 12000 MW is required to be transmitted over a distance of 1000 km. At voltage levels of 400 kv, 750kv, 1000kv, and 1200 kv determine
      i) Possible no of circuits required with equal magnitudes for sending and receiving end voltages with 30° phase difference;
      ii) The currents transmitted and
      iii) The total line losses.
   b) Explain in detail about basic engineering aspects of EHV AC transmission.

2. Solve **any two** questions from the following : **12**
   a) Explain the relation between the temperature rise and current carrying capacity of EHV-AC line.
   b) Explain the need of bundled conductors for EHV AC lines.
   c) What are the gradient factors and their advantages ?

3. Attempt **any one** question from the following : **11**
   a) Derive surface voltage gradient on conductors under the
      i) Maximum surface of voltage gradients for $N \geq 3$
      ii) Mangoldt (Markt-Mengele) formulae.
   b) Derive an expression for maximum charge condition on a 3-phase line.

P.T.O.

SECTION – II

4. Answer **any two** questions from the following : **12**

   a) Derive the differential expression and their solutions for a transmission line with distributed inductance and capacitance.

   b) Explain the clear difference between traveling and standing wave theory.

   c) Derive the generalized constants of a distributed parameter transmission line.

5. Solve **any one** question from the following : **12**

   a) Discuss in detail the voltage rise and arrester rating.

   b) Explain different type of lightning arresters and protective characteristics.

6. Attempt **any one** question from the following : **11**

   a) What are the general principles of the lighting protection problem. Describe it meticulously.

   b) What is tower footing resistance and explain it in detail.

SLR-UN – 4

Seat No.	

M.E. (Civil-Structure) (Semester – I) Examination, 2014
DYNAMICS OF STRUCTURES (Paper – IV)

Day and Date : Monday, 30-6-2014 Total Marks : 70
Time : 10.00 a.m. to 2.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *suitable data* ***if necessary*** *and Mention it clearly.*

SECTION – I

1. a) Write the differential equation of motion for the inverted pendulum as shown in Fig. 1 and determine its natural frequency. Assume small oscillations and neglect mass of rod. **10**

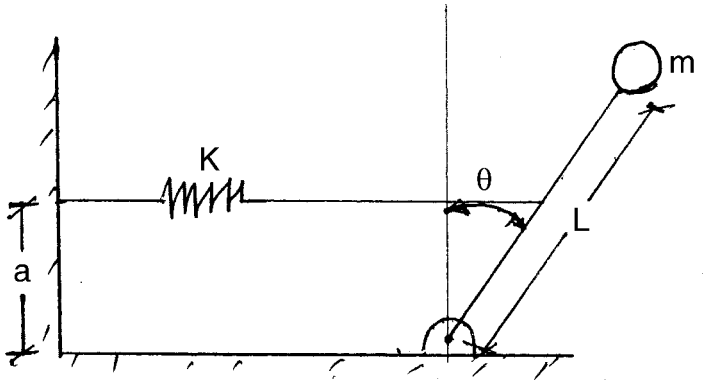


Figure 1 Q. 1 a)

b) A vertical pole as shown in Fig. 2 carries a mass 'm' at its top. Neglecting weight of the pole derive the differential equation for small horizontal vibrations of mass and find the natural frequency. Assume that the effect of gravity is small and non linear effect may be neglected. **8**

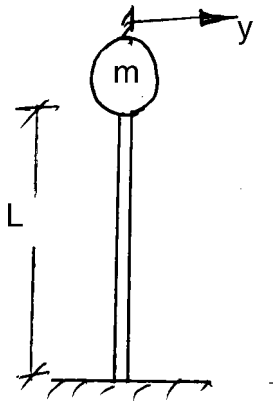


Figure 2 Q. 1 b)

P.T.O.

2. Derive an expression for force transmitted to foundation by a reciprocating type of machine exerting an external force F(t) = Fosin (ω_ft). Plot the graph of transmissibility vs frequency ratio for the damping ratio R = 5% and 10%. **17**

3. Derive the expression for Duhamel's integral for damped system. From this expression derive the expression for Duhamel's integral for the undamped system. **17**

SECTION – II

4. A two degree of freedom system has properties as shown in Figure 3. Determine the natural frequency and mode shapes of the system. Further using mass proportional damping develope the damping matrix for the system assuming 5% damping ratio for the both. **18**

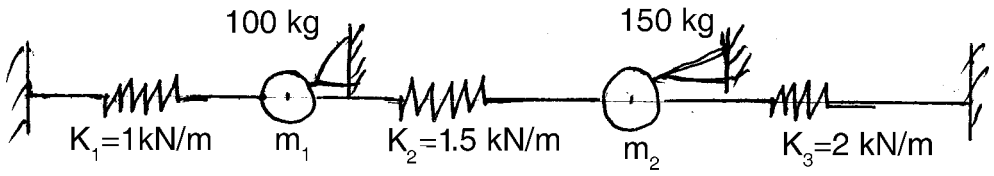
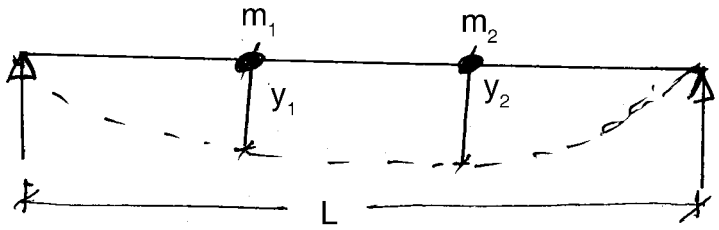


Figure 3. Q. 4)

5. Derive the dynamic stiffness matrix for the following beam by static condensation method. **17**



6. Carry out the free vibration analysis of a cantilever beam and determine its first three frequencies and mode shapes. **17**

SLR- UN – 1

Seat No.	

M.E. (Civil Structures) (Semester – I) Examination, 2014
THEORY OF ELASTICITY AND PLASTICITY (Paper – I)

Day and Date : Monday, 23-6-2014 Total Marks : 70
Time : 10.00 a.m. to 2.00 p.m.

Instructions *: 1) Solve **any two** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** suitable data, if **required**.*

SECTION – I

1. a) State and explain Saint Venant's principle with a neat sketch. How it is useful in Theory of Elasticity ? Define continuum. **11**

   b) Derive differential equations of equilibrium for 2-D problems in rectangular coordinate system. **7**

2. a) The state of stress at a point is given by the following array of terms :

$$\begin{bmatrix} 9 & 6 & 3 \\ 6 & 5 & 2 \\ 3 & 2 & 4 \end{bmatrix} \text{ MPa}$$

   Determine principal stresses and principal directions at the point. **11**

   b) Derive differential equations of equilibrium in polar coordinate system. **6**

3. a) Obtain differential equations of force equilibrium in cylindrical coordinate system. **12**

   b) Obtain generalized Hooke's law. **5**

SECTION – II

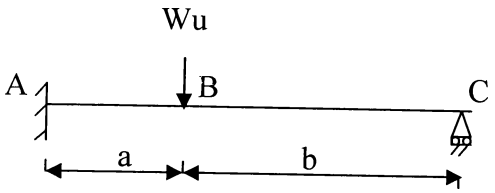
4. a) i) What are the assumptions made in theory of Plasticity ? **4**
   ii) Describe different types of materials with their stress strain diagram and mechanical models. **7**

   b) Draw conventional and true stress strain diagrams and obtain condition for neck formation in ductile metals. **7**

P.T.O.

5. a) i) State static or Lower Bound and Kinematic or Upper Bound Theorems. **4**

   ii) The beam is supported and loaded with ultimate load as shown in Fig. Find the collapse load and draw BMD at collapse. The section of the beam is of constant Mp throughout. **7**



   b) Define shape factor. Obtain its values for Rectangular and Circular sections. **6**

6. a) Write on Mises Yield criterion and its graphical representation. **7**

   b) Find shear stress distribution in a prismatic shaft circular cross section subjected to torque T using warping function. **10**

SLR-UN – 10

Seat No.	

M.E. (Civil-Structures) Semester – II Examination, 2014
Elective – II : DESIGN OF RCC BRIDGES (Paper – X)

Day and Date : Thursday, 3-7-2014 Max. Marks : 70
Time : 10.00 a.m. to 2.00 p.m.

N. B. : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *suitable data, if necessary and mention it* ***clearly****.*

SECTION – I

1. Answer **any three** of the following : **(3×3=9)**
   A) What is the significance of impact factor ? How it is calculated ?
   B) Write a note on Piegaud's theory with its limitation.
   C) Enlist the various loads to be considered for the analysis of bridges.
   D) Enlist and discuss the various bridge codes used in the design of bridges.
   E) Draw the details of IRC-class AA tracked loading.

2. A RCC beam type bridge having deck slab of 200 mm thick, wearing coat of 85 mm thick, four longitudinal girders and five cross girders. Design the exterior longitudinal girder. Use following additional data : **13**
   a) Carriage way – 9 m
   b) Span of bridge – 20 m
   c) Live load – 1 RC class AA tracked
   d) Kerb – 600 mm wide, 400 mm deep
   e) Web thickness of long and cross girder = 300 mm
   f) Longitudinal girder spacing = 3 m
   g) Use – M-30 concrete, Fe – 415 steel.

3. Design RCC solid deck slab with foll. data : **13**
   a) Clear span = 7.5 m
   b) Carriage way width = 7 m
   c) Wearing coat thickness = 100 mm

P.T.O.

d) IRC live load = IRC class A (two lane)

e) Width of support = 450 mm

f) Use M – 25, Fe – 415.

SECTION – II

4. Answer **any three** of the following : **(3×3=9)**

A) Write a note on "Reinforced earth abutment".

B) What is expansion joint ? Where they are provided ?

C) Write the IRC requirements for elastomeric bearing material.

D) Explain the deck construction by cantilever method.

E) Write a note on Inspection of Bridges.

5. Verify the adequacy of dimensions for pier as shown in Fig. 5.1 : **13**

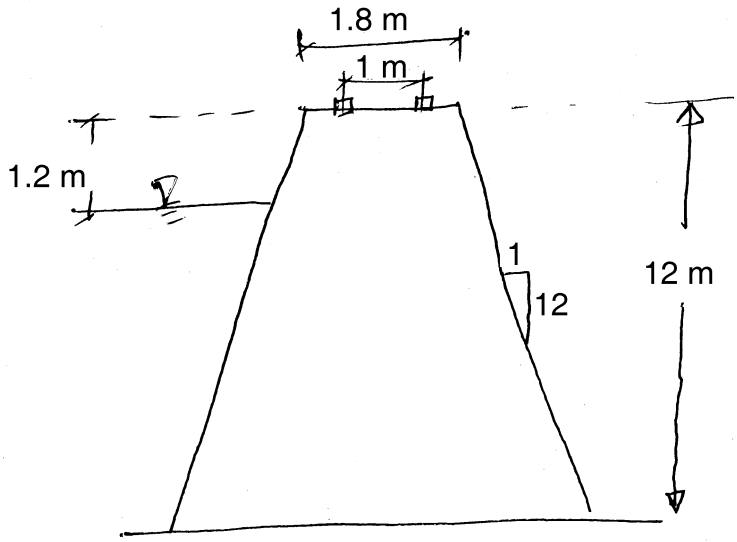


Fig. 5.1

6. A) Design a elastomeric unreinforced bearing pad for following data : **8**

1) Vertical load (sustained) = 150 kN

2) Vertical load (Dynamic) = 70 kN

3) Horizontal force = 75 kN

4) Modulus of rigidity of elastomer = 1 N/mm^2

5) Coefficient of friction = 0.3.

B) Write a detail note on foundations for bridges. **5**

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SLR-UN – 100

Seat No.	

M.E. (Electronics and Telecommunication Engg.) (Semester – I) Examination, 2014
ADVANCED LIGHT WAVE COMMUNICATION (Paper – I)

Day and Date : Monday, 23-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** suitable data **if required**.*

SECTION – I

1. Attempt **any one** of the following questions : **(7×1=7)**
   a) With a neat diagram, explain light wave propagation along a optical fiber using ray theory.
   b) When the mean optical power launched into an 8 km length of fiber is 120 μW, themean optical power at the fiber output is 3 μW. Determine.
      i) the overall signal attenuation or loss in decibels through the fiber assuming there are no connectors or splices;
      ii) the signal attenuation per kilometer for the fiber;
      iii) the overall signal attenuation for a 10 km optical link using the same fiber with splices at 1 km intervals, each giving an attenuation of 1 dB;
      iv) the numerical input/output power ratio in (iii).

2. Attempt **any two** of the following questions : **(5×2=10)**
   a) Briefly outline the general requirements for a source in optical fiber communications.
   b) Outline the common LED structures for optical fiber communication discussing their relative merits and drawbacks.
   c) What is need of optical amplifier ? Explain the principle of operation of EDFA.

P.T.O.

3. Write a short note on **(any three)** : **(6×3=18)**
   a) Semiconductor injection laser.
   b) LED internal quantum efficiency and external quantum efficiency.
   c) Step index and graded index fiber.
   d) Types of optical amplifiers used in communication system.

SECTION – II

4. Attempt the following **(any two)** : **(6×2=12)**
   a) Discuss the use of active and passive components in an optical WDM network.
   b) Why noise consideration is important in a photo detector ? What are different factors creating noise in it ?
   c) With a suitable diagram explain working principle of WDM system. State its advantages.

5. Attempt the following **(any two)** : **(7×2=14)**
   a) Explain the design considerations for long haul, high bandwidth system.
   b) Discuss rise time budget of point to point optical link.
   c) State important characteristics of a Photo detector. With a neat structure explain the Avalanche Photo detector.

6. Write a note on **(any three)** : **(3×3=9)**
   a) PIN photo detector.
   b) Optical LAN.
   c) Hybrid and planar waveguide devices.
   d) Soliton system.

SLR-UN – 101

Seat No.	

M.E. (E and TC) (Semester – I) Examination, 2014
LINEAR ALGEBRA AND ERROR CONTROL TECHNIQUES (Paper – II)

Day and Date : Wednesday, 25-6-2014 Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

Instructions : *i)* ***All*** *questions are* ***compulsory****.*
ii) Assume suitable data, ***if necessary****.*
iii) ***Use separate*** *answer book for* ***each*** *Section.*

SECTION – I

1. Solve **any two** (**7.5** marks **each**) : **15**

   a) Define vector space. Explain general properties of vector space.

   b) Let R be the Field or real numbers. Which of the following are subspaces of $V_3(R)$

      i) $\{(x, 2y, 3z) : x, y, z \in R\}$

      ii) $\{(x, x, x) : x \in R\}$

   c) If a vector space V is the set of all real valued continuous functions over the field of real numbers R then show that the set W of solutions of the differential equation $2\frac{d^2y}{dx^2} - 9\frac{dy}{dx} + 2y = 0$ is a subspace of V.

2. Solve **any two** (**5** marks **each**) : **10**

   a) In $V_3(R)$, where R is the field of real numbers, examine each of the following sets of vectors for linear dependence :

      i) $\{(1, 2, 0), (0, 3, 1), (-1, 0, 1)$

      ii) $\{(-1, 2, 1), (3, 0, -1), (-5, 4, 3)$

   b) Show that the vectors $\alpha_1 = (1, 0, -1)$, $\alpha_2 = (1, 2, 1)$, $\alpha_3 = (0, -3, 2)$. Form a basis of R^3. Express each of the standard basis vectors as a linear combination of α_1, α_2, α_3.

   c) Show that the mapping $f : V_3(F) \rightarrow V_2(F)$ defined by $f(a_1, a_2, a_3) = (a_1, a_2)$ is a homomorphism of $V_3(F)$ onto $V_2(F)$.

P.T.O.

3. Solve **any two** (**5** marks **each**) : **10**

   a) Let V be the vector space $V_2(C)$, with the standard inner product. Let T be the linear operator defined by T(1, 0) = (1, –2), T(0, 1) = (i, –1). If α = (a, b), find $T^* \alpha$.

   b) If α, β are vectors in an inner product space V(F) and a, b $\in$ F then prove that $Re(\alpha, \beta) = \frac{1}{4}\| \alpha + \beta \|^2 - \frac{1}{4}\| \alpha - \beta \|^2$.

   c) If α, β are vectors in an inner product space V(F) then prove using triangle inequality $|| \alpha + \beta || \leq || \alpha || + || \beta ||$.

SECTION – II

4. Attempt **any two** : **15**

   a) Explain encoding and decoding in Reed-Muller codes.

   b) For (6, 3) systematic linear block code three parity check digits are p_4, p_5, p_6 given by

      $P_4 = m_1 \oplus m_2 \oplus m_3$

      $P_5 = m_1 \oplus m_2$

      $P_6 = m_1 \oplus m_3$

      i) What is generator matrix for this code ?

      ii) What is the code generated by this matrix ?

      iii) What will be error correcting capability ?

   c) Draw the state diagram, tree diagram and trellis diagram for the encoder having generator sequences 011, 110, 111.

5. Attempt **any two** : **10**

   a) Construct BCH code for double error correcting and triple error correcting capability. Give primitive polynomial is $X^4 + X + 1$ with GF (2^4).

b) For systematic (7, 4) cyclic code, find out generator and parity check matrix for given generator polynomial $g(x) = x^3 + x + 1$.

c) The parity check matrix for (7, 4) block code is given by

$$H = \begin{bmatrix} 1 & 0 & 1 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 & 1 \end{bmatrix}$$

The received codeword is 1001101. Find syndrome and transmitted codeword. Implement decoder.

6. Attempt **any two** : **10**

a) Generator sequences for a convolutional encoder are described by g1 = 110, g2 = 101, g3 = 111. Output of detector is 101 001 011 110 111... Using Viterbi algorithm, find the transmitted sequence.

b) Check whether given polynomial is primitive or not :

i) $1 + X + X^4$

ii) $1 + X + X^2 + X^3 + X^4$.

c) Design a feedback shift register encoder for an (8, 5) cyclic code with a generator $g(x) = 1 + X + X^2 + X^3$.

Use the encoder to find codeword for message 10101 in systematic form.

SLR-UN – 102

Seat No.	

M.E. (E and TC) (Sem. – I) Examination, 2014
ADVANCED NETWORK SYSTEM (Paper – III)

Day and Date : Friday, 27-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instruction *:* ***All*** *questions are* ***compulsory****.*

1. Attempt **any two** : **12**
   a) What is routing ? What are its different types ? Explain RIP in detail.
   b) Draw resource record format of DNS and explain each field in detail.
   c) What is TFTP ? Explain mechanism of connection establishment and termination in TFTP.

2. Attempt **any two** : **12**
   a) What is RARP ? With a neat schematic explain function of it. What are its drawbacks ?
   b) With respect to electronic mail explain following terms :
      i) User agent
      ii) Message access agent
   c) What are different types of commands used on control connection ? Explain each in brief with some example.

3. Attempt **any three** : **12**
   a) Write short notes on :
      i) Echo request reply
      ii) Source quench message.
   b) Draw and explain question record format.
   c) Comment on address and mailing list in electronic mail system.
   d) Three and four way hand shaking in TCP.

P.T.O.

4. Attempt **any two** : **12**

   a) What is firewall ? What are its types ? Explain packet filtering firewall.

   b) Draw and explain IPV6 datagram formats.

   c) What is PNNI ATM network ? Explain.

5. Attempt **any two** : **12**

   a) Draw and explain physical layer architecture of Gigabit Ethernet.

   b) What is RSVP ? Draw and explain message format.

   c) What is label switching ? How it is implemented for MPLS ? Explain.

6. Write short notes on (**any two**) : **10**

   a) AAL layers

   b) B-ISDN reference model

   c) IEEE802.3z standard

   d) ATM signalling.

SLR- UN – 103

Seat No.	

M.E. (E&TC) (Semester – I) Examination, 2014
RANDOM PROCESSES (Paper – IV)

Day and Date : Monday, 30-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *suitable data* ***wherever*** *necessary.*
4) ***Normal*** *probability density function* ***table*** *allowed.*

1. Answer **any two** : **10**

a) The joint probability function of two continuous random variables is given by

$$f(x,y) = C(2x+3y) \quad 1<x<3 \quad 0<y<2$$
$$0 \qquad \text{otherwise}$$

Find :

i) The value of C

ii) P(X < 2, Y > 1) and

iii) P(X + Y > 3)

b) In case of Binomial distribution determine the mean and variance.

c) Patients arrive at the doctor's office according to a Poisson process with rate, $\lambda = \frac{1}{10}$ minute. The doctor will not see a patient until at least three patients are in the waiting room.

i) Find the expected waiting time until the first patients is admitted to see the doctor.

ii) What is the probability that nobody is admitted to see the doctor in the first hour ?

2. Answer **any two** : **10**

a) Consider an experiment of drawing randomly three balls from an urn containing two red, three white, and four blue balls. Let (X, Y) be a bivariate r.v. where X and Y denote, the number of red and white balls chosen respectively.

i) Find the joint pmf's of (X, Y)

ii) Find the marginal pmf's of X and Y

iii) Are X and Y independent ?

P.T.O.

b) Let A and B be events in a sample space S. Show that if A and B are independent, then (i) A and B^C, (ii) A^C and B^C, and (iii) A^C and B. Events are also independent.

c) The joint pdf of a continuous r.v. (X, Y) is given by

$$f_{XY}(x, y) = \begin{cases} kxy & 0 < x < 1, 0 < y < 1 \\ 0 & \text{otherwise} \end{cases}$$

where k is a constant

i) Find the value of k.

ii) Are X and Y independent ?

iii) Find P(X + Y < 1).

3. Answer **any three** : **15**

a) If 'c' is any constant then prove that

i) Var (cX) = c^2Var (X)

ii) E(cX) = cE(X)

b) The two random variables X and Y have joint pdf given by

$$f_{XY}(x, y) = \begin{cases} Ax^2(1-y) & 0 \le x \le 1, \quad 0 \le y \le 1 \\ 0 & \text{elsewhere} \end{cases}$$

i) Find the value of A

ii) Find the correlation between the two random variables.

c) Prove the Central limit theorem.

d) A laboratory blood test is 95 percent effective in detecting a certain disease when it is, in fact, present. However, the test also yields a "false positive" result for 1 percent of the healthy persons tested. (That is, if a healthy person is tested, then, with probability 0.01, the test result will imply he has the disease). If 0.5 percent of the population actually has the disease, what is the probability a person has the disease given that his test result is positive ?

4. Answer **any three** : **15**

a) Explain the term transition probability matrix in case of Markov chains with the help of suitable example.

b) State properties of Power Spectral Density.

c) Define auto correlation function of a random process. Explain the properties of autocorrelation function.

d) Define cross-spectral density between two random process.

5. Answer **any two** : **10**

a) Consider a random process X(t) defined by

$X(t) = U \cos \omega t + V \sin \omega t \qquad -\infty < t < \infty$

Where ω is constant and U and V are r.v.'s.

i) Show that the condition E(U) = E(V) = 0 is necessary for X(t) to be stationary.

ii) Show that X(t) is WSS if and only if U and V are uncorrelated with equal variance; that is, E(UV) = 0; $E(U^2) = E(V^2) = \sigma^2$.

b) Let X_n be the weather condition on n^{th} day at Mumbai. Suppose three states are 1 = Pleasant, 2 = Bad, 3 = Fair. Suppose by guess work the transition probability matrix as given below

$$\begin{bmatrix} 0.5 & 0.4 & 0.1 \\ 0.4 & 0.5 & 0.1 \\ 0.3 & 0.5 & 0.2 \end{bmatrix}$$

Suppose today is Monday and it is 'bad', what is the probability that Tuesday is 'fair' and Wednesday is 'pleasant'.

c) For the M/M/1 queue, compute

i) E(N) i.e. expected number of arrivals

ii) P_0 i.e. probability that no customers arrives.

6. Answer **any two** : **10**

a) Customers arrive at the express checkout lane in a supermarket in a Poisson process with a rate of 15 per hour. The time to check out a customer is an exponential r.v with mean of 2 minutes.

i) Find the average number of customers present.

ii) What is the expected idle delay time experienced by a customer ?

iii) What is the expected time for a customer to clear a system ?

b) A random process X(t) defined by
$X(t) = A \cos(\omega_0 t + \theta)$

Where ω_0 and A is constant and θ is a r.v. uniformly distributed over $(0, 2\pi)$. Show that the process is ergodic in mean and also in correlation.

c) Two gamblers play the following game. A fair coin is flipped; if the outcome is heads, player A pays player B \$1, and if the outcome is tails player B pays player A \$1. The game is continued until one of the players goes broke. Suppose that initially player A has \$1 and player B has \$2, so a total of \$3 is up for grabs. Let X_n denote the number of dollars held by player A after n trials.

i) Show that X_n is a Markov chain.

ii) Sketch the state transition diagram for X_n and give the one-step transition probability matrix P.

SLR-UN – 105

Seat No.	

M.E. (E & TC) (Sem. – I) Examination, 2014
Elective – I : DIGITAL DATA COMPRESSION (Paper – V)

Day and Date : Wednesday, 2-7-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

N.B. : *1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*

SECTION – I

1. Attempt **any one** : **8**
   a) Write a note on performance measures.
   b) Compare Huffman coding with Arithmetic coding.
2. Attempt **any one** : **9**
   a) In order to encode English lower case alphabet message [a a r d v a r k], show the updating procedure of adaptive Huffman coding.
   b) What are the different types of redundancies ? Explain inter pixel redundancy ?
3. Attempt **any two** : **18**
   a) Explain Dynamic Markov compression.
   b) Explain LZW algorithm with one example.
   c) Write a note on Shanon-Fano code.

SECTION – II

4. Attempt **any one** : **8**
   a) Explain forward adaptive quantization.
   b) What are advantages of vector quantization over scalar quantization ?
5. Attempt **any one** : **9**
   a) Explain adaptive DPCM.
   b) Explain Discrete Cosine transform.
6. Attempt **any two** : **18**
   a) Explain H.261 coding based on motion compensation with block schematic.
   b) With appropriate example, explain fractal image compression.
   c) What is motion compensation in video sequences ?

SLR-UN – 106

Seat No.	

M.E. (Electronics and Telecommunication Engg.) (Semester – II) Examination, 2014
RF AND MICROWAVE CIRCUIT DESIGN (Paper – VI)

Day and Date : Tuesday, 24-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** suitable data **if required**.*

SECTION – I

1. Solve **any two** questions : **(5×2=10)**
   a) State and explain Maxwell's equation in point form and integral form.
   b) Derive Wave equation for conducting Medium.
   c) Derive the equation of transmission lines with the help of uniformly distributed circuit theory in case of lossy and lossless line.

2. Solve **any one** question : **(7×1=7)**
   a) Explain the characteristics of the Smith chart. A transmission line has a characteristic impedance of $50\,\Omega$ and it is terminated in a load impedance of $(50 + j50)\,\Omega$. The operating wavelength $\lambda = 5$ cm. Calculate SWR. Plot the normalized load impedance and the SWR circle on the Smith Chart.
   b) Explain the characteristics of ideal substrate material and ideal conductor material used for the manufacturing of monolithic microwave integrated circuits.

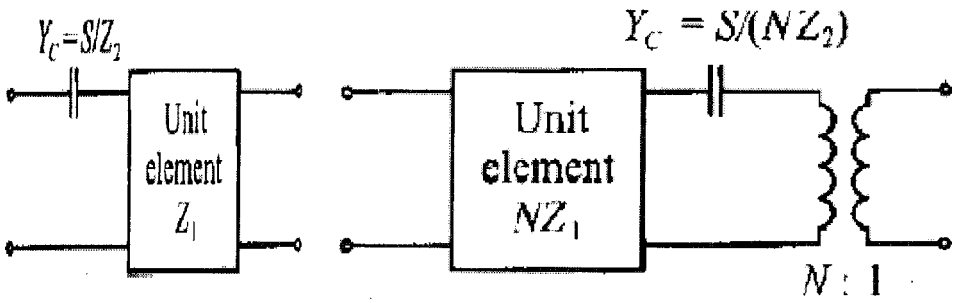
3. Attempt **any three** questions : **(6×3=18)**
   a) A transmission line has the following parameters. R = 2 Ω/m, G = 0.5 mmho/m f = 1GHz, C = 0.23 pF, L = 8nH/m. Calculate the Characteristic impedance and propagation constant.
   b) Define Standing wave ratio and derive the expression for SWR in terms of reflection coefficient.
   c) Explain the physical characteristic of HEMT.
   d) Explain diffusion and ion implantation technique for MMIC fabrication.

P.T.O.

SECTION – II

4. Solve **any two** questions : **(5×2=10)**
   a) State and define S parameters and explain their meanings.
   b) Find ABCD parameters of a RC LPF and calculate transfer function H(w), corresponding phase $\phi(w)$ and the group delay.
   c) Discuss the term insertion loss and loss factor.

5. Solve **any one** question : **(7×1=7)**
   a) Describe different configuration of discreet two component L-section impedance matching networks.
   b) Prove Kuroda's third identity stated below with the help of ABCD parameters. Calculate the value of N.



6. Attempt **any three** questions : **(6×3=18)**
   a) Write a note on Frequency transformation.
   b) Discuss Richard's Transformation and unit element matrix.
   c) Explain design of high frequency microwave osicllator.
   d) Explain Class A RF transistor amplifier design.

SLR-UN – 107

Seat No.	

M.E. (Electronics and Telecommunication Engg.) (Semester – II) Examination, 2014

WIRELESS COMMUNICATION (Paper – VII)

Day and Date : Thursday, 26-6-2014 Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Q.* ***1*** *is* ***compulsory****.*

2) Solve ***any four*** *questions from Q.* ***2*** *to Q.* ***6****.*

3) Figures to the ***right*** *indicate* ***full*** *marks.*

4) ***Assume*** *suitable data* ***if necessary****.*

1. Attempt the following :

   a) Explain the Ricean fading distribution. **5**

   b) Given that a Rayleigh-faded mobile radio signal has a level crossing rate of

   $N_r = \sqrt{2\pi}\, f_m \rho e^{-\rho^2}$, find the value ρ for which N_r is a maximum. **5**

   c) Compare 2G, 2.5G and 3G mobile telephone standards. **4**

2. a) Explain the ground reflection (Two Ray) model. **7**

   b) Given that the probability density function (pdf) of a distributed envelope is given by $P(r) = \frac{r}{\sigma^2} \exp\left(\frac{-r^2}{2\sigma^2}\right)$ where σ^2 is the variance.

   Show that the cumulative distribution function is given as

   $$P(r < R) = 1 - \exp\left(\frac{-R^2}{2\sigma^2}\right).$$ **7**

P.T.O.

3. a) Explain diffraction and scattering in mobile radio propagation. **7**

   b) A vehicle receives a 900 MHz transmission while travelling at a constant velocity for 10 second. The average fade duration for a signal level 10 dB below the rms level is 1 ms. How far does the vehicle travel during 10 second interval ? Assume that the local mean remains constant during travel. **7**

4. a) Explain the difference between wireless and fixed telephone network. **7**

   b) Determine the propagation delay in the packet transmission units if 19.2 Kbps channel data rate is used and each packet contains 256 bits. Assume line-of-sight radio path exists for a user 10 Km away from the transmitter. If the slotted ALOHA is to be used. What is the best choice for the number of bits/ packet for this system (assuming that the 10 Km is the maximum distance between the transmitter and receiver) ? **7**

5. a) Explain the signaling traffic in SS7. **7**

   b) Discuss the personal access communication system. **7**

6. a) Explain IS-54 and IS-136 digital cellular standards. **7**

   b) Explain the Space Division Multiple Access (SDMA) packet radio. **7**

SLR-UN – 108

Seat No.	

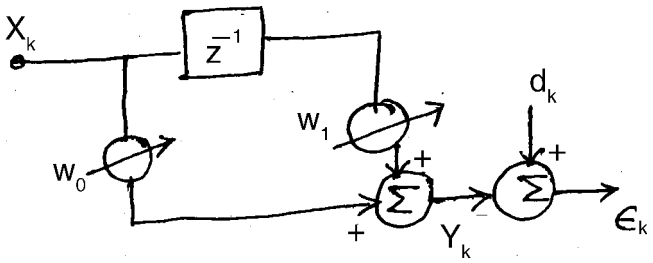
M.E. (Electronics and Telecommunication) (Semester – II) Examination, 2014
Paper – VIII : ADAPTIVE SIGNAL PROCESSING

Day and Date : Saturday, 28-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) **Assume** suitable data **if necessary**.*

1. Attempt **any two** : **15**

a) For given adaptive linear combiner find optimum weight values.



$$X_k = \sin \frac{2\pi k}{N}$$

$$d_k = 2\cos \frac{2\pi k}{N}$$

b) Compare gradient search algorithm by Newton's method and steepest descent method. Draw learning curves and comment on it.

c) Consider an autoregressive process u(n) of order two described by difference equation

u(n) = u(n – 1) –2u(n –2) + v(n)

v(n) is white noise with zero mean and variance 0.5

i) Write Yule-walker equation

ii) Find variance of u(n).

P.T.O.

2. Attempt **any two** : **10**

   a) Find the eigen values of input correlation matrix.

$$R = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 3 \\ 3 & 2 & 1 \end{bmatrix}.$$

   b) Find linear convolution of

   $x(n) = \{1, 2, 3, 4, 5\}$ and $h(n) = \{-1, 0, 1\}$.

   c) Define power spectral density and state properties of it.

3. Attempt **any two** : **10**

   a) Explain different stochastic models.

   b) State different characteristics of adaptive signal processing.

   c) Define general properties of adaptive system. Explain any one closed loop adaption system.

4. Attempt **any two** : **15**

   a) Explain fast block LMS algorithm. What are constraints of this algorithm ?

   b) Discuss convergence behaviour of RLS algorithm.

   c) Explain single weight adaptive noise canceller using RLS algorithm.

5. Attempt **any two** : **10**

   a) Explain IIR filters used for system identification using equation error method.

   b) Explain unconstrained frequency domain adaptive filters.

   c) Explain in brief polyspectra.

6. Attempt **any two** : **10**

   a) Find relation between :

      i) $\phi_{xx}(z)$ and $\phi_{xy}(z)$

      ii) $\phi_{xx}(z)$ and $\phi_{yy}(z)$

   b) Explain application of adaptive modelling used in adaptive signal processing.

   c) Explain square root adaptive filters.

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SLR-UN – 11

Seat No.	

M.E. (Mech.-Design Engg.) (Sem. – I) Examination, 2014
COMPUTATIONAL TECHNIQUES IN DESIGN ENGINEERING

Day and Date : Monday, 23-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any two** questions from **each** Section.*
*2) Figures to **right** indicate **full** marks.*
*3) **Use** of non-programmable calculator is **allowed**.*
*4) **Assume** suitable data **if necessary**.*

SECTION – I

1. A) A curve passes through the points (0, 18), (1, 10), (3, –18) and (6, 90). Find the slope of the curve at x = 2. **10**

1. B) Compute the value of $\int_{0.2}^{1.4} \left(\sin x - \log_e x + e^x\right) dx$ using Simpson's $^3/_8^{th}$ rule. **7**

2. A) Find the missing term in the following table : **7**

x :	0	1	2	3	4
y :	1	3	9	--	81

2. B) Solve by Jocobi's iteration method, 10x + y – z = 11.19, x + 10y + z = 28.08, –x + y + 10z = 35.61 correct to two decimal places. **10**

3. A) Predict the mean radiation dose at an altitude at 3000 feet by fitting an exponential curve to the given data : **10**

Altitude (x) :	50	450	780	1200	4400	4800	5300
Dose of radiation (y) :	28	30	32	36	51	58	69

Take exponential curve as $y = ab^x$.

3. B) The elevation above a datum line of seven points of road are given below : **8**

x :	0	300	600	900	1200	1500	1800
y :	135	149	157	183	201	205	193

Find the gradient of the road at the middle point.

P.T.O.

SECTION – II

4. A) Using Runge-Kutta method of order 4, find y for x = 0.1, 0.2, 0.3 given that $\frac{dy}{dx} = xy + y^2$, y(0) = 1. Continue the solution at x = 0.4 using Milne's method. **12**

4. B) Using finite difference method, find y(0.25), y(0.5) and y(0.75) satisfying the differential eq^n. $\frac{d^2y}{dx^2} + y = x$, subject to the boundary conditions y(0) = 0, y(1) = 2. **6**

5. A) Solve $U_{xx} + U_{yy} = 0$ over the square mesh of side 4 units ; satisfying the following boundary conditions : **12**

   i) $u(0, y) = 0$, for $0 \leq y \leq 4$

   ii) $u(4, y) = 12 + y$, for $0 \leq y \leq 4$

   iii) $u(x, 0) = 3x$, for $0 \leq x \leq 4$

   iv) $u(x, 4) = x^2$, for $0 \leq x \leq 4$

5. B) Find the dominant eigen values and the corresponding eigen vector of

$$A = \begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$$ by using power method. **5**

6. A) Explain types of mathematical models. **5**

6. B) If $\frac{dy}{dx} = 2e^x y$, y(0) = 2, find y(0.4) using Adam's predictor corrector formula by calculating y(0.1), y(0.2) and y(0.3) using Euler's modified formula. **12**

SLR-UN – 110

Seat No.	

M.E. (E and TC) (Sem. – II) Examination, 2014
CRYPTOGRAPHY AND NETWORK SECURITY (Elective – II) (Paper – IX)

Day and Date : Tuesday, 1-7-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instruction : ***All*** *questions are* ***compulsory****.*

1. Attempt **any two** : **10**
   a) What is a network security model ? Explain.
   b) Explain on Rotor Machine.
   c) Explain different security services and mechanisms.
2. Attempt **any two** : **10**
   a) Diagrammatically explain DES and encryption process.
   b) Explain blowfish algorithm.
   c) Explain linear and differential cryptanalysis.
3. Attempt **any two** : **15**
   a) Explain with block diagram public key cryptosystems.
   b) Discuss implementation of RC5 algorithm with suitable example.
   c) Explain in detail transposition cipher.
4. Attempt **any two** : **10**
   a) Draw schematic for public key encryption for confidentiality, authentication and signature.
   b) Explain Secure Hash Algorithm (SHA).
   c) What types of attacks are addressed by message authentication ?
5. Attempt **any two** : **10**
   a) Illustrate diagrammatically basic uses of MAC for message authentication and confidentiality.
   b) Draw and explain X.509 format and fields in certificate.
   c) Explain the figure overview of actions in Kerberos.
6. Attempt **any two** : **15**
   a) Explain the viruses and related threats.
   b) Draw and explain general format of PGP messages.
   c) Explain firewall design principles.

SLR-UN – 112

Seat No.	

M.E. (E and TC) (Part – II) (New CGPA) Examination, 2014
Mobile Computing (Elective – III)

Day and Date : Thursday, 3-7-2014 Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

N.B.: ***All*** *questions are* ***compulsory.***

SECTION – I

1. Solve **any three** : **(8×3=24)**

   a) Draw and explain call routing in GSM.

   b) Explain location management in cellular telephone networks and in PCN.

   c) Draw I-TCP connection set up and explain I-TCP protocol.

   d) What are the issues in designing a routing protocol in wireless networks ? Explain.

2. a) Compare CDMA with GSM. **3**

   b) Explain route establishment and route maintenance in on-demand distance vector routing protocol. **8**

   OR

   b) Explain 802.11 wireless LAN architecture. **8**

SECTION – II

3. Solve **any three** : **(8×3=24)**

   a) What are the characteristics that affects quality of service in wireless networks ? Explain.

   b) Explain types of attacks with the help of figures.

   c) Explain symbion OS architecture with figure.

   d) Expalin tab Remote Procedure Call (RPC) mechanism.

4. a) Write note on mobile middleware. **3**

   b) Explain key exchange algorithm. **8**

   OR

   b) Explain symbian application frame work. **8**

SLR-UN – 114

Seat No.	

M.E. (Electronics and Telecommunication Engg.) (Semester – II) Examination, 2014
COMMUNICATION SYSTEM DESIGN (Elective – III) (Paper – X)

Day and Date : Thursday, 3-7-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. 1 is **compulsory**.*
*2) Solve **any four** questions from Q. **2** to Q. **6**.*
*3) Figures to the **right** indicate **full** marks.*
*4) **Assume** suitable data **if necessary**.*

1. a) Derive an expression for Friss' equation assuming the transmitting antenna to be isotropic. **5**

   b) Explain the generalized topology and the lumped parameter representation of a Low Noise Amplifier. **5**

   c) Derive an expression for the equivalent resistance of a switched capacitor filter. **4**

2. a) Write a note on Intermodulation Distortion due to non-linearity. **7**

   b) Derive an expression for the Noise Figure of a Wideband Core Amplifier. **7**

3. a) For a Narrowband Transformer Connected Low Noise Amplifier, prove that maximum power transfer takes place when the transformer turns ratio is 1. **7**

   b) Derive an expression for the output of the single balanced mixer. What is the drawback of the single balanced mixer ? **7**

4. a) Assume that a Gilbert Mixer operates under the following conditions : **7**

   $V_{GS} - V_T = 0.387$ V

   A_{RF} = A interference = 0.316 V

   = 0 dBm

   Evaluate the following for the Gilbert Mixer :

   i) third order harmonic distortion

   ii) third order intermodulation distortion

   iii) third order input intercept point.

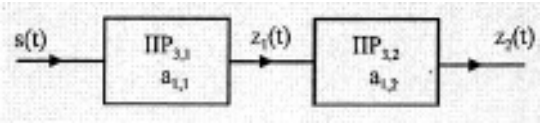
P.T.O.

b) Explain the digital and Hybrid method of baseband detection of QPSK signal. What are the advantages of the Hybrid method ? **7**

5. a) For a communication receiver, derive an expression for input third order intercept point. What is its significance ? **7**

b) Define the term Dynamic Range of an ADC. Derive an expression for Dynamic Range of a second order ADC. **7**

6. a) Two non-linear stages are cascaded as shown below. Derive an expression for the third order input intercept point of the cascaded system. **7**



b) For a Gilbert Mixer derive an expression for third order Intermodulation distortion. **7**

SLR-UN – 116

Seat No.	

M.E. Mechanical (CAD/CAM) (Semester – I) Examination, 2014
ADVANCED MACHINE DESIGN (Paper – I)

Day and Date : Monday, 23-6-2014 Total Marks :70

Time : 10.00 a.m. to 1.00 p.m.

Instructions** : 1) Question **1** and Question **5** are **compulsory.** Out of remaining solve **any two** questions **each** from Sec. **I** and Sec. **II.

*2) Figures to the **right** indicate **full** marks.*

*3) **Assume** necessary data, if **required.***

SECTION – I

1. For the given strain matrix, determine the stress matrix. ($E = 207 \times 10^6$ Kpa, $G = 80 \times 10^6$ Kpa. **13**

$$[\in_{ij}] = \begin{bmatrix} 0.001 & 0 & -0.002 \\ 0 & -0.003 & 0.003 \\ -0.002 & 0.003 & 0 \end{bmatrix}$$

2. a) Determine the principal stresses for following state of stresses **8**

$$\sigma_x = \sigma_y = \sigma_z = \tau_{xy} = \tau_{yx} = 0,\ \tau_{xz} = \tau_{zx} = -G\theta_y, \tau_{yz} = \tau_{zy} = G\theta_x .$$

b) What is true stress and engineering stress ? **3**

3. a) Plane OPQ is equally inclined to axes X, Y & Z. Point 'R' is on the above plane. Derive the expression for resultant stress vector T^n on plane OPQ. **7**

b) Explain principal stresses and stress invariants. **4**

4. What are the Lame's coefficients ? Compute the Lame's coefficients for the material with modulus of elasticity 14×10^6 Kpa and poisons ratio equal to 0.2. **11**

P.T.O.

SECTION – II

5. Determine the diameter of a bar subjected to torque 3400 NM and bending moment 1080 NM. Use maximum normal stress theory and maximum shear stress theory. Take E = 207 Mpa, Poisons ratio = 0.25 and FOS = 3 (Assume suitable data.) **13**

6. a) Explain Castigliano's theorem of elastic energy. **6**

   b) Explain the relationship between various elastic constants. **5**

7. a) Explain the significance of Fatigue strength in the design consideration. **6**

   b) What is theory of virtual work ? **5**

8. Machine component subjected to two dimensional stresses that is in x-direction = 40 to 100 N/mm^2 and in y-direction = 10 to 80 N/mm^2. The ultimate tensile strength is 660 N/mm^2 and endurance limit is 270 N/mm^2. Determine the factor of safety. **11**

SLR-UN – 117

Seat No.	

M.E. Mechanical (CAD/CAM) (Sem. – I) Examination, 2014
COMPUTER AIDED MANUFACTURING (Paper – II)

Day and Date : Wednesday, 25-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any five** questions.*
*2) Assume suitable data **wherever** necessary and state it **clearly**.*
*3) **Draw** appropriate sketches **wherever** required.*
*4) Figures to the **right** indicate **full** marks.*

1. a) Explain the tool holding and work holding features of CNC machine tools. **7**
   b) What is the effect of heat treatment on machining operation ? Explain in details. **7**

2. a) Describe the ISO nomenclature of tools. **7**
   b) Write a note on Abrasive Water Jet Machining. **7**

3. a) Describe various CMM types. **7**
   b) Write a note on Computer Assisted Part Programming. **7**

4. a) Explain DFM guidelines for machining. **7**
   b) Write a note on Geometric Dimensioning and Tolerancing. **7**

5. a) Describe important features of SIEMENS CNC controller. **7**
   b) Write short notes on : **7**
      i) LASER cutting.
      ii) Thermal aspects of metal cutting.

6. a) What are different coordinate systems used in NC/CNC machines ? Explain the rules and concepts of setting coordinate system. **7**
   b) Describe properties of cutting tool materials used for CNC machine tools. **7**

7. With appropriate example, explain, FAPT programming (FANUC), in details. **14**

SLR- UN – 119

Seat No.	

M.E. (Mech.) (CAD/CAM) (Sem. – I) Examination, 2014
DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY
(Paper – IV)

Day and Date : Monday, 30-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve **any three** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Draw** neat diagrams **wherever** necessary.*
*4) **Make** suitable assumptions **if required** and state them **clearly**.*

SECTION – I

1. a) Describe in brief motivation of research. Explain the various research approaches. **8**

   b) Distinguish between creativity and intelligence. **4**

2. a) What do you mean by quantification of cause-effect relations ? Explain the various sources of literature review. **7**

   b) Describe 'collective creativity'. **4**

3. a) Explain modeling with ordinary differential equations and graph. **6**

   b) Explain the various types of simulation. **5**

4. Write short notes **(any three)** : **(3×4=12)**

   a) Types of research

   b) Dependent and independent variables

   c) Critical analysis of already generated facts

   d) Selection of research task.

P.T.O.

SECTION – II

5. a) Define experimental design. Explain guidelines for designing experiments. **8**

   b) Explain single factor experimental design with example. **4**

6. a) Describe in brief analysis of variance and co-variance. Explain two way ANOVA. **7**

   b) Explain the method of steepest ascent. **4**

7. a) Give the significance of report writing and explain the layout of research report. **7**

   b) Explain Taguchi approach to parameter design. **4**

8. Write short notes **(any three)** : **(3×4=12)**

   a) Descriptive and inferential data

   b) Writing research paper for publication

   c) Use of computational tools and softwares for research work

   d) Normal distribution.

SLR-UN – 12

Seat No.	

M.E. (Mechanical – Design Engg.) (Sem. – I) Examination, 2014
MACHINE DYNAMICS (Paper – II)

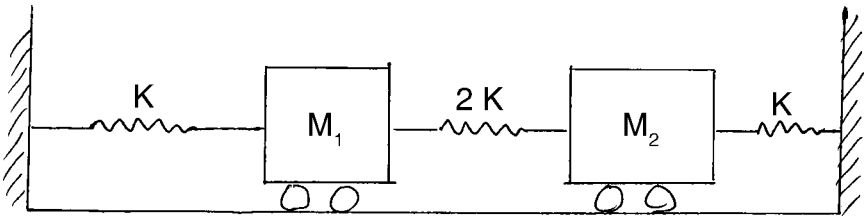
Day and Date : Wednesday, 25-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Que. No. **1** from Section **I** and Que. No. **5** from Section **II** are **compulsory**.*
*2) Solve **any two** questions from Section **I** and **any two** questions from Section **II**.*
*3) Figures to **right** indicate **full** marks.*
*4) **Assume** additional data if necessary and state it **clearly**.*

SECTION – I

1. Explain the principle and working of undamped dynamic vibration absorber. **11**

2. Set up differential equation of motion for the vibrating system as shown in figure. Find its natural frequency and mode shapes. M1 = M2. **12**



3. What do you mean by a continuous system ? Explain vibrations of strings and derive the differential equation for the same. **12**

4. Write short notes on : (**each 6** marks) **12**
   a) Holzer method
   b) Vibration dampers

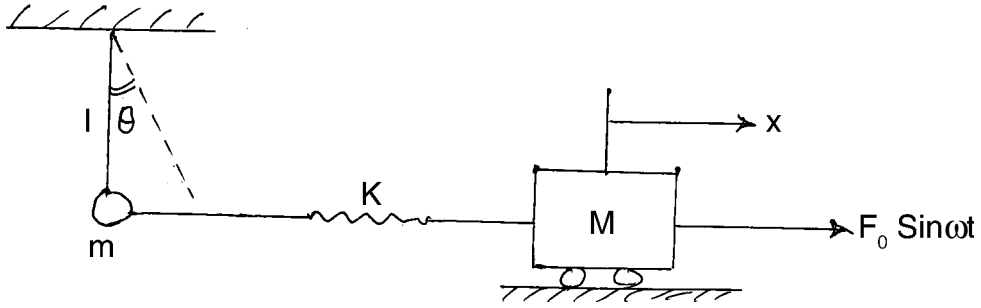
P.T.O.

SECTION – II

5. Explain method of analysis for random vibrations and related terms. **11**

6. State various methods used to analyse non linear vibrations. Explain the phase plane method. **12**

7. Find natural frequency of the coupled pendulum and rolling mass system as shown in fig. when amplitude is zero. **12**



8. Write short notes on : (**each 6** marks) **12**
   a) Rayleigh's method
   b) Torsional vibrations of rods.

SLR-UN – 120

Seat No.	

M.E. (Mech. – CAD/CAM) (Semester – I) Examination, 2014
ADVANCED MATERIALS AND PROCESSING (Elective – I) (Paper – V)

Day and Date : Wednesday, 2-7-2014 Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

Instruction *: Attend* ***any three*** *questions from* ***each*** *Section.*

SECTION – I

1. A) What is HSLA steel ? Explain the reason for high strength and forming properties possessed by HSLA steels. **6**

   B) With suitable examples classify the engineering materials as per their properties and applications. **5**

2. Write a short note on **any three** : **13**

   a) Heat treatment types and applications

   b) Composites

   c) Al-Si alloys

   d) Shape memory alloys

   e) P and N type semiconductors.

3. A) Explain the properties, processing and applications of Al_2O_3 and Diamond. **6**

   B) What are the basic heat treatment processes carried out on ferrous alloys (steels) ? Describe the processes in short and write their purposes. **5**

4. A) Explain in detail the creep properties of ceramics, concrete and polymers. **6**

   B) Explain in detail the materials selection for corrosion resistance. **5**

P.T.O.

SECTION – II

5. A) Explain in detail the materials selection for ship structures. **6**

   B) What are MEMs devices ? Explain the basic MEMs processing. **5**

6. A) What is Rapid Prototyping (RP) and what is the effect of RP on product development time ? **6**

   B) With a neat sketch explain the working principles of Selective Laser Sintering (SLS). What are its advantages and disadvantages ? **5**

7. A) Differentiate between PVD and CVD process. **6**

   B) Explain with neat sketch the process of Ultrasonic Machining (USM). Write its advantages and limitations. **5**

8. Write short notes on **any three** of the following : **13**

   a) Tribology

   b) FDM

   c) Stereolithography

   d) Electrochemical grinding

   e) Thermal metal spraying.

SLR-UN – 121

Seat No.	

M.E. (Mech.) (CAD-CAM) (Semester – II) Examination, 2014
MANUFACTURING SYSTEM DESIGN (Paper – VI)

Day and Date : Tuesday, 24-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

N.B. *: 1) Question **4** and Question **8** are **compulsory** questions.*
*2) Answer **three** questions from **each** Section.*
*3) Figures to the **right** indicate **full** marks.*
*4) **Assume** suitable data **if required**.*

SECTION – I

1. a) Discuss the characteristics and basic attributes of a system. How will you define a system on the basis of its attributes ? **5**

   b) Discuss the decision making criteria for system design and the basic approaches for it. **5**

2. a) What is a system design ? Explain the system design approaches for the large scale system. **5**

   b) Discuss the system for planning a new product. What are the desirable features of a product being designed ? **5**

3. a) What is a line balancing ? State the decisions involved and approaches used in line balancing. **5**

   b) Draw network diagram from following table and calculate critical path for the diagram. **5**

Successor event	9	8	8	7	7	6	6	5	4	4	3	2
Predecessor event	8	7	6	6	5	4	3	2	2	1	1	1
Duration	6	10	8	0	10	10	8	6	8	10	12	4

P.T.O.

4. Write short notes on (**any three**) : **15**
   a) Economies of scale and optimum production scale.
   b) Process planning, process and operation design.
   c) Modes of production – jobbing, intermittent, continuous.
   d) Optimization of single stage manufacturing.

SECTION – II

5. a) What is the need of a database management system in integrated manufacturing ? Explain the modules of a conceptual data base management system. **5**
   b) Discuss the shop floor data collection systems. **5**

6. a) Discuss the stages in the analysis of situation in the design approach for manufacturing system design. **5**
   b) Discuss briefly the types of simulation models. How is the simulation validity checked. **5**

7. a) What makes 'flexible manufacturing system' flexible ? Discuss components of flexible manufacturing system. **5**
   b) Explain Agile manufacturing system approach, applicability and effectiveness in manufacturing environment. **5**

8. Write notes on (**any three**) : **15**
   a) Just in time technique
   b) Simulation validity
   c) On line and off line data collection methods.
   d) Lean manufacturing.

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SLR-UN – 122

Seat No.	

M.E. Mechanical (CAD/CAM) (Sem. – II) Examination, 2014
PRODUCT LIFE CYCLE MANAGEMENT (Paper – VII)

Day and Date : Thursday, 26-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Questions No. **1** from Section – **I** is **compulsory** solve **any two** questions out of remaining.*
*2) Solve **any three** questions from Section – **II**.*
*3) Make suitable assumptions **where** necessary.*

SECTION – I

1. Assume a suitable product assembly consisting of at least six parts and elaborate in details the overall product data management process high lighting on different aspects including Bom, product structure, part families PDM, architecture, product Plat Form. **13**

2. A) Elaborate on how PLM aids in handling change management. **5**
   B) With the help of a block diagram discuss the comparison of PLM with CRM. **6**

3. A) Explain the different challenges and barriers faced during the PLM deployment. **6**
   B) Discuss the concept of Robost designs. What are the noise factors ? **5**

4. A) Enumerate on the elements of economic analysis done during the product development. **6**
   B) Explain the concept of product modeling with the types of product models. **5**

SECTION – II

5. A) Elaborate on the concept of design for environment. **6**
   B) Explain in detail the collaborative product development. **6**

6. A) Discuss the various reasons for implementing a product data management system. **6**
   B) Explain the concept of design for manufacturing with suitable example. **6**

7. A) Explain the House of quality chart with suitable product example having at least six customer voices and five technical requirements. **6**
   B) Explain the various principles used to minimize the product system complexity. **5**

8. A) Explain features of an Intelligent and Integrated manufacturing system. **6**
   B) What is PDMS ? What are the various reasons for PDM implementation ? **5**

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SLR-UN – 123

Seat No.	

M.E. (Mech.) (Semester – II) CAD/CAM Examination, 2014
INDUSTRIAL AUTOMATION AND ROBOTICS (Paper – VIII)

Day and Date : Saturday, 28-6-2014 Max Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Answer **any three** questions from **each** Section.*

*2) Answers to both the Sections are to be written in a **single** answer book.*

*3) Figures to the **right** indicate **full** marks.*

*4) **Assuming** missing data if any, suitable and state it **clearly**.*

*5) Draw neat **sketches/figures wherever** necessary.*

SECTION – I

1. a) Discuss the following approaches in applying automation; **6**

   1) Understand, simplify and automate

   2) Strategies for automation and process improvement

   3) Automation migration strategy.

   b) Compare the levels of automation in process type and discrete type manufacturing industries. Describe the discrete control system. **6**

2. a) With the help of neat sketches, explain various (minimum four) part feeding mechanisms for automated assembly. **6**

   b) Derive the expression for line efficiency of a two stage transfer line with storage buffers. **6**

3. a) What is a parts delivery system at the assembly work-head ? With the help of neat sketches, explain vibratory bowl feeders, selectors, orientors used in automated assembly. **5**

P.T.O.

b) A single station assembly machine performs five work elements to assemble four components to a base port. The elements are listed in the table below together with the fraction defect rate (q) and probability of a station Jam (m) for each of the component added (NA means not applicable). **6**

Element	Operation	Time	q	m	p
1	Add gear	4	0.02	1.0	
2	Add spacer	3	0.01	0.6	
3	Add gear	4	0.015	0.8	
4	Add gear and mesh	7	0.02	1.0	
5	Fasten	5	0	NA	0.012

Time to load base port is 3 sec. and time to unload the completed assembly is 4 sec, giving a total load/unload time of T_n = 7 sec. When a Jam occurs, if takes an average of 1.5 minutes to clear the Jam and restart the machine.

Determine :

a) Production rate of all product

b) Yield of good product

c) Production rate of good product

d) Uptime efficiency of the assembly m/c.

4. Write a short notes : **11**

a) Automated manufacturing system

b) Criteria for selection of Robots

c) Control in transfer lines.

SECTION – II

5. a) Discuss the dynamic properties of Robots : **6**
   i) Stability
   ii) Control resolution
   iii) Accuracy
   iv) Spatical resolution
   v) Repeatability
   vi) Compliance.

   b) Discuss the desirable feature of sensors used in robots, with the help of a block diagram explain the sensor system with a robotic system. **6**

6. a) Explain the types of motion and path controls for Robots. **6**

   b) What is robotic compliance ? Explain active and passive compliance. **6**

7. a) Draw neat sketches and explain the working principles of mechanical, electromagnetic and pneumatic gripper used in robots. **6**

   b) Explain motion interpolation and it's types in robots. **5**

8. Write short notes : **11**
   1) Tactile sensor
   2) Proximity sensors and their applications
   3) Robotic actuators.

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Seat No.	

M.E. (Mechanical Engineering-CAD/CAM) (Sem. – II) Examination, 2014
OPTIMIZATION TECHNIQUES (Paper – IX)

Day and Date : Tuesday, 1-7-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Draw neat sketches **wherever** necessary.*
*4) Make suitable assumptions **if required** and state them **clearly**.*

SECTION – I

1. Explain Hessian Matrix, Saddle Point, Lagrange Multipliers Method. **15**

2. Solve **any two** : **10**

   i) Explain Secant Method

   ii) Explain Fibonacci Method

   iii) Find the minimum of $f(x) = x^2 - 10x + 60$ in the interval (0.0, 10.00) to within 10% of the exact value using Interval-halving Method.

3. Solve **any one** : **10**

   i) Find minimum using Steepest Descent Method of

   $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ starting from the point $X_1 = \begin{Bmatrix} 0 \\ 0 \end{Bmatrix}$.

   ii) Explain Conjugate Gradient Method and Davidon-Fletcher-Powell Method.

P.T.O.

SECTION – II

4. i) Write detailed note on Genetic Algorithm. **8**

   ii) Write detailed note on Simulated Annealing. **7**

5. Write note on **any two** : **10**

   i) Interior Penalty Function Method.

   ii) Exterior Penalty Function Method.

   iii) Artificial Neural Network for optimisation.

6. Write note on **any two** : **10**

   i) Concept of Optimized Production Technology

   ii) Nine principles of optimised Production Technology.

   iii) Comparison of Theory of Constraints and Optimization Approaches.

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SLR-UN – 127

Seat No.	

M.E. (Mechanical) (Sem. – I) Examination, 2014
COMPUTATIONAL TECHNIQUE IN DESIGN ENGINEERING (Paper – I)

Day and Date : Monday, 23-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any two** questions from **each** Section.*
*2) Figures to **right** indicate **full** marks.*
*3) Use of non-programmable calculator is **allowed.***
*4) **Assume** suitable data if necessary.*

SECTION – I

1. A) The pressure and volume of a gas are related by the equation $PV^{\gamma} = k$, where γ and k are constants. Fit this equation to following set of observations. **10**

P :	0.5	1	1.5	2.0	2.5	3.0
V :	1.62	1	0.75	0.62	0.52	0.46

B) Find relative error if number X = 0.004997 is **4**
i) truncated to three decimal digits ii) rounded off to three decimal digits.

C) Find absolute and percentage error when the number 865250 is round off to four significant figures. **4**

2. A) Find the missing value from table. **10**

x :	1	2	4	5	6
y :	14	15	5	–	9

Use suitable formula.

B) The velocity V(km/min) of a moped which starts from rest, is given at fixed intervals of time t(min.) as **7**

t :	2	4	6	8	10	12	14	16	18	20
v:	10	18	25	29	32	20	11	5	2	0

Estimate approximately distance covered in 20 min.

P.T.O.

3. A) The elevation above a datum line of seven points of a road are given below : **10**

x :	0	300	600	900	1200	1500	1800
y :	135	149	157	183	201	205	193

Find the gradient of road at middle point.

B) Apply factorization method, to solve the equations. **7**

$3x + 2y + 7z = 4$, $2x + 3y + z = 5$, $3x + 4y + z = 7$.

SECTION – II

4. A) Solve the initial value problem $\frac{dy}{dx} = x - y^2$, $y(0) = 1$ to find $y(0.4)$ by Adam's method, starting solution required are to be obtained using Runge-Kutta method of order 4 with step size value $h = 0.1$. **12**

B) Explain with figure types of 1D and 2D elements. **5**

5. A) The deflection of a beam is governed by equation $\frac{d^4y}{dx^4} + 81y = \phi(x)$ where

$\phi(x)$ is given by table. **12**

(x) :	1/3	2/3	1
ϕ **(x)** :	81	162	243

and boundary condition $y(0) = y'(0) = y''(1) = y'''(1) = 0$. Evaluate the deflection at the pivotal points of the beam using three sub intervals.

B) Explain mathematical modelling through linear differential equations. **6**

6. A) Solve the equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ subject to the conditions **10**

$u(x, 0) = \sin \pi x$, $0 \leq x \leq 1$; $u(0, t) = u(1, t) = 0$ using

i) Schmidt method

ii) Crank Nicolson method.

B) Using Picard's method, find approximate values of y and z corresponding to

$x = 0.1$ given that $y(0) = 2$, $z(0) = 1$ and $\frac{dy}{dx} = x + z$, $\frac{dz}{dx} = x - y^2$. **7**

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Seat No.	

M.E. (Mech. – Mech. Engg.) (Sem. – I) Examination, 2014
INDUSTRIAL INSTRUMENTATION (Paper – II)

Day and Date : Wednesday, 25-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any three** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Draw** neat diagrams **wherever** necessary.*
*4) **Assume** additional suitable data **if necessary** and state it **clearly**.*

SECTION – I

1. a) Explain the various static characteristics affecting the performance of measuring instruments. **6**

   b) Explain the terms dynamic error and fidelity. **6**

2. a) What are the different functional elements in a generalized measuring system ? Explain with diagram. **6**

   b) What are the applications of the measuring systems in mechanical engineering ? **6**

3. a) Explain the working of LVDT with diagram. **5**

   b) Describe different types of transducers. Explain any one mechanical transducer. **6**

4. a) Write classification of strain gauges. Why electrical strain gauges are widely used ? **6**

   b) Explain the principle and working of any one mechanical recording element. Discuss the advantages and limitations of it. **5**

P.T.O.

SECTION – II

5. a) Explain with neat sketch disappearing filament type optical pyrometer. **6**

   b) Explain ionisation gauge user for very low pressure measurement. **5**

6. a) Explain seismic instrument with neat sketch. **6**

   b) Explain sound power level and intensity level. **5**

7. a) Explain frequency response characteristics by transient testing. **4**

   b) Explain piston ring wear monitoring with neat sketch. **4**

   c) Explain corrosion monitoring. **4**

8. Write a short note on **any four** of the following : **12**

   a) Ferrography.

   b) Emission spectrometer.

   c) Digital frequency analyser.

   d) Piezo-electric type pressure transducer.

   e) Thermistors.

   f) Condenser type microphone.

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Seat No.	

M.E. (Mechanical Engineering) (Semester – I) Examination, 2014
SOLID MECHANICS (Paper – III)

Day and Date : Friday, 27-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any three** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** necessary suitable data, **if required**.*

SECTION – I

1. a) Explain the state of stress at a point with usual notations. **3**

   b) Derive the equation of compatibility for plane stress problem in Cartesian co-ordinates. **8**

2. a) Investigate what problem is solved by a stress function :

   $$\phi = \frac{-F}{d^3} xy^2(3d - 2y)$$

   Applied to the region included by $0 \le y \le d$ and $0 \le x \le 1$. **11**

3. a) Derive the expression for the stresses induced in the thick cylinder. **8**

   b) A thick cylinder of inner diameter of 100 mm and thickness of 25 mm is subjected an internal pressure of $20 N/mm^2$ and external pressure of $5 N/mm^2$, determine the stress distribution across the thickness. **4**

4. Write a note on **any two** of the following : **12**

   i) Relation between E, μ and G with usual notations

   ii) Stresses in rotating disk

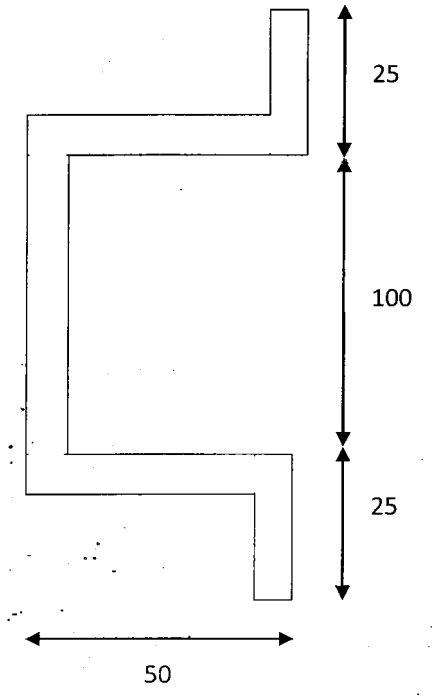
   iii) Soap film analogy.

P.T.O.

SECTION – II

5. a) What are the assumptions made in theory of contact stresses ? **3**

   b) Locate a shear centre for a hat section as shown in the figure, having uniform thickness of 5 mm throughout. All dimensions are in mm. **8**



6. a) Derive the expression for pressure and area of contact between two cylindrical rollers subjected to compressive load. **6**

   b) Explain the membrane analogy used in torsion problems. **6**

7. a) Derive the expression for torsion and angle of twist for elliptical cross section. **6**

   b) An elliptical cross section shaft is having semi major axis and semi minor axis of 40 mm and 20 mm respectively. The modulus of rigidity of shaft material is 80 GPa. If the shaft is subjected to a torque of 4KNm, determine the maximum shearing stress and the angle of twist per meter length. **5**

8. Write a note on **any two** of the following : **12**

   i) Shell of uniform strength

   ii) Torsion of hollow shaft and thin tubes

   iii) Bending of curved bar.

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SLR-UN – 13

Seat No.	

M.E. (Mechanical – Design Engineering) (Semester – I) Examination, 2014

SOLID MECHANICS (Paper – III)

Day and Date : Friday, 27-6-2014 Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any three** questions from **each** Section.*

*2) Figures to the **right** indicate **full** marks.*

*3) **Assume** necessary suitable data, if **required.***

SECTION – I

1. a) Explain the plane stress and plane strain with suitable practical examples. **4**

   b) Derive the equation of compatibility for plane stress problem in Cartesian co-ordinates. **7**

2. a) Prove that, the Airy's stress function ϕ satisfies the equilibrium equations as well the compatibility equations for plane stress problems. **6**

   b) Derive the equation of equilibrium for plane stress problem in polar co-ordinates. **6**

3. a) Derive the stresses in solid rotating disk of uniform thickness. **6**

   b) A hollow circular disk of uniform thickness has inner and outer radii of 50 mm and 200 mm respectively. It is rotated at an angular speed of 30 radians per second. Determine the maximum circumferential and radial stresses. Also sketch the stress variation along the radius. Assume Poisson's ratio = 0.3 and density of material as 7800 Kg/m^3. **6**

4. Write a note on **any two** of the following : **11**

   i) Torsion of rolled profiles

   ii) Shell of uniform strength

   iii) Bending of curved bar.

P.T.O.

SECTION – II

5. a) Derive the expression for torsion and angle of twist for elliptical cross section of prismatic bar. **6**

   b) An elliptical cross section shaft is having semi major axis and semi minor axis of 50 mm and 25 mm respectively. The modulus of rigidity of shaft material is 80 GPa. If the shaft is subjected to a torque of 5000 Nm, determine the maximum shearing stress and the angle of twist per meter length. **6**

6. a) Define the shear centre and explain its practical importance. **3**

   b) Locate the shear centre for the 'C' channel having uniform thickness of 5 mm. **8**

   Width of flanges = 50 mm

   Total height = 100

7. a) Derive the equation for cylindrical rollers for area of contact and pressure distribution over the contact surfaces. **6**

   b) Find the membrane stresses for cylindrical pressure vessel partially filled with liquid and having conical ends. **5**

8. a) Explain the membrane analogy used in solving torsion problems. **6**

   b) Derive the expression for the stresses in thick cylinder. **6**

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Seat No.	

M.E. (Mech. Engg.) (Sem. – I) Examination, 2014
DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY
(Paper – IV)

Day and Date : Monday, 30-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve **any three** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Draw** neat diagrams **wherever** necessary.*
*4) **Make** suitable assumptions **if required** and state them **clearly**.*

SECTION – I

1. a) Describe in brief motivation of research. Explain the various research approaches. **8**

   b) Distinguish between creativity and intelligence. **4**

2. a) What do you mean by quantification of cause-effect relations ? Explain the various sources of literature review. **7**

   b) Describe 'collective creativity'. **4**

3. a) Explain modeling with ordinary differential equations and graph. **6**

   b) Explain the various types of simulation. **5**

4. Write short notes **(any three)** : **(3×4=12)**

   a) Types of research

   b) Dependent and independent variables

   c) Critical analysis of already generated facts

   d) Selection of research task.

P.T.O.

SECTION – II

5. a) Define experimental design. Explain guidelines for designing experiments. **8**

   b) Explain single factor experimental design with example. **4**

6. a) Describe in brief analysis of variance and co-variance. Explain two way ANOVA. **7**

   b) Explain the method of steepest ascent. **4**

7. a) Give the significance of report writing and explain the layout of research report. **7**

   b) Explain Taguchi approach to parameter design. **4**

8. Write short notes **(any three)** : **(3×4=12)**

   a) Descriptive and inferential data

   b) Writing research paper for publication

   c) Use of computational tools and softwares for research work

   d) Normal distribution.

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Seat No.	

M.E. Mechanical Engineering (Sem. – I) Examination, 2014
Elective – I : FINITE ELEMENT METHOD (Paper – V)

Day and Date : Wednesday, 2-7-2014 Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

N.B. *: 1) Solve **any three** questions from Section – **I** and Section – **II**.*

*2) Figures to the **right** indicates **full** marks.*

*3) **Assume** suitable data **if necessary**.*

*4) **Use** of non-programmable calculator is **allowed**.*

SECTION – I

1. a) Explain applications of FEM in detail. **6**

   b) Explain general steps of the FEM. **6**

2. a) Explain different types of elements used in FEM and how to select them for different applications. **6**

   b) Explain Lagrange's shape functions. **5**

3. a) Explain principle of minimization of weighted residual method. **6**

   b) Explain HRZ lumping scheme. **5**

4. Find the solution of the differential equation. **12**

$$\frac{d^2\phi}{dx^2} + \phi + x = 0 \quad 0 \le x \le 1$$

Subject to the boundary conditions $\phi(0) = \phi(1) = 0$ using the point collocation method. Use x = 0.25 and x = 0.5 as the collocation points.

P.T.O.

SECTION – II

5. Find the solution of the standard eigen value problem **12**

$$[H]\ \overline{Y} = \lambda \overline{Y} \text{ where } [H] = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -0.7071 \\ 0 & -0.7071 & 1.5 \end{bmatrix}$$

using the Jacobi method.

6. a) Explain transient response analysis. **6**

   b) Explain validation of FE solutions. **5**

7. a) Explain model validity and accuracy. **6**

   b) Explain element distortion. **5**

8. a) Role of different softwares used in FEM. **6**

   b) Explain shock spectrum analysis. **6**

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Seat No.	

M.E. (Mechanical Engineering) (Semester – II) Examination, 2014
DESIGN ENGINEERING (Paper – VI)

Day and Date : Tuesday, 24-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any three** questions from **each** Section.*
*2) Figures to the r**ight** indicate **full** marks.*
*3) **Assume** necessary suitable data, **if required**.*

SECTION – I

1. a) Explain CEP and CPM cam. **4**

   b) Plot the SVAJ diagram for 3-4-5 polynomial cam. **7**
   Dwell zero displacement for 90°
   Rise at 20 mm displacement for 90°
   Dwell at 20 mm displacement for 90°
   Fall at 20 mm displacement for 90°
   Angular velocity of cam = 2π rad/sec.

2. a) Explain methods of heat removal and decreasing thermal stress. **5**

   b) Explain in detail addition of thermal and working stresses. **7**

3. a) Explain design of variable drives. **4**

   b) What are the types of electric motors used as drives ? Discuss the important factors affecting the selection of electric motors. **7**

4. Write short note on **any three** of the following : **(4×3=12)**
   i) Fracture mechanics approach in design
   ii) Creep in materials
   iii) Form design
   iv) Polydyne cam.

P.T.O.

SECTION – II

5. a) Explain the plastic flow process. **4**

   b) Discuss the discontinuity stresses developed in cylindrical pressure vessels with hemispherical end covers. **7**

6. a) Explain hazard rate and MTTF. **5**

   b) With usual notations derive the expressions for Z(t), R(t), f(t), in reliability. **7**

7. a) Explain reliability of systems in series and parallel. **4**

   b) In the test involving continuous satisfactory performance of elastic instrument under excessive vibratory conditions following failure frequencies are observed. Find : i) MTTF ii) R(t) iii) Z(t) **7**

Time Interval	0 – 1	1 – 2	2 – 3	3 – 4	4 – 5	5 – 6	6 – 7	7 – 8
No. of Failures	3	16	22	42	11	9	4	3

8. Write short note on **any three** of the following : **(4×3=12)**

   i) Rayleigh distribution

   ii) Residual stresses

   iii) Cumulative damage in fatigue

   iv) Discontinuity stresses.

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Seat No.	

M.E. (Mechanical Engineering) (Semester – II) Examination, 2014
THEORY AND ANALYSIS OF COMPOSITE MATERIALS (Paper – VII)

Day and Date : Thursday, 26-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Note** : 1) Answer **any five full** questions.*
*2) **Draw** meaningful sketches **wherever** necessary in **pencil** only.*
*3) Figures to the **right** indicate **full** marks.*
*4) **Make** suitable assumptions, **if required** and state them **clearly**.*

1. a) What are the matrix and fiber factors that contribute to the mechanical performance of composites ? Explain. **7**

   b) Enumerate six primary material selection parameters that are used in evaluating the use of a particular composite material. **7**

2. a) Give the advantages and drawbacks of metal matrix composites over polymer matrix composites. **7**

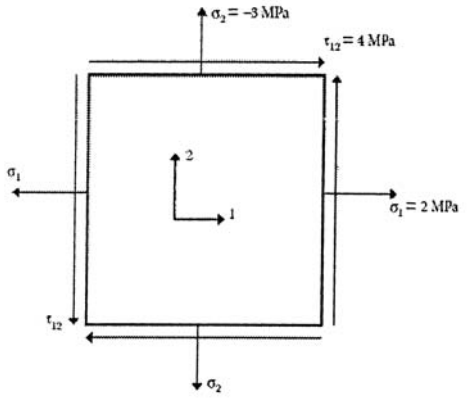
   b) Describe the following for Carbon-Carbon composites. **7**
   a) Properties b) Applications.

3. a) Write the number of independent elastic constants for three-dimensional anisotropic, monoclinic, orthotropic, transversely isotropic and isotropic materials. **7**

   b) For a graphite/epoxy unidirectional lamina, find the following :
   1) Compliance matrix
   2) Minor Poisson's ratio
   3) Reduced stiffness matrix
   4) Strains in the 1–2 coordinate system

P.T.O.

if the applied stresses (Figure) are



$\sigma_1 = 2MPa,\ \sigma_2 = -3MPa, \tau_{12} = 4MPa$

Engineering elastic constants of the unidirectional graphite/epoxy lamina are

E_1 = 181 GPa, E_2 = 10.3 GPa, v_{12} = 0.28, G_{12} = 7.17 GPa. **7**

4. a) Evaluate the Four Elastic Moduli of a unidirectional lamina by strength of materials approach
   - Longitudinal Young's modulus, E1
   - Transverse Young's modulus, E2
   - Major Poisson's ratio, v12
   - In-plane shear modulus, G12. **7**

   b) Find the maximum value of S > 0 if a stress of $\sigma_x = 2S$, $\sigma_y = -3S$ and $\tau_{xy} = 4S$ is applied to the 60° lamina of graphite/epoxy. Use maximum stress failure theory and the properties of a unidirectional graphite/epoxy lamina are

   E_1 = 181 GPa, E_2 = 10.3 GPa, v_{12} = 0.28, G_{12} = 7.17 GPa

   $\left(\sigma_1^T\right)_{u/t}$ = 1500 MPa, $\left(\sigma_1^C\right)_{u/t}$ = 1500 MPa, $\left(\sigma_2^T\right)_{u/t}$ = 40 MPa,

   $\left(\sigma_2^C\right)_{u/t}$ = 246 MPa, $(\tau_{12})_{u/t}$ = 68 MPa **7**

5. Derive the extensional, coupling, and bending stiffness matrices for a laminate. **14**

6. a) Explain the restriction, assumptions and consequences in deriving the governing equations for vibration of laminated plates. **7**

   b) Derive the governing equilibrium buckling equation for laminated plates. **7**

7. a) Explain the fatigue damage behaviour of composite materials and metals. **7**

   b) Explain the effect of material properties on stresses at the edge of a circular hole in a orthotropic plate under principal stress applied : **7**

   - Along the fiber orientation
   - At an angle to the fiber orientation.

8. a) Explain in detail the Stiffeners design parameters. **7**

   b) Explain in detail the design analysis stages in structural design. **7**

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Seat No.	

M.E. (Mechanical Engg.) (Semester – II) Examination, 2014
MECHATRONICS SYSTEM DESIGN (Paper – VIII)

Day and Date : Saturday, 28-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Note** : 1) Answer **any five full** questions.*
*2) **Draw** meaningful sketches **wherever** necessary in **pencil** only.*
*3) Figures to **right** indicate **full** marks.*
*4) Make suitable assumptions, **if required** and state them clearly.*

1. a) Describe the basic elements of a closed loop control system with appropriate example. **7**

   b) Describe : **7**

      i) Optical encoders

      ii) Proximity switches.

2. a) Explain the factors to be considered while selecting a sensor for a particular application. **7**

   b) Write a note on Digital Signal Processing. **7**

3. a) Explain briefly hydraulic actuation systems. **7**

   b) What is PLC ? Explain the basic internal structure of a PLC. **7**

4. Write short notes on the following : **14**

      i) Mechatronic System Design steps

      ii) Internal relays in PLC

      iii) Modes of control.

5. a) With suitable example explain sequencing in PLC. **7**

   b) How does a microcontroller differ from a microprocessor ? Explain. **7**

P.T.O.

6. Explain, in details, any one diagnostic application of PLC. **14**

7. a) Explain the elements of data acquisition and control system. **7**

   b) Explain overframing. **7**

8. Write notes on the following : **14**

   i) Mechatronic monitoring system for a machine tool

   ii) Fuzzy logic applications in Mechantronics

   iii) Micro-sensors in Mechatronics.

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Seat No.	

M.E. – Mechanical Engineering (Semester – II) Examination, 2014
INDUSTRIAL PRODUCT DESIGN (Paper – IX)

Day and Date : Tuesday, 1-7-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: i) Attempt* ***any five*** *questions from the following.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) Support the answers by neat sketches ***wherever*** *necessary.*

1. a) How creativity can be used to innovate the products ? **7**
   b) Explain the design and development process of industrial products. **7**
2. a) Discuss the ergonomic aspect of design of automobiles. **7**
   b) Explain the process of setting specifications of a product. **7**
3. a) Discuss effect of color with reference to ergonomics of consumer products. **7**
   b) Explain interpretation of information in product design. **7**
4. a) Explain the aesthetic expressions of symmetry and balance. **7**
   b) Explain the psychology of seeing. **7**
5. a) Explain the concept of design for production. **7**
   b) Write a note on 'standardization'. **7**
6. a) Explain value analysis and cost reduction. **7**
   b) Discuss conceptual (conceptional) design. **7**
7. a) Write a note on influence of line and form. **7**
   b) Write a note on rhythm and radiance with reference to aesthetics of a product. **7**

SLR-UN – 137

Seat No.	

M.E. (Mechanical Engg.) (Semester – II) Examination, 2014
MATERIAL HANDLING EQUIPMENT DESIGN (Elective – II) (Paper – X)

Day and Date : Thursday, 3-7-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

N.B. *: 1) Answer **any three** questions from Section – **I** and **three** questions from Section – **II**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Make suitable assumptions **if** required and state them **clearly**.*
*4) Draw **neat** sketches, flow charts, block diagrams etc. **wherever** necessary.*

SECTION – I

1. a) Define material handling. Explain basic principles of design of material handling system. **7**

   b) Explain the objectives of material handling systems. **4**

2. Discuss the types, design considerations for various types of industrial trucks used in material handling. **12**

3. a) Discuss design procedure of wire rope and pulley. **6**

   b) Write a note on material handling and safety. **5**

4. Discuss, construction, working and below mentioned parameters for **12**

   a) Vibrating type conveyor

   b) Hydraulic type conveyor

   parameters to be covered – step, speed, power requirement, capacity, advantages and limitations.

P.T.O.

SECTION – II

5. Give detailed design step of belt conveyor. Assume suitable material, properties, Flow rate, horizontal distance and vertical height. **12**

   i) Design of belt for strength

   ii) Design of drive rollers

   iii) Design of support structure.

6. a) Discuss stability and structural analysis of cranes. **6**

   b) Discuss fault finding of material handling system. **5**

7. a) Discuss design procedure of wheels and rails. **6**

   b) Explain stepwise procedure for solving material handling problem. **5**

8. Write note on (**6** marks **each**) : **12**

   a) Brakes and ratchet stops

   b) Material handling cost reduction.

SLR- UN – 14

Seat No.	

M.E. (Mechanical) Design Engineering (Sem. – I) Examination, 2014
DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY (Paper – IV)

Day and Date : Monday, 30-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instruction *: Attempt* ***any five*** *questions.*

1. a) Define research. Explain research process with suitable example. **7**
   b) What is research proposal ? Explain the contents of research proposal. **7**

2. a) Explain literature review and its purpose. **7**
   b) What is research design ? Explain research design process. **7**

3. a) Explain the process of problem of problem solving with suitable example. **7**
   b) Explain principles of modelling. **7**

4. a) What is experiment ? What do you mean by factorial experiment, explain with an example ? **7**
   b) Explain the basic principles of experimentation. **7**

5. a) Explain the Taguchi method in detail. **7**
   b) Explain two factor factorial design technique. **7**

6. a) Briefly, describe the important parametric tests used in context of testing hypothesis. **7**
   b) Discuss the format of research report. **7**

7. Write short notes on **any two :** **14**
   a) Primary data and secondary data
   b) Simulation
   c) Processing results of experiment
   d) Delphi method.

SLR-UN – 140

Seat No.	

M.E. (Mech.-Manufacturing Process Engg.) (Sem. – I) Examination, 2014
ELECTRO PHYSICAL PROCESSES (Paper – II)

Day and Date : Wednesday, 25-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Note : *1) Answer **any five full** questions.*
*2) **Draw** meaningful sketches **wherever** necessary in **pencil** only.*
*3) Figures to **right** indicate **full** marks.*
*4) Make suitable assumptions, **if required** and state them **clearly**.*

1. a) Discuss the characteristic features of Modern Machining Processes that distinguish them from conventional machining processes. **7**

   b) Classify modern machining process on the basis of application to machine various engineering materials. **7**

2. a) Derive a theoretical model for MRR in AJM as suggested by Sheldon and Finnie. **10**

   b) Discuss why the MRR by AJM when applied to ductile materials is low. **4**

3. a) Explain the effects of the following process parameters on MRR in USM :
      i) Amplitude and frequency of vibration
      ii) Grain size
      iii) Concentration of slurry and
      iv) Applied static load. **9**

   b) Sketch and describe any two types of tool feed systems used in USM. **5**

4. a) With the help of a neat sketch explain the principle and working of an ECM process. **7**

   b) Explain Electro Chemical Discharge Grinding with its principle and application. **7**

P.T.O.

5. a) With the help of a neat sketch explain EDM process and its principle. **7**

   b) Discuss the process capabilities and limitations of LBM. **7**

6. a) Explain basic EDM circuits and explain relaxation pulse generation circuit. **9**

   b) What are the different functions, requirements and types of dielectric fluids used in EDM ? **5**

7. Write short notes on (**any three**) : **14**

   a) Process capabilities of EDM

   b) Application of LASER in micromachining

   c) Wire EDM

   d) Advantages and applications of EBM.

SLR-UN –141

Seat No.	

M.E. – Mechanical (Manufacturing Process) (Semester – I) Examination, 2014

COMPUTER AIDED MANUFACTURING (Paper – III)

Day and Date : Friday, 27-6-2014 Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any five** questions.*

*2) **Assume** suitable data **wherever** necessary and state it **clearly.***

*3) Draw appropriate sketches **wherever** required.*

*4) Figures to the **right** indicate **full** marks.*

1. a) Explain working of re-circulating ball screw and preloading of ball screw. **7**

   b) What is DNC ? What are the advantages of using DNC on the shop floor ? **7**

2. a) Define GT. Explain parts classification and coding for GT. **7**

   b) Explain different types of machine cells and layouts in GT. **7**

3. a) Explain different flexibilities in FMS. **7**

   b) Explain various elements of FMS. **7**

4. a) Discuss implementation issues in concurrent engineering. **7**

   b) With example, explain QFD. **7**

5. a) Explain retrieval CAPP system. **7**

   b) Explain MRP. **7**

6. a) Explain process optimization. **7**

   b) Explain the various data required for a product data management system. **7**

7. a) Discuss contact and non-contact inspection techniques used in process monitoring. **7**

   b) Write a note on similarity coefficient method. **7**

SLR-UN – 142

Seat No.	

M.E. Mech. (Manufacturing Process) Engg. (Sem. – I) Examination, 2014
RELIABILITY AND TERO TECHNOLOGY (Paper – IV)

Day and Date : Monday, 30-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

N.B. *: 1)* ***Assume*** *suitable data* ***wherever*** *necessary.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Attempt ***any five*** *questions.*

1. a) Explain total probability theorem. **7**
   b) Draw the failure rate curve for an industrial product and explain its shape. **7**

2. a) Explain reliability based design of mechanical component system. **7**
   b) What is meant by redundency ? Distinguish active, partially active and stand by. **7**

3. a) Discuss MTTF, MTBF and FMEA in brief. **7**
   b) Define reliability and discuss both tub curve. **7**

4. A logical gate diagram for FMEA study has been shown in fig. 1. The basic failure modes of A,B and C have failure rates 0.002, 0.003 and 0.000 per hour respectively. Find out the failure rate of T_0. Assume the mission time of 100 hrs. **14**

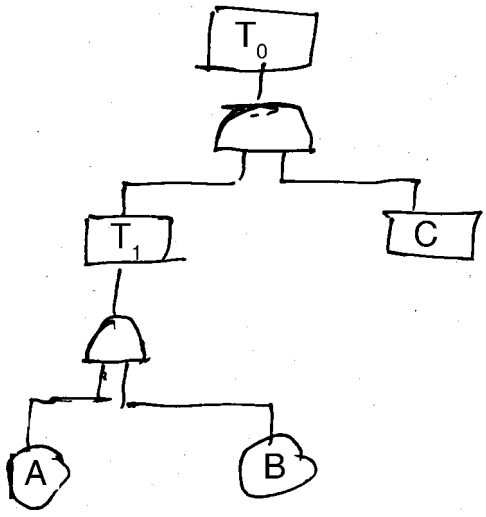

Fig. 1

5. The following short sample refer to an accelerated lie testing of a system

Failure No.	1	2	3	4	5	6
Operating hrs.	26	10	21.5	15.5	35	32

Plot the variation of reliability against time by :

i) mean

ii) median by ranking method. **14**

6. The network shown in fig. 2 indicates the reliabilities of the component. Find out the reliability of the system by star delta method. **14**

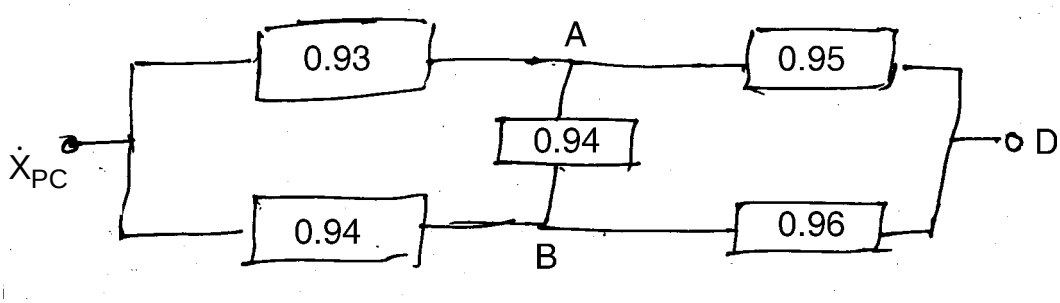

Fig. 2

7. Write the short notes on **any two** : **14**

a) Maintainability and availability

b) Reliability Centred Maintence (RCM)

c) Factor of safety and reliability.

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SLR-UN – 144

Seat No.	

M.E. Mechanical (Manufacturing Process) (Sem. – I) Examination, 2014
Elective – I : DESIGN FOR MANUFACTURING (Paper – V)

Day and Date : Wednesday, 2-7-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any five** questions.*
*2) **Assume** suitable data **wherever** necessary and state it **clearly**.*
*3) **Draw** appropriate sketches **wherever** required.*
*4) Figures to the **right** indicate **full** marks.*

1. Explain Technology Development Cycle, in details, by taking suitable example. **14**

2. With suitable examples discuss embodiment design phase. **14**

3. What is a material index ? With two examples, show how it helps in selection of material for a given application. **14**

4. Explain importance of cost estimation at design stage and describe elements of cost. **14**

5. What are general design considerations for casting processes with respect to
   a) Economical moulding
   b) Solidification
   c) Surface integrity
   d) Fettling and cleaning. **14**

6. Elaborate various design guidelines for extrusion processes. **14**

7. Describe DFM guidelines for plastic processing. **14**

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SLR-UN – 147

Seat No.	

M.E. Mechanical (Manufacturing Process Engg.) (Semester – II) Examination, 2014

ADVANCED MANUFACTURING TECHNIQUES – II (Paper – VI)

Day and Date : Tuesday, 24-6-2014 Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Answer **any five full** questions.*

*2) **Assume** suitable data **wherever** necessary and state it **clearly**.*

*3) Figures to the **right** indicate **full** marks.*

1. A) Explain the steps to be followed in investment casting process. Also state some applications. **7**

   B) In detail explain any four commonly observed defects in casting. Also suggest the remedies for the same. **7**

2. A) Explain in detail the hot pressing process related with powder metallurgy. **7**

   B) Explain the various super finishing processes with examples in general. **7**

3. A) Explain what do you mean by magnetic forming process. **7**

   B) Explain in detail the Full Mould casting process. **7**

4. A) Explain the expansion moulding technique of plastic manufacturing in detail. **7**

   B) What are the different types of binders that are used in plastics ? **7**

5. A) Explain in detail the method of fiber metal process related with powder metallurgy. **7**

   B) Describe the process of transfer moulding in detail. **7**

6. Write short notes on **(any 4)** : **14**
   1) Lapping
   2) Isostatic moulding
   3) Injection moulding
   4) Solid phase welding
   5) Deburring processes.

SLR-UN – 148

Seat No.	

M.E. Mechanical (Manufacturing Process) (Sem. – II) Examination, 2014
ROBOTICS AND ROBOT APPLICATIONS (Paper – VII)

Day and Date : Thursday, 26-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Note** : 1) Answer **any five full** questions.*
*2) Draw meaningful sketches wherever necessary in **pencil** only.*
*3) Figures to the **right** indicate **full** marks.*
*4) Make suitable assumptions, **if required** and state them **clearly**.*

1. a) Define a robot. Is robotics an automation ? Discuss the various types of joints used in robots. **7**

   b) Discuss the various generations of robots. Sketch and explain the typical configuration and degrees of freedom of wrist assembly. **7**

2. a) What are the basic components of a robotic system ? Explain the functions of each of the components with a neat sketch. **7**

   b) State the laws of robotics and discuss various mechanical design considerations of robots. **7**

3. a) What is robot vision ? Describe a vision sensor used to take the image of an object. **7**

   b) Discuss response, accuracy and sensitivity in relation to robot sensors. Explain the working of proximity and range sensors. **7**

4. a) Discuss the advantages and disadvantages of different types of actuators. Explain the working of hydraulic actuator system. **7**

   b) Discuss the functions of gripper with the help of a sketch. Explain the working of magnetic grippers used for robots. **7**

P.T.O.

5. a) What is homogenous transformation of coordinates ? Write homogenous transformation matrices for translation followed by rotation. **7**

   b) Discuss the various inputs to an inverse kinematics algorithm. Explain the functioning of an inverse kinematic algorithm. **7**

6. a) Discuss the relative merits and demerits of different textual robot languages. Explain the different program instructions. **7**

   b) Enumerate the non-manufacturing areas where robots are expected to be used. Discuss robot application for welding and machine loading. **7**

7. a) With the aid of a sketch describe the specifications of degrees of freedom required on a robot wrist to be used in painting applications. **7**

   b) In which type of production, robots are preferred for loading and unloading function ? Explain. **7**

SLR-UN – 149

Seat No.	

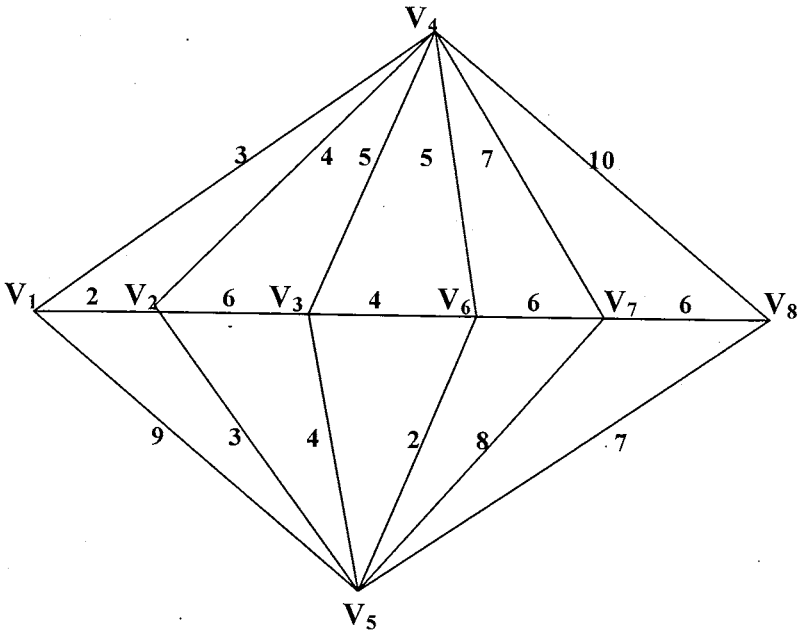
M.E. – Mechanical (Mfg. Process Engg.) (Sem. – II) Examination, 2014
MANUFACTURING PROCESS MODELLING (Paper – VIII)

Day and Date : Saturday, 28-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Note** : i) Answer **any five** full questions.*
*ii) Figures to the **right** indicate **full** marks.*
*iii) **Use** of nonprogrammable calculator is **allowed**.*
*iv) Make suitable assumptions **whenever** necessary and state it **clearly**.*

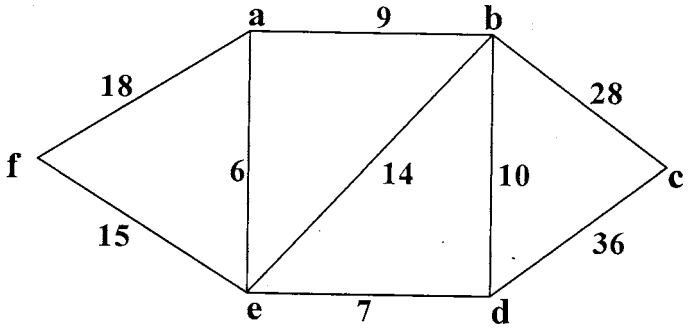
1. Give and explain the eight performance measures of any manufacturing system. **14**

2. a) Solve the Chinese problem for the graph shown below from the vertex V_1. **7**



P.T.O.

b) Use Dijkstra's algorithm on connected weighted graph shown below to find length of shortest paths from the vertex "f" to each of other vertices. **7**



3. Explain in detail the steps in the simulation study. **14**

4. a) Discuss Karl Pearson's coefficient of correlation. **6**

   b) From the given data, find :

      i) the two regression equations and

      ii) coefficient of correlation. **8**

Marks in Mathematics :	25	28	35	32	31	36	29
Marks in Science :	44	46	49	41	36	32	31

5. Explain in detail how the neural networks are used. **14**

6. a) Difference between discrete and continuous system. **6**

   b) From a sample of 200 pairs of observations, the following quantities were calculated.

   $\Sigma x = 11.34, \Sigma y = 20.72, \Sigma x^2 = 12.16, \Sigma y^2 = 84.96, \Sigma xy = 22.13$ from above data show how to complete the coefficients of equations. **8**

SLR-UN – 15

Seat No.	

M.E. (Mech.Design) (Sem.– I) Examination, 2014
SYNTHESIS AND ANALYSIS OF MECHANISMS AND MACHINES
(Elective – I) (Paper – V)

Day and Date : Wednesday, 2-7-2014 Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Answer **any three** questions from **each** Section.*

*2) Figures to the **right** indicate **full** marks.*

*3) **Assume** necessary data if **required.***

*4) **Use** of calculator is **permitted**.*

SECTION – I

1. a) Explain the type synthesis, number synthesis and dimensional synthesis. **4**

   b) Design a 4-bar linkage to generate the function $y = x^{1.8}$ for an interval in x from 1 to 5. The input link is to start from 315° and is to have a range of 90°. The output link is to start from 20° and is to have a range of 70°. Use three point Chebychev spacing. **8**

2. a) Discuss three position synthesis of four bar mechanism. **6**

   b) Explain crank and follower synthesis by three accuracy point. **6**

3. a) The function y = log x is to be generated in the interval $1 \leq x \leq 2$ by mean of 4-bar linkage oAABoB. The variable x and y are represented respectively by crank and follower angle ϕ and ψ through the relation, calculate link length ratio. **6**

   b) Explain in brief branch and order defects. **5**

4. Write notes on the followings : **11**

   a) Cups and cranodes

   b) Pole triangle.

P.T.O.

SECTION – II

5. a) Derive Euler-Savery equation for a four bar linkage. **6**

   b) To determine the link of a four bar mechanism that will one of it's position satisfy the following specifications. **6**

   $w_1 = 8$ rad/sec $\quad \alpha_1 = 0$

   $w_2 = 1$ rad/sec $\quad \alpha_2 = 20$ rad /sec^2

   $w_3 = -3$ rad/sec $\quad \alpha_3 = 0$

   Comment on the resulting mechanism.

6. a) Explain the symmetrical coupler curve. **6**

   b) Explain cubic of stationary curvature. **6**

7. a) Explain the role of computer technique in design and analysis of mechanism. **5**

   b) Explain Eulerian rotation transformation and Eulerian angle for Spatial mechanism. **6**

8. Write notes on the followings : **11**

   a) Bloch's synthesis

   b) Denavit-Harternberg parameters.

SLR-UN – 151

Seat No.	

M.E. Mechanical (Manufacturing Process) (Semester – II) Examination, 2014
TOTAL QUALITY CONTROL (Elective – II) (Paper – X)

Day and Date : Thursday, 3-7-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Note** : 1) Answer **any five full** questions.*
*2) Draw meaningful sketches **wherever** necessary in **pencil** only.*
*3) Figures to **right** indicate **full** marks.*
*4) Make suitable assumptions, **if required** and state them **clearly**.*

1. a) Discuss quality deployment in detail with example. **7**
   b) Enlist the series of standards and explain the registration procedure for quality standards. **7**

2. a) Discuss in brief the Philosophy of TQM by Ishikawa and Crossby Imai. **7**
   b) Explain quality cost in detail. **7**

3. a) Compare six-sigma with specification limits. **7**
   b) Discuss Advanced Quality Control Charts. **7**

4. a) Discuss QS and ISO in detail. **7**
   b) Discuss dimensions of quality and quality circle in detail. **7**

5. a) Compare acceptance sampling with 100% inspection. **7**
   b) Explain Taguchi's view on quality control. **7**

6. a) Enlist and explain guidelines to establish and cut down quality cost. **7**
   b) Write a note on Fishbone diagram by taking a suitable example. **7**

7. a) Define QFD and state its importance in product development process. **7**
   b) State and explain the core concept of TQC. **7**

SLR-UN – 157

Seat No.	

M.E. Mechanical (Thermal Engineering), (Sem. – I) Examination, 2014
Paper – III : ADVANCED HEAT AND MASS TRANSFER

Day and Date : Friday, 27-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Answer **any two** question from **each** Section*
*2) Assume suitable data, **if necessary**.*
*3) Use of **non programmable** calculator is allowed.*
*4) Figures to the **right** indicate full marks.*

SECTION – I

1. a) An Aluminium alloy conductor of cross-section 6.25 cm^2 and length 2.5 cm has three of its sides insulated and carries a current of 800 amp. The exposed surface is in contact with air at 30° C. Find the maximum temperature of the conductor at steady state. **6**

   b) What is critical radius of insulation and derive an equation for the critical radius for a cylindrical pipe. **6**

   c) Write a note on experimental method to determine thermal conductivity of solids. **6**

2. a) Explain lumped heat capacity method in detail. **8**

   b) Derive differential equation of heat conduction in Cartesian. **9**

3. Write notes on :

   a) Hydrodynamic and thermal boundary layers. **5**

   b) Effect of Prandtl number on their formation. **6**

   c) Physical significance of Reynold number and Grashof number. **6**

P.T.O.

SECTION – II

4. a) Explain the
   i) Kircoff's law
   ii) Wein's displacement law. **6**

   b) What is shape factor ? Explain in detail. Write various remarks of shape factor. **6**

   c) Explain the effect of radiation on temperature measurement. **6**

5. a) Explain the NTU-Effectiveness method of heat exchanger analysis. Write expression for effectiveness of counter flow heat exchanger. **8**

   b) Saturated steam at 120°C is condensing on the outer tube surface of a single pass heat exchanger. The overall heat transfer co-efficient on outer side is 1800 W/m^2K; Determine surface area of heat exchanger capable of heating 1000kg/hr water from 20°C to 90°C. Also calculate the rate of condensation of steam. Take latent heat of steam 2200 kJ/kg. **9**

6. Write short note on :

   a) Flow pattern in natural convection **4**

   b) Pool boiling curve **4**

   c) Analogy of heat transfer and mass transfer **4**

   d) Drop condensation promoters. **5**

SLR-UN – 158

Seat No.	

M.E. (Mechanical-Thermal Engineering) (Semester – I) Examination, 2014
DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY (Paper – IV)

Day and Date : Monday, 30-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Answer **any two** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** suitable data if **necessary**.*
*4) **Draw** neat sketches, flow diagram **whenever** required.*
*5) **Use** of non-programmable calculator is **allowed**.*

SECTION – I

1. a) Explain various types of research with suitable example. **9**

   b) What is the need of literature review ? Explain the method to carry out literature review. **9**

2. a) What is mathematical modelling ? Explain classification of mathematical modelling. **9**

   b) Find the regression by using following data : **8**

X	10	9	11	12	11	12	13	13	14	15
Y	44	40	42	46	48	52	54	58	56	60

3. a) Write note on testing linearity/non linearity of model. **6**

   b) Explain classification of simulation model. **6**

   c) Write note on modelling with ordinary differential equations. **5**

P.T.O.

SECTION – II

4. a) What points will you keep in mind while preparing a research report ? Explain in detail. **9**

   b) Explain guidelines for design of experiments with suitable example. **9**

5. a) Explain Taguchi method of parameter design. **9**

   b) Discuss creativity v/s intelligence. **8**

6. a) Write short note on types of report. **6**

   b) Write short note on creativity and madness. **6**

   c) Explain dependent/independent variables. **5**

SLR-UN – 159

Seat No.	

M.E. (Mechanical – Thermal Engineering) (Sem. – I) Examination, 2014
Paper – V : ADVANCED THERMODYNAMICS (Elective – I)

Day and Date : Wednesday, 2-7-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Assume suitable data, ***if necessary****.*
3) ***Use*** *of non programmable calculator is* ***allowed****.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. a) Define co-efficient of volumetric expansion β and isothermal compression k and prove that $cp - cv = \frac{T.v.\beta^2}{k}$. **6**

   b) Derive : $T.ds = Cv.dT + \frac{T\beta}{k} dv$. **6**

   c) Explain thermal death of universe. **5**

2. a) State third law of thermodynamics and discuss its importance. Also state the important corollaries of third law. **6**

   b) Generalized compressibility chart. **5**

   c) What is entropy and concept of lost work ? **6**

3. Write notes on :

   a) Explain in detail fluctuation hypothesis. **6**

   b) Vander Wall's equation. **6**

   c) Equation of state of real gasses. **6**

P.T.O.

SECTION – II

4. a) Percentage composition by weight of sample of fuel reads as :
   Carbon = 90%
   Hydrogen = 3.5%
   Oxygen = 3%
   Sulphur = 1%
   Remaining is incombustible,
   Determine :
   i) Stoichiometric air required for 1 kg of fuel.
   ii) Analysis of flue gasses by percentage weight. **9**

   b) Explain term heat of reaction and heating value of fuel. **8**

5. a) Explain Amgat's model and Dalton's model. **5**

   b) Describe statical thermodynamics. **6**

   c) What is exergy and exergetic efficiency ? Explain in detail. **6**

6. Write short note on :

   a) Elastic collision and mean free path. **6**

   b) Gravimetric and volumetric analysis and its applications. **6**

   c) Importance of quantum effect. **6**

SLR-UN – 16

Seat No.	

M.E. (Mech. – Design Engg.) (Semester – I) Examination, 2014
Elective – I : INDUSTRIAL INSTRUMENTATION (Paper – V)

Day and Date : Wednesday, 2-7-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any three** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Draw **neat** diagrams **wherever** necessary.*
*4) Assume additional suitable data **if necessary** and state **it clearly**.*

SECTION – I

1. a) Explain the generalized measurement system with various functional elements. **6**
   b) What is calibration ? Explain the general procedure of calibration. **6**

2. a) What is order of an instrument ? Derive the equation for the 3rd order measuring system and explain various terms in it. **8**
   b) What are the important parameter considered for the selection of an instrument for static condition ? **4**

3. a) Describe the principle of digital to analogue converter (DAC) in a closed loop arrangement. **6**
   b) Explain the working of hydraulic and pneumatic type load cells. **5**

4. a) Derive the relation for gauge factor of electrical resistance strain gauge. Also explain half bridge circuit. **8**
   b) What are the different mechanical sensing elements ? What are their limitations ? **3**

P.T.O.

SECTION – II

5. a) Explain total radiation pyrometer with neat sketch. **6**

   b) Explain Mcleod Gauge with neat sketch. **6**

6. a) Explain electret microphone with neat sketch. **6**

   b) Explain accelerometer with resistance strain gauge. **5**

7. a) Explain real time parallel analyser. **4**

   b) Explain permanent monitoring system. **4**

   c) Explain particle counters. **3**

8. Write a short note on **any four** of the following : **12**

   a) Importance of computers in instrumentation system

   b) Ferrographic analyser

   c) Sweeping filter analyser

   d) Sound level meter

   e) Knydsen gauge

   f) Manometers.

SLR-UN – 160

Seat No.	

M.E. (Mechanical) Thermal Engineering (Semester – II) Examination, 2014
DESIGN OF THERMAL SYSTEMS (Paper – VI)

Day and Date : Tuesday, 24-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

N.B. : *1) Question no. **1** is **compulsory** and solve **any two** questions from **each** Section.*
*2) **Use** of nonprogrammable calculator is **allowed**.*
*3) **Assume** suitable data **wherever** necessary.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

1. Crude oil is to be transported overland in Alaaska in such a way that the environment is not adversely affected. **18**

   a) Describe two workable methods of transporting this oil.

   b) Of the workable methods, a pipeline is the method chosen for further examination. The inside diameter of the pipe is 600 mm and the pipe will carry a crude oil flow rate of 44 kg/sec. the distance between pumping station is 32 km. to facilitate pumping a heater will be installed at each pumping station. The pipeline is to be buried into the permafrost whose temperature at design condition is – 4°C. The permafrost is not to be melted. Insulation may be used on external surface whose temperature should not exceed 0°C. Use following data :

   ho = 7.2 W/m^{2}K

   K for insulation = 0.036 W/mk

   hi = 125 W/m^{2}K

   neglect thermal resistance of pipe wall.

   The available thickness of insulation are 25, 50, 75, 100 mm

$$\frac{1}{UiAi} = \frac{1}{113Ai} + \frac{x}{K\left[\frac{Ai + Ao}{2}\right]} + \frac{1}{7.2Ao}$$

$$mCp(-dt) = U\pi D\left[t - (-4°C)\right] dL$$

P.T.O.

Cp = for oil = 2000 J/kgK

D = 0.6

The pressure drop in the 32 km section of pipe is a function of inlet and outlet temperature of the pipe. The maximum pressure of pipe that can withstand is 2350 kpa. Assume pressure drop for 32 km as 2200 kpa. Specify the following :

Insulation = _____ mm

Inlet oil temperature =

Outlet oil temperature =

Temperature of surface in contact with permafrost =

Review the design and list the decisions that preclude possible optimization later in the design.

2. a) Fit a straight line for the following values : **10**

T in °C	0	10	20	30	40	50	60	70	80	90	100
Hf in KJ/kg	– 0.04	41.9	83.86	125.66	167.45	209.26	251.09	292.97	334.92	376.94	419.06

b) What is a role of regression analysis in curve fitting. Define correlation coefficient. **7**

3. a) Dry saturated steam is entering at 50°C into a heat exchanger in which cold water is entering at a temperature of 30°C . The flow of water is to be chosen so that heat exchanger transfers 50 KW. The heat exchanger is 1.4 Sq.m. Determine the value of flow rate

$$\frac{1}{U} = \frac{0.0445}{w^{0.8}} + 0.185$$

W = flow rate of water. **10**

b) Explain any one method of simulation with one example. **7**

SECTION – II

4. a) A truck climbs a hill that consists of three section. The fuel consumption in each section is function of the time required for the distance in the section to be covered as shown in table. A total of 25 sec. is available for the climb of hill. Use dynamic programming to determine the time allocation to each section that results in minimum total fuel consumption **12**

Section	Time, sec	Fuel consumed, gm
A-B	7	40
	8	34
	9	29
	10	25
B-C	7	61
	8	52
	9	45
	10	38
C-D	7	49
	8	41
	9	35
	10	30

b) Explain the method of optimization by substitution of variable. **6**

5. a) Find the maximum of y, where

$Y = 3X_1 + 2X_2 + 4X_3$ subjected to

$3X_1 + 4X_2 + 5X_3 \leq 40$

$X_1 + X_2 + X_3 = 9$

$7X_1 + 4X_2 + 4X_3 \geq 42.$ **10**

b) Explain significance of dynamic programming in thermal system. **7**

6. a) Stream 1 enters a multi pass heat exchanger at a temperature of 82°C with a flow rate of 4.1 Kg/sec. The fluid has a specific heat of 4.19 KJ/KgK. Stream 2 enters at a temperature of 18°C with a flow rate of 4.5 Kg/sec, the fluid has a specific heat of 3.2 KJ/KgK. The effectiveness of heat exchanger is 0.46. What is the rate of heat transfer in heat exchanger? **10**

b) Consider a simple parallel flow heat exchanger and analyse its dynamic behavior and draw the block diagram for it. **7**

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SLR-UN – 161

Seat No.	

M.E. (Mechanical) Thermal Engg. (Sem. – II) Examination, 2014
COMPUTATIONAL TECHNIQUES IN THERMAL ENGINEERING
(Paper – VII)

Day and Date : Thursday, 26-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Assume suitable data ***if necessary****.*
3) ***Use*** *of non-programmable calculated is* ***allowed****.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. a) Solve the following equations using Gauss-Seidal method. **9**
$20x + y - 2z = 17$
$3x + 20y - z = -18$
$2x - 3y + 20z = 25$

   b) Find the real roots of $x \log_{10} x = 1.2$ upto five decimals using Newton's iterative method. **8**

2. a) What are the method to obtain solution of linear algebraic equation ? Compare direct and iterative methods. **9**

   b) Calculate the value of $\int_0^{\pi} \sin x dx$ by Simpson's one-third rule. Verify answer by direct integration. **8**

3. a) Find the Taylor's series of method, the values of y at $x = 0.1$ and $x = 0.2$ to five places of decimals from $dy/dx = x^2y - 1$, $y(00) = 1$. **8**

   b) Predict the mean radiation intensity at an altitude of 3000 meter by fitting curve $y = ab^x$ for the following data :

Altitude (x) in meter	50	450	780	1200	4400	4800	5300
Intensity of Radiation	28	30	32	36	51	58	69

Define coefficient of correlation and coefficient of determination related to curve fitting. **10**

P.T.O.

SECTION – II

4. a) Compare between forward difference table and backward difference table. **8**

   b) Evaluate : **9**

      a) $\Delta^2\left[(5x+12)/(x^2+5x+16)\right]$

      b) $\Delta^2(ab^x)$

      c) $\Delta^n(e^x)$.

5. a) Explain application of finite difference method in 1D heat induction problem. **8**

   b) Apply the finite difference method to a plate of 3 cm × 3 cm. Find temperature at a distance of 1 cm from corner in x direction and 1 cm from a corner in y direction. **9**

6. Write short notes on **any three** of the following : **18**

   a) Elements in FE analysis

   b) Meshing and shape function

   c) Rayleigh Ritz method

   d) Application of FEM.

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SLR-UN – 162

Seat No.	

M.E. (Mechanical – Thermal Engg.) (Semester – II) Examination, 2014
THEORY AND DESIGN OF I.C. ENGINES (Paper – VIII)

Day and Date : Saturday, 28-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) ***Assume*** *suitable data* ***if necessary****.*
3) ***Use*** *of non-programmable calculator is* ***allowed****.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. a) Explain construction and working of Wankel engine with figure. **9**

   b) The cylinder of a four stroke diesel engine has following specifications :
   Cylinder Bore = 150 mm
   Maximum gas pressure = 35 Mpa
   Cylinder Material = Gray cast iron FG 200 (S_{ut} = 200 N/mm^2)
   Factor of safety = 5
   Poisson's Ratio = 0.25
   Determine the thickness of cylinder wall. Also calculate the apparent and net circumferential and longitudinal stresses in the cylinder wall. **9**

2. a) Explain knocking in S.I. engine. Mention various effects of knocking. **8**

   b) The bore of cylinder of four stroke diesel engine is 150 mm. The maximum gas pressure inside the cylinder is limited to 3.5 Mpa. The cylinder head is made of gray cast iron FG 200 (S_{ut} = 200 N/mm^2) and factor of safety is 5. Determine thickness of the cylinder head.
   Studs are used to fix the cylinder head to the cylinder and obtain leak proof joint. They are made of steel FeE 250 (S_{yt} = 250 N/mm^2) and the factor of safety is 5. Calculate :
   i) Number of studs
   ii) Nominal diameter of studs
   iii) Pitch of studs. **9**

P.T.O.

3. a) Explain stages of combustion of fuel in CI engine. Explain variables affecting the delay period. **8**

   b) The cylinder of four stroke diesel engine has the following specifications :

   Brake power = 7.5 KW

   Speed = 1400 rpm

   Indicated mean effective pressure = 0.35 Mpa

   Mechanical efficiency = 80%

   Maximum gas pressure = 3.5 Mpa.

   The cylinder liner and head are made of gray cast iron FG 260 (S_{ut} = 260 N/mm^2 and μ = 0.25). The factor of safety for all parts is 6. The studs are made of plain carbon – steel 40C8 (S_{yt} = 380 N/mm^2)

   Calculate :

   i) Bore and length of cylinder liner

   ii) Thickness of cylinder liner

   iii) Thickness of cylinder head. **9**

SECTION – II

4. a) Explain need of cooling system in I.C. Engine. Also explain pressure cooling system with thermostatic valve. **8**

   b) The following data is given for a four stroke diesel engine :

   Cylinder bore = 250 mm

   Length of stroke = 300 mm

   Speed = 600 rpm

   Indicated mean effective pressure = 0.6 Mpa

   Mechanical efficiency = 80%

   Maximum gas pressure = 4 Mpa

   Fuel consumption = 0.25 kg per BP per hr.

   Higher calorific value = 44000 kJ/kg.

   Assume that 5% of the total heat developed in the cylinder is transmitted by piston. The piston is made of gray cast iron FG 200 (S_{ut} = 200 N/mm^2 and

K = 46.6 W/m/°C) and factor of safety is 5. The temperature difference between the center and edge of piston head is 220°C.

Calculate

i) The thickness of piston head by strength consideration.

ii) The thickness of piston head by thermal consideration

iii) Which criterion decide the thickness of piston head.

iv) The number and thickness of Piston ribs.

v) The radius of cup. **9**

5. a) Classify the lubrication system used for I.C. engine and explain with figure pressure lubrication system. **8**

b) Determine the dimension of cross-section of the connecting rod for a diesel engine with the following data :

Cylinder bore = 100 mm

Length of connecting rod = 350 mm

Maximum gas pressure = 4 Mpa

Factor of safety = 6. **9**

6. a) Discuss in detail recent advances in pollution control of I.C. Engine. **9**

b) Design the exhaust valve for a horizontal diesel engine using following data :

Cylinder bore = 150 mm

Length of stroke = 275 mm

Engine speed = 500 rpm

Maximum gas pressure = 3.5 Mpa

Seat angle = 45°

Calculate :

i) Diameter of the valve port

ii) Diameter of valve head

iii) Thickness of valve head

iv) Diameter of valve stem

v) Maximum lift of valve. **9**

Data for Solving Problem

* Roboring allowance for I.C. engine cylinders.

D	75	100	150	200	250	300	350	400	450	500
C	1.5	2.4	4.0	6.3	8.0	9.5	11.0	12.5	12.5	12.5

Note : D and C are in mm.

* Allowable Mean Velocities of gas (V_p)

Types of Engine	**Mean Velocity of gas (m/s)**	
	Inlet valve	**Exhaust valve**
Low speed engine	33 – 40	40 – 50
Medium speed engine	35 – 45	50 – 60
High speed engine	80 – 90	90 – 100

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Seat No.	

M.E. (Mech./Thermal Engineering) (Sem. – II) Examination, 2014
DESIGN OF REFRIGERATION AND AIR CONDITIONING SYSTEM
(Paper – IX)

Day and Date : Tuesday, 1-7-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Attempt* ***any two*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Assume suitable data ***if necessary****.*
4) ***Use*** *of steam tables, psychrometric chart, refrigeration property charts is* ***allowed****.*
5) ***Use*** *of non-programmable calculator is* ***allowed****.*

SECTION – I

1. a) A cascade refrigeration system is design to supply 10 TR at an evaporator temperature of –60°C and a condenser temperature of 25°C. The load at –60°C is absorbed by a unit using R-22 as the refrigerant and is rejected to a cascade condenser at –20°C. The cascade condenser is cooled by a unit using R-12 as the refrigerant and operating between –30°C evaporating temperature and 25°C condenser temperature. The refrigerant leaving the R-12 condenser is subcooled to 20°C but there is no subcooling of R-22 refrigerant. The gas leaving both the evaporators is dry and saturated and the compressions are isentropic. Neglecting losses, determine.
   1) Compression ratio of each unit
   2) Quantity of refrigerant circulated per minute for each unit
   3) C.O.P. for each unit
   4) C.O.P. of the whole system
   5) Theoretical power required to run the system. **12**

   b) Explain water cooled condensers. **6**

2. a) A moist air at DBT = 40°C, WBT = 22°C is handled in a air conditioning plant. Obtain all psychometric properties of that air. **8**

   b) Explain mass transfer by molecular diffusion and convection. **9**

P.T.O.

3. Write note on the following : **17**
   a) Various types of refrigeration system controls. **6**
   b) Thermostatic expansion valve. **5**
   c) Psychometric processes. **6**

SECTION – II

4. a) Explain practical aqua-ammonia vapour absorption system. **8**
   b) Explain room air distribution. **9**

5. a) Given for the air conditioning of a room.
   Indoor conditions : 26°C DBT and 19°C WBT
   Outside conditions : 35°C DBT and 27°C WBT
   Room latent heat gain = 3.9 kW
   Room sensible heat gain = 11.1 kW
   The conditioned air supplied to the room is 50 CMM and 25% fresh air and 75% recirculated air determine :
   i) The DBT and WBT of supply air
   ii) The DBT and WBT of mixed air before entering the cooling coil
   iii) The ADP and BPF of the coil
   iv) The refrigeration load on the cooling coil. **12**
   b) Explain enthalpy – Concentration diagram for binary mixture. **6**

6. a) Design of cooling and dehumidifying coils. **9**
   b) Explain passive cooling systems. **8**

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Seat No.	

M.E. (Mech./Thermal Engineering) (Sem. – II) Examination, 2014
Paper – X : POWER PLANT ENGINEERING (Elective – II)

Day and Date : Thursday, 3-7-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Attempt* ***any two*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Assume suitable data ***if necessary****.*
4) ***Use*** *of steam tables, psychometric, refrigeration property charts is* ***allowed****.*
5) ***Use*** *of non-programmable calculator is* ***allowed****.*

SECTION – I

1. a) Steam is the working fluid in an ideal Rankine cycle with superheat and reheat. Steam enters the first-stage turbine at 8.0 MPa, 480°C and expands to 0.7 MPa. It is then reheated to 440°C before entering the second-stage turbine, where it expands to the condenser pressure of 0.008 MPa. The net power output is 100 MW. Determine –
   a) Thermal efficiency of the cycle.
   b) Mass flow rate of steam in Kg/hr.
   c) Rate of heat transfer $Q\square_{out}$ from the condensing steam as it passes through the condenser in MW.

   Discuss the effects of reheat on the vapour power cycle. **10**

   b) Explain with neat sketch the working of spreader stocker. **4**

   c) Explain different types of nuclear fuels. **4**

2. a) What do you mean by rainfall ? Discuss any two types of instrument used to measure the rainfall. **6**

P.T.O.

b) A pelton wheel driven by two similar jets transmits 4000 kW to the shaft when running at 400 rpm. The head from reservoir level to the nozzle is 200 m and the efficiency of power transmission through the pipelines and nozzles is 90%. The jets are tangential to a 1.50 m diameter circle. The relative velocity decreases by 10% as the water traverses the buckets, which are so shaped that they would, if stationary, deflects the jet by 165°. Neglecting windage losses. Estimate –

i) Hydraulic efficiency of runner.

ii) Diameter of each jet. **6**

c) Explain working of Schmidt-Hartman boiler with neat sketch. **5**

3. a) Explain Unit pulverized system and Bin pulverized system with neat sketch. **6**

b) Explain mechanical dust collection system. Also explain working of Electrostatic precipitator. **6**

c) Explain Liquid-Metal fast breeder nuclear reactor with neat sketch. **5**

SECTION – II

4. a) Explain with neat sketch combined Gas turbine-Steam turbine power plant with its arrangement and its representation on T-S diagram. **6**

b) Explain working of Electro-mechanical regulator with neat sketch. **6**

c) Why it is necessary to operate hydro and steam plants in combination ? Write in detail. **5**

5. a) Plant capacity 120 MW (3 units of 40 MW each), capital cost (including interest payments, during the 6 years of construction period) Rs. 68×10^8 (this consists of Rs. 40×10^8 for the civil works, Rs. 25.5×10^8 for electrical work and Rs. 2.5×10^8 for 132 KV transmission system to evacuate power from plant), interest rate 16%, depreciation 2.5%, operation and maintenance 1.5% of capital cost per year, general reserve 0.5%, Plant load factor 0.6, auxiliary consumption 0.5%. Calculate generation cost of energy for hydro-electric plant. **6**

b) List out any six points where the flow is required to be measured in Power plant. **6**

c) Explain A.C. and D.C. excitation system. **6**

6. a) Write note on General tariff form. Also explain Hopkinson demand rate method. **6**

b) Explain any six types of load with their load curve. **6**

c) How the water is polluted by thermal power plant ? Discuss different ways to prevent water pollution from thermal power plant. **5**

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Seat No.	

M.E. (E and TC-Digital Electronics and Communication System) (Semester – I) Examination, 2014
COMMUNICATION NETWORKS (Paper – I)

Day and Date : Monday, 23-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instruction** : **All** questions are **compulsory**.*

SECTION – I

1. Attempt **any two** : **20**
   a) Explain in detail about IAB-Internet Architecture Board and RFCs-Request for comments.
   b) Explain along with message formats, any two error reporting methods in ICMP.
   c) Draw and explain domain mapping message format. Comment on 'caching-key to efficiency'.

2. Attempt **any three** : **15**
   a) IP address
   b) Multicast routing
   c) IPV6
   d) RARP.

SECTION – II

3. Attempt **any two** : **20**
   a) Explain in detail need and functions of ATM adaptation layer.
   b) What is label switching ? How it is implemented for MPLS ? Explain.
   c) Give overview and explain architecture of Gigabit Ethernet.

4. Attempt **any three** : **15**
   a) PNNI routing
   b) IP forwarding
   c) IEEE 802.32
   d) BISDN model.

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Seat No.	

M.E. (E&TC.) Digital Electronics and Communication System
(Semester – I) Examination, 2014
CMOS VLSI DESIGN (Paper – II)

Day and Date : Wednesday, 25-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any three** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*

SECTION – I

1. a) Explain cut off region, nonsaturation region and saturation region of NMOS transistor. **6**

   b) Explain second order effects for MOS transistor. **5**

2. a) Explain the procedure of obtaining VTC of static CMOS inverter. **6**

   b) Explain dynamic power dissipation. **5**

3. a) Design full adder using CMOS logic. **6**

   b) What is pass transistor logic and how universal gates can be implemented using this logic ? **6**

4. Write notes on **any three** of the following : **(4×3=12)**

   a) Cascading dynamic gates.

   b) Pseudo MOS inverter

   c) Technology scaling

   d) Ratioed CMOS logic.

P.T.O.

SECTION – II

5. a) Explain C^2MOS master slave positive edge triggered register. **6**

   b) Explain the bistability principle. **5**

6. a) Explain clock skew in detail. **6**

   b) Explain synchronous timing basics. **5**

7. a) Explain any one method of designing fast adders. **6**

   b) Explain designing of DRAMs. **6**

8. Write notes on **any three** of the following : **(4×3=12)**

   a) Arbiters

   b) PLL for clock synchronization

   c) Designing fast multipliers

   d) Timing classification methods.

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Seat No.	

M.E. (E & TC) (Digital Electronics and Communication System)
(Semester – I) Examination, 2014
MODERN DIGITAL SIGNAL PROCESSING (Paper – III)

Day and Date : Friday, 27-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *suitable data* ***if required****.*

SECTION – I

1. 1) Explain the design of optimum equiripple linear phase FIR filter. **6**

   2) Determine the coefficients {h(n)} of a linear phase FIR filter of length m =15 which has a symmetric unit sample response and a frequency response that satisfies that condition : **6**

$$H_r = \left(\frac{2\pi K}{15}\right) = 1 \ \{ K = 0, 1, 2, 3$$
$$= 0 \ \{ K = 4, 5, 6, 7$$

2. 1) Derive the equation for Schur algorithm for prediction coefficient. **6**

   2) Determine the reflection coefficient {Km} of the lattice filter corresponding to FIR filter described by the system function. **6**

$$H(z) = A_z(z) = 1 + 2z^{-1} + \frac{1}{3}z^{-2}.$$

3. 1) Derive the equation for ARMA model for power spectrum estimation. **6**

   2) Consider a FIR filter with coefficient vector $\{1, -2r\cos\theta, r^2\}$.

   Determine the values of the reflection coefficient for the corresponding FIR lattice filter. **5**

P.T.O.

SECTION – II

4. 1) Suppose the desired unit sample response is **6**

$$hd(n) = 2\left(\frac{1}{2}\right)^n u(n).$$

Determine the parameters of filters and H(z) using Paale approximation method.

2) Derive the relation between 'S' and 'Z' variable. Explain the effect of prewarping. **6**

5. 1) Explain in detail interpolation by a Factor I. Draw the spectra of x(n) and v(n). **6**

2) Explain polyphase structures in detail. **6**

6. 1) Describe Haar wavelet transform. Give two properties of Haar wavelet transform. **6**

2) Explain the concept of multiresolution analysis of wavelet system by decomposition. **5**

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Seat No.	

M.E. (E and TC) (Digital Electronics and Communication System) (Sem. – I) Examination, 2014
PROBABILITY AND RANDOM PROCESS (Paper – IV)

Day and Date : Monday, 30-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

N. B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) Assume suitable data ***if necessary****.*

SECTION – I

1. a) Define following :
   i) Joint probability
   ii) Conditional probability. **2**

   b) A box contains 4 bad and 6 good tubes. Two are drawn out from the box at a time. One of them is tested and found to be good. What is the probability that the other one is also good ? **3**

   c) A gambler flips a fair coin three times :
   i) Draw a sample space S for this experiment. A random variable X representing his winnings is defined as follows : He loses Rs. 1 if he gets no heads in three flips he wins Rs. 1, Rs. 2 and Rs. 3 if he obtains 1, 2 or 3 heads respectively. Show how elements of S map to values of X.
   ii) What are the probabilities of the various values of X ? **5**

   OR

   c) A balanced coin is tossed nine times. Find the probabilities of each of the following events :
   i) exactly 3 heads occured
   ii) at least 3 heads occured
   iii) at least 3 heads and at least 2 tails occured. **5**

2. a) A random variable has a CDF given by $F_X(x) = \left(1 - e^{-\lambda x}\right) u(x)$. Find its PDF. **2**

   b) Write PDF, CDF for following random variables along with the application :
   i) Uniform random variable
   ii) Gamma random variable
   iii) Chi square random variable
   iv) Gaussian random variable. **4**

P.T.O.

c) If a random variable X has the probability density function

$$f_x(x) = \begin{cases} 1/A(x+1) & \text{if } -1 < x < 1 \\ 0 & \text{elsewhere} \end{cases}$$

Find :
i) A
ii) mean
iii) variance. **3**

d) If X represents the outcome when a fair dice is tossed, find the moment generating function of X and hence find : E[X] and variance. **4**

3. a) Write note on : Entropy and source coding. **5**

b) Calculate the mean value, second moment and variance of following random variable Poisson : $Px(K) = \frac{\alpha^k}{k!} e^{-\alpha}$, K = 0, 1, 2... **3**

c) A random variable X has a characteristic function, $\phi_x|w|$. Write the characteristic function of Y = aX + b in terms of $\phi_x|w|$ and constants a and b. **4**

OR

c) Let X be a random variable with E[X] = 1 and Var[X] = 4. Find the following :
i) E[2X – 4]
ii) $E[X^2]^2$
iii) $E[(2X–4)^2]$. **4**

SECTION – II

4. a) Define Markov process and explain in brief any two examples of Markov processes. **6**

b) Consider a random process with sample function X(t) = a sin ($\omega_0 t + \theta$) where θ is uniformly distributed over [0, 2π]. Obtain its autocorrelation function. **3**

OR

b) Consider a random process Y(t) formed by modulating a carrier with another random process X(t). Let Y(t) = $X(t).\cos(\omega_0 t + \theta)$ and θ is uniformly distributed over $[0, 2\pi]$ and independent of X(t). Under what conditions Y(t) is WSS ! Prove your result. **3**

c) State the properties of autocorrelation function. **3**

5. a) Define following for pair of random variables :
   i) covariance
   ii) correlation coefficient.

   If two random variable X and Y are defined by relationship Y = 3X + 2. Find the correlation coefficient between X and Y. **6**

   b) Let X and Y be jointly Gaussian random variables with E[X] = 1, E[Y] = – 2, Var[X) = 4, Var(Y) = 9 and $\int X, Y = 1/3$. Find the PDF of Z = 2X – 3Y – 5. **6**

   OR

   b) Two random variables X and Y have $\mu_x = 2$, $\mu_y = -1$, $\sigma_x = 1$, $\sigma_y = 4$ and $\int X, Y = 1/4$. Let v = X + 2Y and V = 2X – Y. Find following :
   i) E[U] and E[V]
   ii) $E[U^2]$, $E[V^2]$, Var(U), Var(V)
   iii) E[UV], CoV(U, V) and $\int U, V$. **6**

6. a) Show that the random variables X and Y with joint PDF.

   $F_{xy}(x, y) = \begin{cases} 9e^{-3x} e^{-3y} & x, y \geq 0 \\ 0 & \text{otherwise} \end{cases}$ are independent of each other. **4**

   b) Two $1\,\Omega$ statistically independent and uniformly distributed resistance with 10% tolerance are connected in series in a circuit. Find the probability that the net resistance is less than or equal to $2.1\,\Omega$. **3**

   c) Write note on : Gaussian Random Variable in multiple dimension. **4**

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Seat No.	

M.E. (E&TC) (Digital Electronics and Communication System) (Sem. – I) Examination, 2014
Elective – I : OPTICAL COMMUNICATION AND NETWORKS (Paper – V)

Day and Date : Wednesday, 2-7-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

N. B. *: 1) Figures to* ***right*** *indicate* ***full*** *marks.*
2) ***Assume*** *suitable data* ***if necessary****.*

SECTION – I

1. Attempt following : **(7+6=13)**
   1) Discuss different SCM techniques in detail.
   2) The radiative and nonradiative recombination lifetimes of minority carriers in active region of a double hetero junction LED are 60 ns and 100 ns respectively. Determine the total carrier recombination lifetime and the power internally generated within the device when peak emission wavelength is 0.87 μm at a drive current of 40 mA.

2. Attempt **any two** : **(6×2=12)**
   1) Explain in detail erbium-doped fiber amplifier.
   2) Explain LED characteristics with reference to optical output power, output spectrum and modulation bandwidth.
   3) Explain in detail time division multiplexing.

3. Write a short note on **any two** : **(5×2=10)**
   1) LASER.
   2) Channel demultiplexing.
   3) Optical communication system.

P.T.O.

SECTION – II

4. Attempt following : **(7+6=13)**

   1) Pulse dispersion measurements are taken over a 1.2 km length of partially graded multimode fiber. The 3dB widths of optical pulses are 300 ps and corresponding 3dB widths of output pulses are found to be 12.6 ns. Assuming pulse shape and fiber responses are gaussian, calculate.

      1) 3dB pulse broadening for fiber in $nskm^{-1}$.

      2) Fiber bandwidth-length product.

   2) Explain different synchronous networks with its specification of hierarchy.

5. Attempt **any two** : **(6×2=12)**

   1) What are the different methods of fiber refractive index profile measurement ?

   2) Explain point to point links system considerations.

   3) Explain in detail SONET/SDH.

6. Write a short note on **any two** : **(5×2=10)**

   1) Fiber attenuation loss (total).

   2) Next generation networks.

   3) Time domain measurement.

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Seat No.	

M.E. (Electronics and Telecommunication Engg. : (Digital Electronics and Communication System) (Semester – II) Examination, 2014
RF AND MICROWAVE CIRCUIT DESIGN (Paper – VI)

Day and Date : Tuesday, 24-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *suitable data* ***if required****.*

SECTION – I

1. Solve **any two** questions : **(5×2=10)**

   a) Derive the expression for transmission coefficient and reflection coefficient of Transmission line.

   b) State and prove Poynting theorem.

   c) Explain planar transmission line.

2. Solve **any one** question : **(7×1=7)**

   a) Explain the construction of smith chart with resistance and reactance circles.

   b) Explain the different types of interconnecting networks.

3. Attempt **any three** questions. **(6×3=18)**

   a) Derive expressions for the input impedance of short circuit transmission line. Express the input impedance of short circuit transmission line as a function of frequency.

   b) ZL = $(75 + j50)\,\Omega$ connected to a transmission line with characteristic impedance of $50\,\Omega$. Find the corresponding reflection coefficients and transmission coefficients.

   c) Discuss in brief about RF filters configurations and design parameters.

   d) Write a note on linear and non-linear mixer operation.

P.T.O.

SECTION – II

4. Solve **any two** questions : **(5×2=10)**

   a) Derive expression for conversion between S parameters and Z parameters.

   b) Write short notes on constant VSWR circles in case of microwave amplifiers.

   c) Explain about design of high frequency microwave oscillator.

5. Solve **any one** question : **(7×1=7)**

   a) Write a note on oscillator design by using the small signal scattering matrix parameters.

   b) A GaAS MESFET with a gold gate fabricated to be 1.0 μm in length and 200μm in width and d=0.5μm in depth. The following electric characteristics are known $\varepsilon_r = 13.1$, $N_D = 10^{16}\ cm^{-3}$ and $\mu_n = 8500\ cm^2/V.S$. Find the cut-off frequency at room temperature.

6. Attempt **any three** questions : **(6×3=18)**

   a) Write short note on Input Output stability circles in Microwave Amplifier Design.

   b) Explain Class A RF transistor amplifier design.

   c) Explain the construction and characteristics of GaAs MESFET.

   d) Design a T-type matching network that transforms load impedance $Z_L = (60 - j30)\Omega$ into a $Z_{in} = (10 + j20)\Omega$ input impedance and that has maximum nodal quality factor of 3. Compute the values for the matching network components, assuming that the Matching is required at f=1GHz.

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Seat No.	

M.E. (E and TC) (Semester – II) Digital Electronics and Communication System Examination, 2014
Paper – VII : HIGH SPEED DIGITAL DESIGN

Day and Date : Thursday, 26-6-2014 Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*

*2) Figures to **right** indicate **full** marks.*

SECTION – I

1. a) What is transmission line ? What are the types of transmission line ? Explain Lossy transmission lines in brief. **6**

   b) Explain Geometry and Electrical properties of wires. **5**

2. a) Explain signaling over lumped transmission media. **6**

   b) Explain symbiotic bypass capacitors. **5**

3. a) Explain power supply network in detail. **6**

   b) Explain the different noise sources in digital system. **6**

4. Write short note on **any three** of the following : **(4×3=12)**

   a) Electrical models of wires.

   b) Local power regulation.

   c) Cross talk.

   d) On chip bypass capacitors.

P.T.O.

SECTION – II

5. a) Explain power supply noise reduction and filtering in detail. **6**

   b) Explain shielding concepts related to power supply. **5**

6. a) Explain EMI/RFI consideration related to power supply. **6**

   b) Explain grounding in high speed system. **5**

7. a) Explain distortion and noise in an ideal N bit ADC. **6**

   b) Explain power supply conditioning in power supply. **6**

8. Write notes on **any three** of the following : **(4×3=12)**

   a) Prototyping circuits

   b) Features of AD 9220 12 bit ADC

   c) Base band anti aliasing filters

   d) Harmonic sampling and band pass sampling.

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Seat No.	

M.E. (Electronics and Telecomm.) Engg. – Digital Electronics and Communication System (Sem. – II) Examination, 2014
ADVANCED EMBEDDED SYSTEMS (Paper – VIII)

Day and Date : Saturday, 28-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** suitable data **if necessary**.*

SECTION – I

1. 1) Give the advantages to be used application specific instruction set processor in Embedded systems. **6**
   2) Explain 32 bit ARM SOC architecture in detail. **6**

2. 1) Explain interfacing of SRAM with microcontroller in detail. **5**
   2) Explain the concept of memory management used in embedded system. **6**

3. 1) Explain with examples various data types used in ARM. **6**
   2) Explain the concept of interrupt latency. **6**

SECTION – II

4. 1) Explain rate monotonic algorithm (RM) used in case of task scheduling. **6**
   2) Explain the features of µcos II RTOS. **6**

5. 1) What are steps involved in estimation ? **5**
   2) Describe a typical target testing setup for embedded systems. What tools will you use to perform testing ? **6**

6. 1) Explain multiplexed, tristate and open drain buses in ARMg processor. **6**
   2) Explain functions of timers in ARMg processor architecture. **6**

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Seat No.	

M.E. (E & TC – Digital Electronics and Comm. System)
(Semester – II) Examination, 2014
WIRELESS AND MOBILE NETWORK (Paper – IX)

Day and Date : Tuesday, 1-7-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Assume suitable data **if necessary**.*

SECTION – I

1. Answer **any two** : **14**
   a) Explain Fresnel zones for different knife-edge diffraction scenarios.
   b) In the U.S. digital cellular system if fc = 900 MHz and the mobile velocity is 70 km/hr, calculate the received carrier frequency if the mobile
      i) Directly toward the transmitter (positive Doppler shaft).
      ii) Directly away from the transmitter.
      iii) In a direction perpendicular to the direction of the arrival of the transmitted signal.
   c) What is fading ? Explain the factors influencing small scale fading.

2. Answer **any two** : **12**
   a) Briefly explain about antenna and frequency diversity techniques.
   b) With suitable example explain Reed-Solomon encoding circuit.
   c) Explain convolution coding and its properties.

3. a) Compare the parameters of mobile station of endless phone and cellular phone. **5**
   b) Briefly explain 'Ray Leigh fading' in mobile communication. **4**

P.T.O.

SECTION – II

4. Answer **any two**: **14**

   a) Explain the basic structure of an IEEE 802.11 MAC frame.

   b) Explain components and interface of the WAP network configuration.

   c) Write a note on mobile-TCP. What are its advantages and disadvantages ?

5. Answer **any two** : **12**

   a) Explain physical layer of IEEE 802.11.

   b) Describe indirect-TCP. What are its advantages and disadvantages ?

   c) What are the advantages and limitations of wireless LAN ?

6. a) Write a note on dynamic host configuration protocol. **5**

   b) Compare infrastructure and ad-hoc networks. **4**

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Seat No.	

M.E. (E & TC) Digital Electronics and Communication Systems
(Semester – II) Examination, 2014
IMAGE AND VIDEO PROCESSING AND BROADCASTING (Elective – II)
(Paper – X)

Day and Date : Thursday, 3-7-2014 Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

***N.B.**: 1) **All** questions are **compulsory**.*

*2) Assume suitable data **if required**.*

SECTION – I

1. Write a short note on **any two** : **(5×2)**

   1) Quantization

   2) DWT

   3) Blind deconvolution

2. a) Show that for a stationary pth order AR sequence of length N, its non causal MVR can be written as $H_u = v + b$ and $E[vv^T] = B^2H$ and $E[vb^T] = 0$. **6**

   OR

   a) Explain spatial and frequency domain filtering.

   b) Explain image observation models. **6**

3. a) Explain maximum entropy restoration in detail. **6**

   OR

   a) Explain coordinate transformation and geometric correction.

   b) Explain in detail one dimensional causal models. **7**

P.T.O.

SECTION – II

4. Write a short note on **any two** : **(5×2)**

   1) Classification techniques in image analysis.

   2) Region representation.

   3) Boundary extraction.

5. a) Explain inverse Random transform. **7**

   b) Explain concept of interframe coding with any one technique in detail. **6**

   OR

   b) Explain image compression standards.

6. a) Discuss various operators used in edge detection. **6**

   b) Discuss image analysis in context with geometry shape features. **6**

   OR

   b) Discuss different classification of texture in detail.

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Seat No.	

M.E. (Electrical Engineering) (Sem. – I) Examination, 2014
POWER ELECTRONICS (Paper – I)

Day and Date : Monday, 23-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

1. Explain the role of power electronics in different engineering applications. **12**

2. Explain the reverse recovery phenomenon of power diode. Compare reverse phenomenon of SCR and GTO. **11**

OR

2. Why parallel operation is difficult in power BJT ?

3. Explain asymmetrical and symmetrical configurations used for 1-quadrant operation of ac to dc converter circuit and explain the half wave effect also.

OR

3. For the circuit shown in Fig. 1 determine the average value of load current for $\alpha = 60°$. What is the new value of average current flowing through the load if a large 'L' is connected in series with the load ? Neglect the device drop. **12**

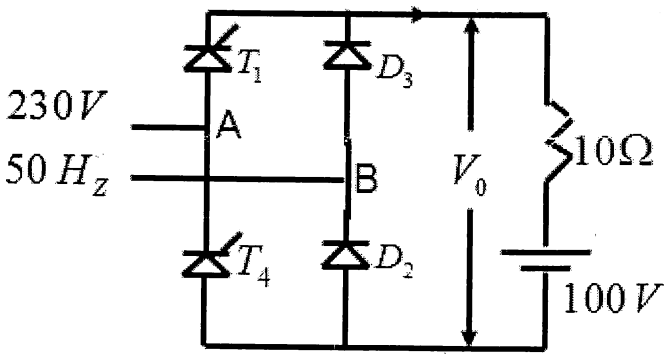

Fig. 1

P.T.O.

SECTION – II

4. Explain the construction and working of single phase half wave bridge inverter with the following load conditions.
   I) R-load
   II) L-load
   III) R-L load
   IV) R-L-C load.

OR

4. Explain the following methods of output voltage control of three phase inverter.
   I) PWM
   II) Stepped modulation
   III) Sinusoidal PWM
   IV) Harmonics elimination
   V) Third harmonic injected modulation. **15**

5. Explain single phase AC voltage controller and derive its output voltage. **10**

6. For the circuit shown in Fig. 2, switching frequency = 10 KHz, 'i' is just continuous. Find out Ton and I_p ? **10**

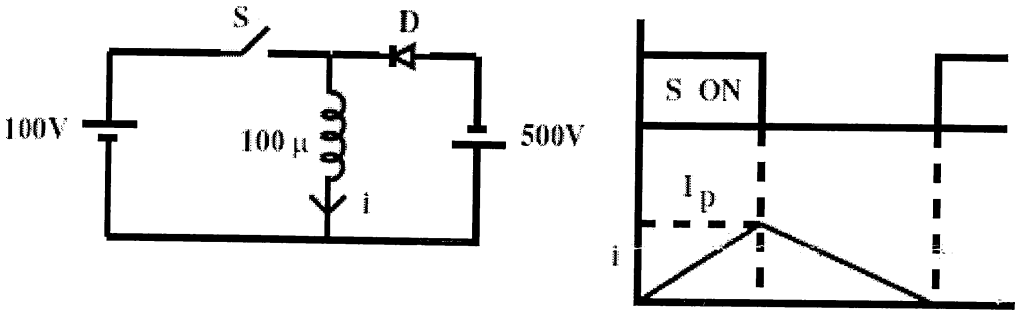

Fig. 2

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Seat No.	

M.E. (Electrical Engineering) (Sem. – I) Examination, 2014
POWER SYSTEM DYNAMICS AND CONTROL (Paper – II)

Day and Date : Wednesday, 25-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****. However some* ***internal*** *options are provided.*
2) Assume suitable data ***wherever*** *necessary and mention the* ***same****.*

SECTION – I

1. Attempt **any two** : **12**
   a) Explain the voltage instability problem faced by power system in details.
   b) Explain the frequency instability problem faced by power system in details.
   c) Explain the concept of transient stability related to power system.
2. Attempt **any two** : **12**
   a) Explain in detail the control hierarchy of power system in India.
   b) Explain the typical feedback control used in power system control.
   c) Explain the concept of equilibrium related to power system.
3. Explain the behaviour of synchronous machine connected to infinite bus bar. **11**

SECTION – II

4. Attempt **any two** : **12**
   a) Explain the excitation control system and its protective circuit.
   b) Explain the basic structure of prime mover and energy supply system.
   c) Explain the effect of change in excitation on stability.
5. Explain the modeling of induction machine and its need. **12**
6. Explain the effect of change in input to the prime mover on synchronous generator connected to infinite bus if the field excitation remains constant. **11**

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Seat No.	

M.E. (Electrical Engineering) (Sem. – I) Examination, 2014
DC DRIVES (Paper – III)

Day and Date : Friday, 27-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *Answer **all** the questions **sequentially**.*
*Figure on **right** square bracket indicate **max marks**.*
***Assume** suitable data **if required** giving reason.*

SECTION – I

1. Define elective drive. With neat block diagram indicate different components of an electric drive. State and explain important considerations for electric drives. **[8]**

2. a) What are basic types of loads ? With suitable diagram explain four quadrant operation of hoist. **[8]**

   OR

   a) With a neat diagram discuss concept of motor-load interaction. What is equilibrium point of operation ? Derive the condition for stability of equilibrium point. **[8]**

   b) With suitable example differentiate clearly between steady state and transient stability of an electric drive. Derive necessary condition for stability of an electric drive. **[6]**

3. a) From fundamentals obtain the expression for speed of separately excited DC motor, hence draw and explain speed torque characteristics for different armature resistance. **[9]**

   OR

   a) With neat schematic diagram and operating equations explain process of dynamic braking in case of separately excited dc motor. **[9]**

   b) A 50 HP 440 V DC shunt motor running at 600 rpm on full load having armature current of 100 A is braked by plugging. Calculate the value of resistance to be inserted in series with the armature circuit to limit the initial braking current to 150 A. Calculate the braking torque so obtained. Assume Ra to be 0.1 Ohm. **[4]**

P.T.O.

SECTION – II

4. a) With neat circuit diagram and waveforms explain regenerative braking process for fully converter fed separately excited dc motor. **[8]**

OR

a) Develop the mathematical expression governing operation of fully control converter fed dc motor in continuous mode of operation. Hence develop steady state characteristics of the same. **[8]**

b) A 100 kW, 1000 rpm DC shunt motor is controlled at its armature by a 400 V, three φ full converter. Find triggering angle α and p.f. at its rated speed. What is the value of the triggering angle at 50% of the rated speed. Assume the input ac supply to be 415 V. **[4]**

5. a) Compare in brief operation of dc motor drive fed with single phase fully controlled and three phase fully controlled converter operating in motoring and regenerative braking mode. **[8]**

OR

a) State various types of choppers. Explain operation of class-A chopper with neat circuit schematic and operating waveforms. **[8]**

b) A Dc shunt motor takes a current of 80 A on 480 V supply and runs at 960 rpm. The armature resistance is $0.5\,\Omega$ and field resistance is $120\,\Omega$. A chopper is used to control the speed of the motor in the range of 400 to 750 rpm having constant torque. The on period is 3 msec. The field is supplied directly from 480 V. Determine, the range of frequency of chopper. **[4]**

6. a) Explain with neat circuit schematic operation of dc motor drive fed with fully controlled dual converter operating in non simultaneous mode. **[8]**

b) Write a note on speed control of drives requiring wide Range of speed. **[3]**

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Seat No.	

M.E. (Electrical) (Sem. – I) Examination, 2014
CONTROL ENGINEERING (Paper – IV)

Day and Date : Monday, 30-6-2014 Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

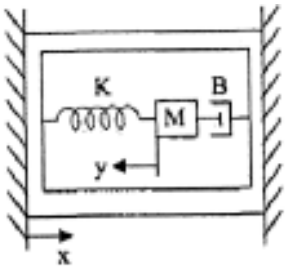
1. Attempt **any four** : **(4×6=24)**

   a) What are the control objectives of feedback control system ?

   b) Explain with the aid of appropriate diagrams, the construction and operation of a linear variable differential transformer (LVDT).

   c) Explain the effect of feedback on system sensitivity in control systems.

   d) Write the differential equation governing the mechanical system shown in fig. 1. Also draw the F-V and F-I analogy.



$$T(s) = \frac{Y(s)}{X(s)}$$

   e) Explain with neat sketch, the construction and operation of electro pneumatic control valve.

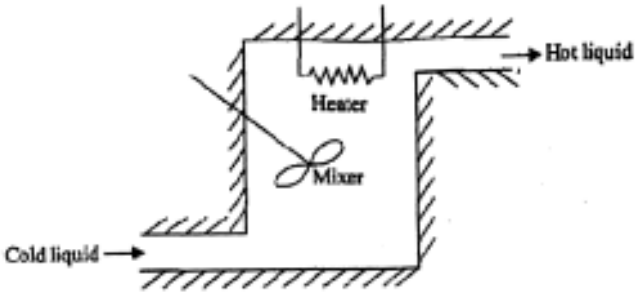
P.T.O.

2. Attempt **any one** : **(1×11=11)**

a) In the thermal system shown, heater coil is used to heat the liquid entering the insulated tank at temperature θ_i to hot liquid at temperature θ. The liquid is thoroughly mixed to maintain uniform temperature of the liquid in the tank. If M is the mass of the liquid in the tank in Kg, C is the specific heat of liquid in J/Kg/°K, W is the steady state liquid flow rate in kg/sec and h_i is the heat input rate in J/sec, obtain the transfer function of the system when,

i) Heat input rate is changed, with inlet temperature of liquid kept constant and

ii) Inlet temperature is changed with heat input rate held constant. Also write the differential equation when heat input rate and inlet liquid temperatures are changed.



b) In designing control systems, the following aspects must be taken into account.

i) Stability

ii) Noise filtering

iii) Sensitivity and robustness

iv) Disturbance rejection

Explain the significance of each.

SECTION – II

3. Attempt **any four** : **(4×6=24)**

a) State space representation of speed control system.

b) Explain the performance specifications in time domain.

c) A unity feedback system is characterized by the open loop transfer function

$$G(s) = \frac{1}{s(0.5s+1)(0.2s+1)}$$

i) Determine the steady state errors to unit step, unit ramp and unit parabolic inputs.

ii) Determine the rise time, peak time, peak overshoot and settling time of the unit step response of the system.

d) Obtain the transfer function for the following system shown :

i) $\dot{X} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -2 & -3 & -4 \end{bmatrix} X + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} U$

$Y = [1\ 0\ 0]\ X$

ii) $\dot{X} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -4 & -6 & -8 \end{bmatrix} X + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} U$

$Y = [-2\ 4\ 0\ ]\ X + 2U$

e) Determine the break away points, angles of departure and centroid of the root locus for the system,

$$G(s)\,H(s) = \frac{k(s+3)}{2s(s+5)(s+6)(s+2s+2)}$$

Also sketch the root locus.

4. Attempt **any one** : **(1×11=11)**

a) Consider a type-1 unity-feedback system with an open loop transfer function, $G(s) = \frac{k}{s(s+1)}$. It is desired to have the velocity error constant K_v = 10. Furthermore, desire the P.M. of the system be at least 45°.

b) Obtain the state space representation in :

i) Companion form or bush form

ii) Diagonal or Jordon form for the following systems.

a) $\dddot{x} + 9\ddot{x} + 23\dot{x} + 15 = u$

b) $\dddot{x} + 9\ddot{x} + 23\dot{x} + 15 = \ddot{u} - 2\dot{u} + 2u$.

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Seat No.	

M.E. (Electrical Engineering) (Sem. – I) Examination, 2014
EXTRA HIGH VOLTAGE TRANSMISSION SYSTEMS
(Elective – I) (Paper – V)

Day and Date : Wednesday, 2-7-2014 Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Necessary data **wherever** required is given. If such data is not given it means that the knowledge of that data is a part of examination.*

*2) If you have assumed any data then mentioned it **clearly** with reasons.*

SECTION – I

1. Answer the **any one** question from the following : **12**

   a) A power of 12000 MW is required to be transmitted over a distance of 1000 km. At voltage levels of 400 kV, 750 kV, 1000 kV and 1200 kV determine.

      i) Possible no. of circuits required with equal magnitudes for sending and receiving end voltages with 30° phase difference;

      ii) The currents transmitted and

      iii) The total line losses.

   b) What are the various types of conductor vibrations in a transmission line ? Explain how they are measured and controlled.

2. Solve the **any two** questions from the following : **12**

   a) Discuss the effect of resistance, power loss and skin effect on EHV-AC lines in detail.

   b) Explain the need of bundled conductors for EHV AC lines.

   c) What are the gradient factors and their advantages ?

P.T.O.

3. Attempt the **any one** question from the following : **11**

   a) Explain the corona phenomena and the factors influencing the corona inception.

   b) Derive an expression for maximum charge condition on a 3-phase line.

SECTION – II

4. Answer the **any two** questions from the following : **12**

   a) What is the purpose of reflection and refraction coefficients of traveling waves and its significance explain in detail ?

   b) Explain the clear difference between traveling and standing wave theory.

   c) Derive the generalized constants of a distributed parameter transmission line.

5. Solve the **any one** question from the following : **12**

   a) Discuss thoroughly with examples insulation coordination based on lightning.

   b) Explain different type of lightning arresters and protective characteristics.

6. Attempt the **any one** question from the following : **11**

   a) What are the general principles of the lighting protection problem describe it meticulously ?

   b) What is tower footing resistance and explain in detail ?

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Seat No.	

M.E. (Electrical Engineering) (Semester – II) Examination, 2014
POWER ELECTRONICS APPLICATIONS TO POWER SYSTEM
(Paper – VI)

Day and Date : Tuesday, 24-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I **35**

1. Attempt **all** :

   a) Why does utility need inter connected transmission system ? **8**

   b) Explain the various benefits and perspectives of facts technology. **9**

   OR

   b) Explain various factors which limit the loading capability of transmission lines. **9**

2. Solve **any two** questions from the following : **(2×9=18)**

   a) Explain mid-point regulation for line segmentation.

   b) The particulars of the uncompensated transmission line are V = 220 V, F= 60 HZ, X = 1.8 Ω and δ = 70°. Find

      a) the line current

      b) the active power P

      c) the reactive power Q ?

   c) Explain thyristorised controlled reactor in detail.

SECTION – II **35**

3. Attempt **all** :

   a) Explain the principle of series compensation in detail. **9**

   b) Explain Thyristorized Controlled Series Capacitor (TCSC) in detail. **8**

   OR

P.T.O.

b) The particulars of a series compensated with a TCSC are V = 480 V, F = 60 HZ, X = 16 Ω and P_p 96 kw. The particulars of the TCSC are δ = 80°, C = 25 μF and L = 0.4 mh. Find

a) The degree of compensation r

b) The compensating capacitance reactance X_{comp}

c) The line current IL

d) The reactive power Qc

e) The delay angle α of the TCSC if the effective capacitive reactance is $X_t = -40\Omega$. **8**

4. Solve **any two** questions from the following : **(2×9=18)**

a) Explain the principle of phase compensation in detail.

b) Explain UPFC in detail.

c) Explain Load Compensation in detail.

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SLR-UN – 185

Seat No.	

M.E. (Electrical Engineering) (Semester – II) Examination, 2014
Paper – VII : POWER QUALITY

Day and Date : Thursday, 26-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

1. a) What is the meaning of power quality disturbances ? State at least two reasons for increased power quality concern. **8**

   b) With a waveform, explain the terms :
      i) Voltage sag
      ii) Voltage interruption
      iii) Voltage swells
      iv) Sag with harmonics. **9**

2. a) Explain the characteristics of power quality events in short duration variations and long duration variations. **8**

   b) Discuss about the Computer Business Equipment Manufacture Associations (CBEMA) curve. Explain about the events described in the curve. **9**

SECTION – II

3. Explain for the following :
   i) Harmonic sources from commercial loads
   ii) Harmonic sources from industrial loads
   iii) Harmonic sources from residential loads. **18**

OR

3. What is the need of locating harmonic sources ? How will you find the harmonic sources from point of common coupling ? Give the identification procedure on the basis of voltage indices. **18**

4. a) Explain briefly about practical considerations in the design of passive filters. **9**

   b) Discuss about combined shunt and series voltage controller. **9**

OR

   b) Explain in detail about principles of operation of shunt active power filter with neat schematic. **9**

SLR-UN – 186

Seat No.	

M.E. (Electrical) (Sem. – II) Examination, 2014
AC DRIVES (Paper – VIII)

Day and Date : Saturday, 28-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

1. Answer the following :

   A) Draw torque slip characteristic of a three-phase induction motor. Also draw motor current on the same characteristic. Explain the shape of torque slip characteristic. **8**

   B) Draw a family of torque speed characteristics for a three phase induction motor under stator voltage control. Show load torque curve on this graph. Why this speed control strategy is suitable for only fan type loads ? Comment on efficiency under stator voltage control. **9**

2. Attempt **any two** of the following : **(9×2=18)**

   A) Prove that under E/f control, for a given load torque fall in speed from synchronous to actual motor speed is same for any value of frequency of stator voltage.

   B) With a neat block diagram, explain closed loop V/f control scheme for three phase induction motor.

   C) Explain with neat diagram, shift of operating point from initial frequency “f” to a new frequency “0.7 f” under E/f control strategy.

P.T.O.

SECTION – II

3. Answer the following :

   A) What is closed loop slip control scheme ? With neat block diagram, explain closed loop control of three phase induction motor speed using slip control. **8**

   B) Draw and explain typical power circuit configuration used for three phase induction motor speed control. Explain need of dynamic braking resistance in this configuration. **9**

4. Attempt **any two** of the following : **(9×2=18)**

   A) Explain operation of switched reluctance motor. How speed of such motor is controlled using drive ?

   B) With neat block diagram explain true synchronous mode of speed control in synchronous motor.

   C) With neat circuit schematic explain static Scherbius drive. State basic philosophy used for operating induction motor in variable speed mode in this drive.

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SLR-UN – 187

Seat No.	

M.E. (Electrical) (Semester – II) Examination, 2014

Paper – IX : ADVANCED CONTROL ENGINEERING

Day and Date :Tuesday, 1-7-2014 Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

1. Attempt the following : **(2×9=18)**

a) Design the PI controller for SISO process model $G(s) = \frac{0.5}{s^2 + 1.595s + 1.62}$ and $G_c(s) = K_p + K_i/s$ using model parameters k = 0.5; $\alpha_1 = 1.595$ and $\alpha_0 = 1.62$, optimised coefficients $c_1 = 0.5 \rightarrow d_2 = 1.595$ and $d_1 = 2.12$. Estimate the PI controller parameter for SISO process.

b) For a series-feedback compensation scheme with $G(s) = \frac{4e^{-2s}}{4s - 1}$ and the controllers $Gc\ 1(s) = \frac{0.262s + 0.131}{2s}$ and Gc2(s) = 0.5 (s + 1), determine the time domain performance measures for static load disturbances :

i) In the absence of the inner-loop controller

ii) With the inner-loop controller in action.

OR

P.T.O.

b) Design a series PID controller for TITO system having the plant dynamics

$$G(s) = \frac{1}{(s+1)(2s+1)^2(0.5s+1)} \begin{bmatrix} 1.5s+1 & 0.2(0.75s+1) \\ 0.6(0.75s+1) & 0.8(1.2s+1) \end{bmatrix} \text{ and}$$

$$G_m(s) = \begin{bmatrix} \frac{0.849e^{-0.3422s}}{(1.879s+1)^2} & 0 \\ 0 & \frac{0.678e^{-0.3271s}}{(1.757s+1)^2} \end{bmatrix}.$$

Choose $A_{ml} = 2$ and $\Phi_{ml} = 45^\circ$. Estimate the series PID controller parameters by using phase and gain margin criteria.

2. Explain the limitations of PID controller in detail. **(1×8=8)**

3. Derive the equivalent gain of a relay. **(1×9=9)**

OR

3. For a series-feedback compensation scheme with $G(s) = \frac{4e^{-2s}}{2s+1}$ and

$Gc(s) = \frac{0.131(2s+1)}{2s}$, determine frequency-domain performance measures.

SECTION – II

1. Attempt the following : **(2×9=18)**

a) Derive an expression for determining exact conditions for existence of limit cycles.

b) By using asymmetrical relay test, estimate the steady state gain for SOPDT transfer function model $G(s) = \frac{k(T_0 s+1)e^{-\theta s}}{(T_1 s \pm 1)(T_2 s+1)}$.

OR

b) Estimate the parameters of aplant whose dynamics are given by

$G(s) = \frac{ke^{-\theta s}}{Ts \pm 1}$ and the dynamics of the controller are given by

$G_c(s) = K_c\left(1 + \frac{1}{T_i s} + T_d S\right)$. Use DF based on-line identification process.

2. Derive analytical expressions for the parameters of transfer function with gain and delay $G(s) = K_e^{-\theta s}$. **(1×8=8)**

3. Identify the SOPDT transfer function model with pole multiplicity

$$G(s) = \frac{K_e^{-\theta s}}{(T_1 s + 1)^2}$$ **(1×9=9)**

OR

3. Identify the FOPDT model by using state-space analysis. **(1×9=9)**

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SLR-UN – 19

Seat No.	

M.E. (Mechanical Design Engineering) (Semester – II)
Examination, 2014
ADVANCED DESIGN ENGINEERING (Paper – VI)

Day and Date : Tuesday, 24-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any three** questions from **each** Section.*
*2) Figures to **right** indicates **full** marks.*
*3) Assume necessary data, **if required**.*

SECTION – I

1. a) Explain the types of cams with neat sketch. **6**

   b) Compare the kinematics of SHM and cycloidal motion cam with the help of SVAJ diagrams. **6**

2. a) Explain dynamic viscosity and kinematic viscosity with their S.I. units. **4**

   b) The following data refer to a short hydrodynamic journal bearing : **7**

Radial load	=	1000 N
Journal speed	=	2100 r.p.m.
(l/d ratio)	=	0.5
Eccentricity ratio	=	0.65
Radial clearance	=	0.002 × journal radius
Flow rate of lubricant	=	3.45 litre per hour

   Calculate :

   i) Diameter of journal
   ii) Radial clearance
   iii) Dimensions of bearing
   iv) Minimum oil-film thickness
   v) Absolute viscosity of lubricant.

P.T.O.

3. a) Give the comparison between long and short hydrodynamic journal bearing. **5**

   b) Explain different power loses in hydrostatic step bearing. **6**

4. Write short notes on **any two** of the following : **12**

   a) CEP and CPM in high speed cams.

   b) Deformation theory of friction.

   c) Pressure development mechanism in hydrodynamic journal bearing.

SECTION – II

5. a) Define and explain following terms used in reliability analysis. **6**

      i) Reliability

      ii) Failure density

      iii) Hazard rate.

   b) In reliability testing of 100 specimen components, following failure frequencies were observed. The total test period was of 8 hours.

Time interval	0 – 1	1 – 2	2 – 3	3 – 4	4 – 5	5 – 6	6 – 7	7 – 8
No. of failures	2	12	20	41	13	9	5	3

   Find reliability, hazard rate and MTTF. **6**

6. a) In a life test on a sample of 10 bulbs it is found that they fail at the following test hours. Determine MTTF of bulbs.
   Failure hours : 802, 852, 901, 940, 993, 1060, 1105, 1137, 1182, 1202. **4**

   b) Derive the expression for thermal stresses in a long hollow cylinder. **7**

7. a) Explain in detail the contiguity constraints in case of rigid bolted joint subjected to thermal stresses. **5**

   b) Explain the design for manufacturing and assembly. **6**

8. Write short notes on **any two** of the following : **12**

   a) Rayleigh distribution

   b) Methods for reducing thermal stresses

   c) Bath tub curve.

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Seat No.	

M.E. (Electrical Engineering) (Semester – II) Examination, 2014
HIGH VOLTAGE DC TRANSMISSION SYSTEMS (Elective – II) (Paper – X)

Day and Date : Thursday, 3-7-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I **35**

1. Attempt **all** :

   a) With neat sketches explain the different kinds of D.C. links available. **8**

   b) With the help of a neat diagram, explain the operation of a 6 pulse bridge rectifier. Sketch the relevant voltage and current waveforms. **9**

   OR

   Explain in detail the converter control characteristics of HVDC systems.

2. Solve **any two** questions from the following : **(2×9=18)**

   a) What are the equipment used in hvdc transmission system explain in detail ?

   b) For a 3-φ, 6 pulse Graetz's circuit, draw the timining diagram considering overlap angle is less than 60° and without overlap for the following :

      i) Voltage across load.

      ii) Voltage across any two pair of conduction values.

   c) Explain the working of working basic power controller using VDCOL (Voltage Dependent Current Order Limiter).

P.T.O.

SECTION – II **35**

3. Attempt **all** :

   a) Discuss the various faults exist in converter station. Explain. **8**

   b) Write a note on the following sources of reactive power :

      i) Synchronous condensers

      ii) Static VAR system. **9**

      OR

      What are the types of MTDC systems and explain each in detail ?

4. Solve **any two** questions from the following : **(2×9=18)**

   a) What are the causes of over voltages and explain type of over voltages in a converter station in details ?

   b) What are the various types of filters that are employed in HVDC converter station ? Discuss them in detail.

   c) Classify the solution methodology for AC-DC load flow and explain.

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Seat No.	

M.E. (Biomedical Engineering) (Sem. – I) Examination, 2014
Paper – I : HUMAN PHYSIOLOGY FOR ENGINEERS

Day and Date : Monday, 23-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) Figures to **right** indicate **full** marks.*
*3) **Assume** suitable data if **necessary** and mention it **clearly.***

SECTION – I

1. a) Draw the structure of human cell and explain its constitutions. **8**

   b) Discuss in detail composition of blood. **10**

2. Describe the cell membrane organization and origin of membrane potential arises from ion channels and ion pumps. **17**

3. Describe the structure and physiology of heart. Elaborate cardiac cycle. **17**

SECTION – II

4. a) Elaborate organization and function of the visual cortex. **10**

   b) Explain the function of human respiratory system. **8**

5. a) What is reflex action and reflex arc ? Explain the role of sympathetic and parasympathetic nervous system. **7**

   b) Describe the mechanism of hearing. **10**

6. Describe transport of O_2 and CO_2 by hemoglobin and factors affecting this transport. How acid base regulation is achieved in the body ? **17**

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Seat No.	

M.E. (Biomedical Engineering) (Sem. – I) Examination, 2014
BIOMEDICAL TRANSDUCERS AND SENSORS (Paper – II)

Day and Date : Wednesday, 25-6-2014 Total Marks : 70
Time :10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) Figures to **right** indicate **full** marks.*
*3) **Assume** suitable data **if necessary** and mention **it clearly**.*

SECTION – I

1. a) What are known as "Korotkoff sound" ? How will you measure them with an indirect method of measurement ? **10**
   b) Write a note on different types of transducer. **8**
2. a) Explain in detail how pulsatile blood volume changes can be measured using photoelectric type resistive transducer. **10**
   b) Draw the diagram and equivalent circuit of a differential capacitance pressure transducer and briefly explain its operation. **7**
3. a) Explain the working of piezoelectric transducer as arterial pressure sensor. **7**
   b) With a neat diagram explain the operation of optical – fiber temperature sensors. **10**

SECTION – II

4. a) Where do you use Clarke's electrode ? Discuss the method used for measuring flow rate of CO_2 and O_2 in exhaust air. **10**
   b) Discuss clinical applications of ISFET biosensor. **8**
5. a) Explain the basic principle and working of the Radiation method of temperature measurements. **10**
   b) What is enzyme based biosensor ? Discuss applications of immunosensors. **7**
6. a) What is pH of a solution ? Draw constructional details of pH electrode and explain chemical reactions involved in determining pH of a solution. **10**
   b) Distinguish Photo emissive, Photoconductive, Photoelectric principles of transducers. **7**

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Seat No.	

M.E. (Biomedical) (Sem. – I) Examination, 2014
Paper – III : ADVANCED DIGITAL SIGNAL PROCESSING

Day and Date : Friday, 27-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Assume suitable data **wherever** required and mention **it clearly**.*

SECTION – I

1. a) Explain different techniques used for frequency transformation from analog to discrete domain and mention the procedure for designing IIR filters. **10**

   b) Distinguish between FIR and IIR digital filters. **8**

2. a) Design a second order digital band pass filter 200 Hz to 300 Hz with sampling frequency 2KHz. (Use any suitable technique). **10**

   b) Define and differentiate parametric and non-parametric methods for power spectral estimation. **7**

3. a) Design a digital low pass Butterworth filter for the following specifications. **12**

   Pass Band Attenuation – 0.9

   Slop Band Attenuation – 0.15

   Pass Band Frequency – 0.3π

   Slop Band Frequency – 0.7π

   Sampling Frequency – 10 KHz

   Use Bilinear Transformation method.

   b) Write a short note on least square method to design digital filters. **5**

P.T.O.

SECTION – II

4. a) Why data compression is needed ? Explain lossy and lossless data compression. Explain any two data compression technique. **10**

   b) Explain Haar multi resolution analysis. **8**

5. a) Verify perfect reconstruction in Haar wavelet with following sequence : **9**

   $X(n) = \{1, 2, 1, 2\}$

   b) Explain ECG data compression using turning point algorithm. **8**

6. a) Explain any two applications of DSP in Biomedical Signals in detail. **8**

   b) Explain the Daubechies family of wavelets with its significance. **9**

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Seat No.	

M.E. (Biomedical) (Semester – I) Examination, 2014
(Paper – V) : BIOLOGICAL TRANSPORT PHENOMENON (Elective – II)

Day and Date : Wednesday, 2-7-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve **any two** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** suitable data **wherever** required and mention it **clearly**.*

SECTION – I

1. a) Explain the distribution of ingested food energy within the body and its transfer to the environment with necessary diagram. **10**
   b) Define and explain active transport mechanism in detail. **8**
2. a) Draw and explain model for heat transfer between core and skin, also derive expression for effective thermal conductivities. **10**
   b) Differentiate between basic mechanism and postulated mechanism for active transport process. **7**
3. a) Define pharmacokinetics model. Explain pharmacokinetics model for following system : **12**
      a) Drug distribution in body
      b) Bile transport model
      c) Urea distribution model.
   b) Derive the expression for the overall mass transfer in differential length of a dialyzer. **5**

SECTION – II

4. a) Define “osmosis”. Explain the process of osmosis at a cell membrane when NaCl solution is placed on one side of membrane and water on the other side. **10**
   b) Describe the need to study the biochemistry of digestion. **8**
5. a) Draw and explain Babb’s two compartmental model of urea removal in a patient artificial kidney system. **9**
   b) Explain Gibbs Donnan equilibrium phenomenon in detail. **8**
6. a) Differentiate between passive diffusions of electrolytes and nonelectrolytes. **8**
   b) Derive an expression for resting membrane potential in nerve cell. **9**

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SLR-UN – 2

Seat No.	

M.E. (Civil-Structures) (Semester – I) Examination, 2014
MECHANICS OF STRUCTURES (Paper – II)

Day and Date : Wednesday, 25-6-2014 Max. Marks :70
Time : 10.00 a.m. to 2.00 p.m.

N.B. : *1)* ***All*** *questions are* ***compulsory.***
2) Figures to the ***right*** *indicates* ***full*** *marks.*
3) ***Assume*** *suitable data if required and mention it* ***clearly.***

SECTION – I

1. Draw ILD for BM, normal thrust, radial shear at quarter span for 2 hinged parabolic arch of span 'L' and central rise 'h'. **12**

OR

1. Two span continuous beam is shown in Fig. 1. Compute the influence line ordinates at 1 m interval for RA, RB, RC and MB. **12**

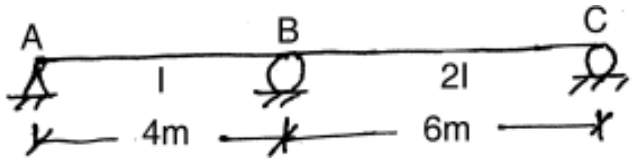


Fig. 1

2. Plot BMD and TMD for a semicircular beam curved in plan shown in Fig. 2. **12**

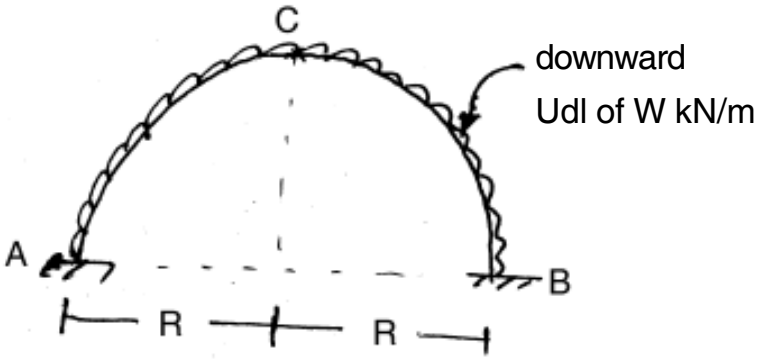


Fig. 2

P.T.O.

3. Draw SFD, BMD, deflection diagram and foundation pressure diagram for a semi infinite beam on elastic foundation fixed at one end and subjected to udl of 'W' throughout the length. **11**

SECTION – II

4. A simply supported beam column is subjected to loading shown in Fig. 3. Find maximum deflection and maximum bending moment in the beam column. **11**

Fig. 3

5. Analyze the fixed beam shown in Fig. 4 by structure oriented stiffness method. Draw BMD. **12**

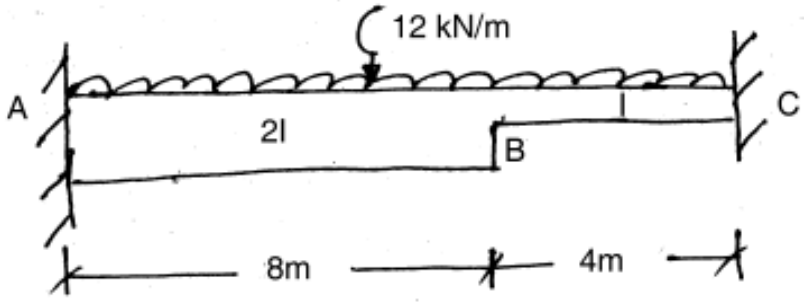


Fig. 4

OR

5. Analyze the frame shown in Fig. 5 by stiffness method. Draw BMD. **12**

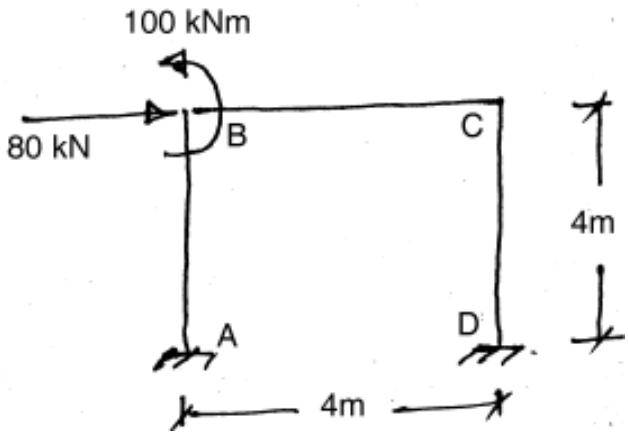


Fig. 5

6. A) Derive the stiffness matrix for a beam element (2D). **6**

   B) Derive the force transformation matrix for a truss element (2D). **6**

SLR- UN – 20

Seat No.	

M.E. (Mech. Design Engg.) (Semester – II) Examination, 2014
FINITE ELEMENT ANALYSIS (Paper – VII)

Day and Date : Thursday, 26-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Attempt **any three** questions from **each** Section.*
*2) **Make** suitable assumptions **if necessary** and state them **clearly**.*

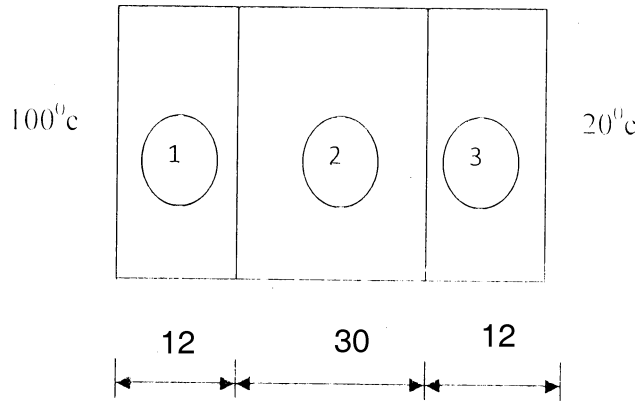
SECTION – I

1. a) Explain Weighted Residual method. **6**

   b) Derive an expression of stiffness matrix of 2 noded 1D bar element. **6**

2. Using potential energy method derive the element stiffness matrix and element equation for a simple bar element. **12**

3. a) Using finite element method find temperature distribution and heat flow through composite wall as shown in figure. **8**



K1 = K3 = $80*10^{-3}$ W/mm°c:K2 = $0.8*10^{-3}$ W/mm°c: All dimensions are in mm.

   b) Write a short note on history of FEA along with its application. **4**

P.T.O.

4. Write short note on (attempt **any two**) : **12**

   a) FDM and FVM

   b) Rayleigh Ritz method

   c) Matrix Algebra.

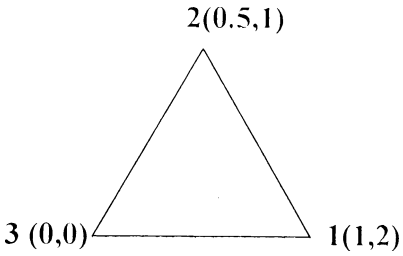
SECTION – II

5. a) Describe 1-D, 2-D and 3-D elements. **6**

   b) Prove that sum of shape function at any node of an element is unity. **4**

6. a) Explain submodeling and substructuring methods to improve modeling efficiency. **4**

   b) Find the stress vector considering plane stress condition for given element as shown in figure. **8**



   Take E = 200 Gpa; μ = 0.3; u1 = v1 = 0.1 mm ; u2 = 0.2 mm; v2 = 0.3 mm ; u3 = 0.4 mm; v3 = 0.1 mm.

7. Explain modeling procedure of conductive thermal analysis using software based FEM along with its application. **10**

8. Write short note on (attempt **any two**) : **12**

   a) Model validity and model accuracy

   b) Concept of mapping

   c) Spectrum analysis.

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Seat No.	

M.E. (Biomedical) (Semester – II) Examination, 2014
BIOMEDICAL INSTRUMENTATION AND CIRCUIT DESIGN (Paper – VI)

Day and Date : Tuesday, 24-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) Figures to the right indicate **full** marks.*
*3) Assume suitable data **wherever** required and mention it **clearly**.*

SECTION – I

1. a) With the help of neat diagram explain the process of generation of action potential. **4**
   b) Draw a block diagram of heart rate variability meter and mention its significance. **8**
   c) List various types of electrodes that are used to sense biophysical signals and explain any 2 of them in detail. **6**

2. For patient monitoring system answers the following :
   a) Explain the working of anyone noninvasive method of measuring blood pressure. **6**
   b) Mention any six medical applications of telemetry system. **3**
   c) Explain the function of impedance plethysmography with neat diagram. **6**
   d) Mention any one type of sensor/transducer and its material that is used to measure temperature and respiration rate. **2**

3. 1) Calculate the β of thermistor if it has a resistance of $3K\Omega$ at 27°C and a resistance of $2.46\ K\Omega$ when the room temperature increases by 15%. **7**
   2) Explain with a suitable diagram the construction and working of LVDT. **10**

P.T.O.

SECTION – II

1. a) Draw and explain power supply circuit of any analytical instrument with output of 6 V, 1 Amp. **8**

   b) Draw and explain circuit diagram for blood gas analyzer : **10**

      a) bicarbonate

      b) Total Co_2

      c) Base Excess.

2. a) Draw and explain complete block diagram of Hemodialysis machine. **10**

   b) List various operating modes of ventilator. **4**

   c) Differentiate any six points between defibrillator and cardiac pacemaker. **3**

3. a) Define micro shock, macro shock and leakage current and state their limiting values. **7**

   b) Explain various patient isolation techniques with necessary diagram. **10**

SLR-UN – 202

Seat No.	

M.E. (Biomedical Engineering) (Semester – II) Examination, 2014
BIOMEDICAL IMAGE PROCESSING AND ITS APPLICATION (Paper – VII)

Day and Date : Thursday, 26-6-2014 Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

3) Assume suitable data ***wherever*** *required and mention it* ***clearly****.*

SECTION – I

1. a) What is image ? Explain image type in detail. **4**

   b) Compare between Contrast Stretching and Histogram Equalization. **8**

   c) Differentiate between Brightness and Contrast in a image. **6**

2. a) How digitization of an image is achieved, explain in detail. **5**

   b) Explain conversion of Gamma rays based image into electrical using Gamma camera. **6**

   c) Discuss any method of Picture archiving and communication systems. **6**

3. a) Explain in detail the region based segmentation. **6**

   b) Discuss briefly the features of a compression model with a neat block diagram. **6**

   c) How Edge linking is performed, explain in detail. **5**

P.T.O.

SECTION – II

1. a) What is image enhancement ? And how it is performed ? **4**

   b) Explain, Homomorphic filter in detail and its application. **8**

   c) How the issues of image degradation, noise and blurring are taken care off ? **6**

2. a) Discuss the methods used in object identification and classification. **6**

   b) How a structural classification method of image analysis is used in medical application ? **4**

   c) Explain the system of 3D image visualisation. **7**

3. a) Draw and explain the procedure of Angiography and discuss its applications. **9**

   b) Explain the methodology used in Memography for tumor detection in medical diagnosis. **8**

SLR-UN – 203

Seat No.	

M.E. (Biomedical) (Semester – II) Examination, 2014
MEDICAL IMAGING AND ITS TECHNIQUES (Pape – VIII)

Day and Date : Saturday, 28-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** suitable data **wherever** required and mention it **clearly**.*

SECTION – I

1. a) Draw schematic diagram of X ray machine and explain how generation of X-rays takes place. **10**

   b) Write a short note on significance, construction and applications of collimators. **8**

2. a) List and explain various components and operations of computers in medical imaging. **10**

   b) List different display techniques of digital images and explain any one of it in detail. **7**

3. a) Explain various generations of CT in short. **8**

   b) State and prove central slice theorem. **4**

   c) List the detectors used in C.T. and explain any one in detail. **5**

SECTION – II

4. a) What is superconductivity ? Explain different types of magnets used in MRI. **7**

   b) What is free induction decay ? How it is used to obtain NMR ? **7**

   c) Define Larmer frequency and spin-spin relax. **4**

P.T.O.

5. a) What is piezoelectric effect ? How it is used to generate and receive ultrasound waves ? **8**

   b) With the help of diagram explain A-mode, B-mode and M-mode of ultrasound imaging. **9**

6. a) Obtain projection of following image and reconstruct the image using back projection technique. **10**

2	4	3	2
4	5	6	7
3	4	2	6
6	2	4	1

   b) List the methods that are used for extraction of anatomical information from imaging modality. Explain any one of it with example in detail. **7**

SLR-UN – 207

Seat No.	

M.E. (Biomedical Engineering) (Semester – II) Examination, 2014
Paper – IX : HOSPITAL MANAGEMENT AND INFORMATION SYSTEM
(Elective – III)

Day and Date : Tuesday, 1-7-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve **any two** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** suitable data **if necessary** and mention it **clearly**.*

SECTION – I

1. Describe the various types of medical records maintained in the hospital. **17**

2. Describe the functional capabilities of computerized hospital information system. **18**

3. Explain the procedure for developing tools and collecting information for decision making in a healthcare organization. **17**

SECTION – II

4. Explain the legal and ethical issues related to Hospital Information System. **17**

5. Discuss the health information regulations, laws and the standards in detail. **17**

6. State any two problems which arise due to leakage currents in equipment. What is meant by let-go current ? Define electrical safety, macro shock and micro shock. **18**

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SLR-UN – 21

Seat No.	

M.E. (Mechanical – Design Engineering) (Semester – II) Examination, 2014
EXPERIMENTAL STRESS ANALYSIS (Paper – VIII)

Day and Date : Saturday, 28-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Answer* ***any three*** *questions from* ***each*** *Section.*
2) Make necessary assumptions, if required and mention it ***clearly****.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) Use of non programmable calculator is ***allowed****.*

SECTION – I

1. a) The following readings of strain were obtained on a three element rectangular rosette mounted on aluminum for which E = 70 GPa, μ = 0.32, ϵ_a = 285 μ m/m, ϵ_b = 65 μ m/m, ϵ_c = 102 μ m/m. Determine principal strains, Principal strain directions, Principal stresses and Maximum shear stress. **8**

   b) Discuss commonly used strain gauge adhesives. **4**

2. a) Explain the crack patterns observed in brittle coating. **5**

   b) Discuss use of strain gauge for measurement of load and temperature. **6**

3. a) Derive the expression for output voltage of Wheatstone bridge. **5**

   b) Explain the different types of electrical resistance type of strain gauge with help of neat sketches. **6**

4. Write note on : **12**

   a) Dynamic strain measurement

   b) Balancing methods of Wheatstone bridge.

P.T.O.

SECTION – II

5. a) Derive expression for intensity of light observed through analyser when stressed model is kept in circular polariscope dark field arrangement. **8**

   b) Distinguish between natural birefringence and artificial birefringence. **4**

6. a) Explain the method of identifying zero order fringe. **6**

   b) Discuss electrical analogy method. **5**

7. a) Discuss stress freezing techniques in 3D photoelasticity. **6**

   b) A loaded two dimensional photoelastic model of 8 mm thickness is observed in circular polariscope. The isochromatic fringe pattern revealed that the point of interest lies between 4^{th} and 5^{th} order fringe. On rotation of analyser through 60°, the 4^{th} order fringe passed through the point of interest. Calculate the fractional fringe order and maximum shear stress if material fringe value is 14.5 N/mm. **6**

8. a) Discuss fringe sharpening. **5**

   b) Explain the scaling of model results to prototype. **6**

SLR-UN – 210

Seat No.	

M.E. (Biomedical Engineering) (Sem. – II) Examination, 2014
Paper – X : LASERS AND FIBER OPTICS FOR THERAPY AND SURGERY
(Elective – IV)

Day and Date : Thursday, 3-7-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) **Figures** to the **right** indicate full marks.*
*3) Assume suitable data **wherever** required and mention it clearly.*

SECTION – I

1. a) What is Laser ? How it differs with light ? **4**

   b) Explain the principle of Laser generation. Draw a block diagram and explain any one method of generation of Laser. **8**

   c) Describe the need and action of a Laser pump. **6**

2. a) Derive an expression and explain the threshold condition in Laser generation. **7**

   b) Define and explain the role of resonator in Laser source. **6**

   c) Mention different types of Lasers used in medical application. **4**

3. a) Explain optical fiber, and methods used for making optical fibers. **8**

   b) What are the materials used for making of optical fibers, comment with their advantages. **4**

   c) How signal attenuation takes place in fiber, explain in detail. **5**

P.T.O.

SECTION – II

1. a) What is fiber optic bundle ? And what are its applications ? **4**

   b) Explain, how power is transmitted in OFC, and what are the necessary conditions. **8**

   c) Discuss the fabrication procedure of OVPO. **6**

2. a) Discuss in detail the interaction of Laser with tissue/material. **6**

   b) Draw and explain a catheter and its applications in endoscopy. **4**

   c) Comment on Laser safety and its importance in Hospital. **7**

3. a) Draw a complete Laser Surgical System, and discuss its few applications in surgery. **9**

   b) Explain with neat block diagram Endo-Fluoroscopic imaging system and its applications in medical diagnosis. **8**

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Seat No.	

M.E. Mechanical Design Engineering (Sem. – II) Examination, 2014
INDUSTRIAL PRODUCT DESIGN (Paper – IX)

Day and Date : Tuesday, 1-7-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : i) Attempt **any five** questions from the following.*
*ii) Figures to the **right** indicate **full** marks.*
*iii) Support the answers by **neat** sketches **wherever** necessary.*

1. a) Explain the concept of Industrial Design. **7**
   b) Explain the design and development process of industrial products. **7**

2. a) Discuss the ergonomic aspect of design of machine tools. **7**
   b) Explain the process of setting specifications of a product. **7**

3. a) Explain the importance of balance and proportion in case of consumer product. **7**
   b) Explain the standard and legal requirements of consumer products. **7**

4. a) Explain the concept of unity and order with variety. **7**
   b) Explain the influence of line and form in the aesthetics of a product. **7**

5. a) Explain the maintenance aspects of a product design. **7**
   b) Write a note on 'product patents'. **7**

6. a) Explain significance and use of creativity in product design. **7**
   b) Discuss mechanics of seeing. **7**

7. a) Write a note on modeling technique used in product design. **7**
   b) Write a note on use of standardization in cost reduction. **7**

SLR-UN – 25

Seat No.	

M.E. (Mech. Design Engineering) (Semester – II) Examination, 2014
THEORY AND ANALYSIS OF COMPOSITE MATERIALS (Elective – II) (Paper – X)

Day and Date : Thursday, 3-7-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Note** : 1) Answer **any five full** questions.*
*2) **Draw** meaningful sketches **wherever** necessary in **pencil** only.*
*3) Figures to the **right** indicate **full** marks.*
*4) Make suitable assumptions, **if required** and state them **clearly**.*

1. a) What is the difference between the thermosets and thermoplastics ? Give some examples of both. **7**

   b) Describe the following for Carbon-Carbon Composites :
      a) Properties
      b) Applications. **7**

2. a) What is Filament winding ? With a neat sketch explain the process. What are the limitations of lament winding ? **7**

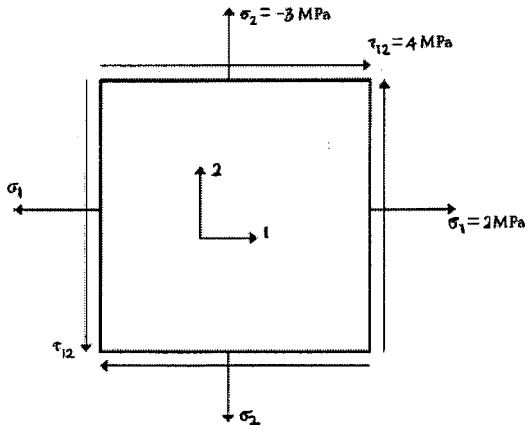
   b) With the help of neat sketch explain the Preperg Manufacturing. **7**

3. a) Write the number of independent elastic constants for three-dimensional anisotropic, monoclinic orthotropic, transversely isotropic, and isotropic materials. **7**

   b) For a graphite/epoxy unidirectional lamina, find the following :
      1) Compliance matrix
      2) Minor Poisson's ratio

P.T.O.

3) Reduced stiffness matrix
4) Strains in the 1-2 coordinate system if the applied stresses (Figure) are $\sigma_1 = 2$ MPa, $\sigma_2 = -3$ MPa, $\tau_{12} = 4$ MPa.



The properties of unidirectional graphite/epoxy lamina are

$E_1 = 181$ GPa, $E_2 = 10.3$ GPa, $v_{12} = 0.28$, $G_{12} = 7.17$ GPa. **7**

4. a) Explain the Tsai-Hill failure criteria for biaxial orthotropic materials. **7**

b) A glass/epoxy lamina consists of a 70% fiber volume fraction. Use the following properties of glass and epoxy, to determine the

1) Density of lamina
2) Mass fractions of the glass and epoxy
3) Volume of composite lamina if the mass of the lamina is 4 kg
4) Volume and mass of glass and epoxy in part (3)

$E_f = 85$ GPa, $E_m = 3.4$ GPa, $\vartheta_f = 0.2$, $\vartheta_m = 0.3$, $G_f = 35.42$ GPa and $G_m = 1.308$ GPa $\rho_f = 2500$ kg/ m^3 . $\rho_m = 1200$ kg/m^3. **7**

5. a) Derive the linear relationship of the strains in a laminate to the curvatures of the laminate. **7**

   b) Derive the extensional, coupling and bending stiffness matrices for a laminate. **7**

6. a) Derive the governing equilibrium buckling equation for laminated plates. **7**

   b) Explain the transverse shear effects on cylindrical bending of an infinitely long cross-ply strip. **7**

7. a) Explain the fatigue damage behavior of composite materials and metals. **7**

   b) Explain the various elements of structural design in detail. **7**

8. a) Explain in detail the design analysis stages in structural design. **7**

   b) Explain the different types of stiffeners. **7**

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SLR-UN – 27

Seat No.	

M.E. (Electronics) (Semester – I) Examination, 2014
VLSI DESIGN (Old) (Paper – I)

Day and Date : Monday, 23-6-2014 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Attempt* ***any three*** *questions from* ***each*** *Section.*
2) Assume suitable data ***if required****.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. a) Draw circuit for one bit full subtracter using CMOS logic. **6**
   b) Design 4 : 1 multiplexer using CMOS switches and logic gates. **6**
   c) Design negative level sensitive D latch. **4**

2. a) With the help of transfer characteristics explain effect of B_n/B_p on noise margin of CMOS inverter. **8**
   b) What are basic CMOS technologies ? Explain any one in detail. **8**

3. a) Explain analytical delay model for CMOS inverter. **8**
   b) Explain physical origin of latchup. Explain internal latchup prevention techniques. **8**

4. Write notes on **any three** : **(6×3=18)**
   a) Routing capacitance
   b) Scaling of MOS transistor dimensions
   c) Design margins
   d) Behavioral representation of CMOS circuits.

P.T.O.

SECTION – II

5. a) What is static load CMOS logic ? Implement $f = \overline{d(a + b + c) + a\ b\ c}$ using this logic. **8**

   b) What is necessity of layout design rules ? Explain these rules with suitable example. **8**

6. a) Explain the problem of metastability and synchronization failure. **8**

   b) Explain the terms with respect to CMOS-chip design : hierarchy, modularity, regularity and locality. **8**

7. a) Explain the architecture of CPLD. **8**

   b) Explain any one of the scan based testing methods for testing sequential circuits. **8**

8. Write notes on **any three** : **(6×3=18)**

   a) Row and column decodes in memory architecture

   b) LSSD scan chain

   c) Sea of gate

   d) Fault grading and fault simulation.

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Seat No.	

M.E. (Electronics) (Semester – I) Examination, 2014
ADVANCED DIGITAL SIGNAL PROCESSING (Paper – II) (Old)

Day and Date : Wednesday, 25-6-2014 Max. Marks : 100

Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) Draw ***neat*** *diagram* ***whenever*** *required.*

SECTION – I

1. a) Explain the Goertzel algorithm for direct computation of DFT. Draw the direct form II realization of two pole resonator for computation of DFT. **9**

   b) The signal $x(n) = a^{|n|}$, $-1 < a < 1$ has a Fourier transform

   $$X(\omega) = \frac{1 - a^2}{1 - 2a\cos\omega + a^2}$$

   i) Plot $X(\omega)$ for $0 \le \omega \le 2\pi$, a = 0.8.

   ii) Reconstruct and plot $X(\omega)$ from its samples, $X(2\pi k/N)$, $0 \le k \le N - 1$ for N = 20.

   iii) Illustrate the time domain aliasing when N = 20. **9**

2. a) Derive the equation of reflection coefficient from the sequence of function by using schur algorithm. **8**

   b) Derive the equations for backward prediction error. **8**

3. a) Explain the frequency sampling method for designing FIR Filter. **8**

   b) Design an ideal differentiator with frequency response $H(e^{j\omega}) = j\omega \quad |\omega| \le \pi$ using rectangular window for N = 9. **8**

P.T.O.

SECTION – II

4. a) Derive mean square error in LMS algorithm with optimization. **9**

   b) Design a digital low pass butterworth filter using bilinear transformation with pass band and stop band cutoff frequencies 800 rad/sec. and 1800 rad/sec. respectively. The pass band attenuation is –3 dB and stop band attenuation is –10 dB. **9**

5. a) Explain the Burg method for AR model parameter. **8**

   b) Derive the expression for energy density function for signal using Fourier transform. **8**

6. a) Explain with block diagram process of decimation by a factor 'D'. For each stage draw the spectrum. **8**

   b) Draw the block diagram offer sampling rate conversion by a factor I1D. Derive the equation for the spectrum of output sequence. **8**

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SLR- UN – 29

Seat No.	

M.E. (Electronics) (Semester – I) Examination, 2014
ADVANCED NETWORK ENGINEERING (Paper – III) (Old)

Day and Date : Friday, 27-6-2014 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

1. Answer the following :
   1) What are the different ICMP report messages obtained in case of unreachable destination ? How ICMP helps in case of congestion situation ? **6**
   2) What is retransmission in TCP ? How timeout and retransmission are related ? **6**
   3) Draw and explain UDP header format. How checksum is computed in UDP ? **6**

2. Answer **any two** : **(2×8=16)**
   1) Why ARP with fixed size cache fails when used on network that has many hosts and much ARP traffic ? Explain ARP encapsulation and identification.
   2) How variable window size is used for flow control in TCP ? How checksum is computed in TCP ? Explain acknowledgment and retransmission process in TCP.
   3) What is Kern's algorithm to manage retransmission timers ? Explain timer back-off scheme.

3. Answer **any two** : **(2×8=16)**
   1) Draw and explain TCP state machine.
   2) Explain TFTP. Compare TFTP with FTP.
   3) What is window size and sequence number in TCP ? How they are managed ? Explain Random Early Discard (RED) policy in TCP communication.

SECTION – II

4. 1) What is the need of RTCP ? List and explain RTCP message types. **6**
   2) Explain the concept of scatter-nets and pico-nets for Bluetooth devices. **6**
   3) Discuss different types of firewalls ? What is stub network ? **6**

P.T.O.

5. Answer **any two** : **(2×8=16)**

   1) Explain the rolls of RSVP and COPS to ensure quality in audio and video over IP.

   2) Draw and explain firewall architecture.

   3) What is the need of extensions in IPv6 header ? Draw the IPv6 header format with one and two extensions and discuss.

6. Answer **any two** : **(2×8=16)**

   1) How multiple external connections are handled through single firewall ? Draw and discuss associated firewall architecture.

   2) Explain service discovery protocol in Bluetooth.

   3) Explain source routing and fragmentation in IPv6.

SLR-UN – 3

Seat No.	

M.E. (Civil-Structures) (Sem. – I) Examination, 2014
ADVANCED DESIGN OF CONCRETE STRUCTURES (Paper – III)

Day and Date : Friday, 27-6-2014 Total Marks : 70
Time : 10.00 a.m. to 2.00 p.m.

***Instructions** : 1) Answer **any two** questions from **each** Section.*
*2) Assume suitable data **if necessary**.*
*3) Use of **calculator and IS 456, IS 3370 Part IV** are allowed.*

SECTION – I

1. Design the interior panel of flat slab 5.6 m × 6.6 m in size, for a superimposed load of 7 kN/m. Provide two way reinforcement. Use M_{20} concrete and Fe_{415} steel. **17**

2. Design a combined footing for columns C_1 and C_2 located at a distance of 4 m centre to centre. Column C_1 is 450 mm × 450 mm in size and carries a load of 750 kN. Column C_2 is 550 mm × 550 mm in size and carries a load of 850 kN. The SBC of soil is 150 kN/m^2. Use M_{25} concrete and Fe_{500} steel. **17**

3. a) Design a open rectangular tank of size 3.5 m × 8.5 m × 3 m deep resting on a firm ground. Use M_{25} concrete and Fe_{415} steel. Adopt IS 3370 – Part IV design constants. **15**

   b) Write on approximate wind analysis of staging used in case of over head tanks. **3**

SECTION – II

4. a) A post tensioned beam 250 mm × 350 mm is prestressed with a tendon of 520 mm^2 are a stretched to a stress of 1050 N/mm^2. The tendon passes through a hole of 50 mm wide and 75 mm deep left in the beam, the centre of the hole being 75 mm from the bottom. Loss of prestress at the time of anchoring is 5%. Find the stresses in concrete immediately after prestressing. **12**

   b) Why high strength concrete and high tensile steel are to be used for prestressed concrete ? **5**

P.T.O.

5. a) A rectangular PSC beam has a span of 12 m and bears a load of 15 kN/m for the entire span, excluding self weight, given permissible stresses in concrete and steel as 15 N/mm^2 and 1000 N/mm^2 respectively. Design the beam using 6 mm tendons. **8**

   b) A prestressed concrete beam 250 mm wide and 650 mm deep is subjected to an effective prestressing force of 1370 kN along the longitudinal centroidal axis. The cables may be assumed to be symmetrically placed over mild steel anchor plate in an area 150 mm × 350 mm. Design the end block.

   Take cube strength of concrete at transfer = 30 N/mm^2,

   Characteristic strength of concrete = 30 N/mm^2,

   Assume initial prestressing force as 1.2 times the effective prestressing force. **9**

6. a) A post tensioned continuous beam consists of two spans each 19 m. The external loading other than the dead load of the beam is 18 kN/m. Design the beam. **12**

   b) Write on partial prestressing. **6**

SLR-UN – 30

Seat No.	

M.E. (Electronics) (Semester – I) Examination, 2014
RANDOM SIGNALS AND PROCESSES (Paper – IV) (Old)

Day and Date : Monday, 30-6-2014 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Answer* ***any three*** *questions from* ***each*** *Section.*
2) ***Assume*** *suitable data* ***if*** *necessary and state the* ***assumptions****.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. a) If A and B are independent events prove that
   i) $\overline{A}$ and $\overline{B}$
   ii) $\overline{A}$ and B
   are independent events. **8**
   b) Write short note on "Moments". **6**
   c) The random variables X and Y are defined by the relationship Y = 4X + 9. Find their correlation coefficient. **4**

2. a) State and explain Bays theorem. **8**
   b) There are 3 identical boxes A, B and C. Box A contains 200 components out of which 25% are defective. Box B contains 500 components out of which 20% are defective and Box C contains 200 components out of which 30% are defective.
   A Box is selected at random and a component is removed from the box at random. What is the probability that this component is defective ? What is the probability that it was taken out from the Box B ? **8**

3. a) Define conditional probability density function. Give its properties. **4**
   b) Define characteristic function and obtain characteristic function for Gaussian distributed random variable. **4**

P.T.O.

c) A random variable X has a probability density function given by

$f_X(x) = A\, e^{-|x|}$

i) Determine the value of constant A
ii) Find the probability that X > 1
iii) Find the mean value and variance of X. **8**

4. a) Explain in brief how to estimate population mean and to get expected value and variance of this estimate. **7**

b) Given the joint probability density function for two random variables X and Y

$$f_{XY}(x, y) = \begin{cases} Kx(1+y) & 0 < x \le 2,\ 0 < y \le 1 \\ 0 & \text{elsewhere} \end{cases}$$

i) What is the value of K ?
ii) What is the joint distribution function ? **5**

c) Show that the random variables X and Y with following joint pdf are independent

$$F_{XY}(x, y) = \begin{matrix} g\, e^{-3x} e^{-3y} & x, y \ge 0 \\ 0 & \text{elsewhere} \end{matrix}.$$ **4**

SECTION – II

5. a) What is the cross correlation function between two random variables ? Explain along with its properties. **5**

b) Two jointly wide sense stationary random processes have sample functions of the form

$X(t) = A \cos(\omega_o t + \theta)$

and $Y(t) = B \cos(\omega_o t + \theta + \phi)$

where θ is a random variable uniformly distributed between 0 and 2π and A, B and ϕ are constants.

i) Find the cross correlation function $R_{XY}(\tau)$
ii) For what value of ϕ are X(t) and Y(t) orthogonal. **5**

c) Suppose that the sample functions are given by

$X(t) = A \cos(\omega t + \theta)$

Where A and θ are statistically independent random variables, θ uniformly distributed form 0 to 2π, A is Gaussian distributed with mean 0 and variance 4.

i) Is the random process stationary ? Explain
ii) Is the process ergodic ? Explain.
iii) What is the autocorrelation function of random process ? **8**

6. a) Define spectral density and explain the method to estimate the spectral density of records of limited duration. **8**

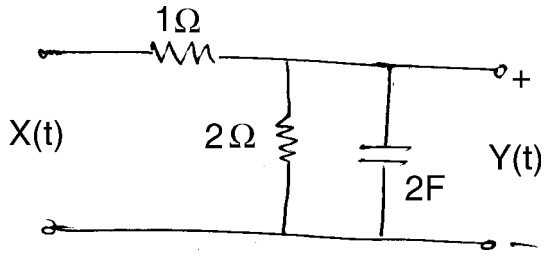
b) A stationary random process has an autocorrelation function given by

$$R_X(\tau) = \begin{cases} 1 - \frac{|\tau|}{T} \cos \omega_o \tau & |\tau| \le T \\ 0 & |\tau| > T \end{cases}$$

Determine and sketch the spectral density of the process. **8**

7. a) Derive the expression for autocorrelation function for output, cross correlation function between the input and output for a linear system. **8**

b) The input to the circuit shown below is a white noise process with spectral density A. What is the output autocorrelation function ? **8**



8. a) What is queueing theory ? According to which basic characteristics these are classified ? Explain in brief. **8**

b) Customers arrive at a one-man barber shop according to a Poisson process with a mean interarrival time of 20 minutes. Customers spend an average of 15 minutes in barber chair. If an hour is used as a unit of time, then

i) What is the probability that a customer need not wait for a haircut ?
ii) What is the expected number of customers in the barber shop and in the queue ?
iii) How much time can a customer expect to spend in the barber shop ? **8**

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SLR-UN – 31

Seat No.	

M.E. (Electronics Engineering) (Semester – I) Examination, 2014
Elective – I : STATISTICAL COMMUNICATION THEORY
Paper – V (Old)

Day and Date : Wednesday, 2-7-2014 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** suitable data **if necessary**.*

SECTION – I

1. Solve **any two** : **(2×8=16)**

   a) Given input signal x(t) = u(t), impulse response h(t) = e[cos2t–(1/2) sin2t]u(t), obtain the output y(t) of the system for input x(t).

   b) With suitable example explain purpose of encoding.

   c) Explain power spectral and power spectral density function. Explain one example of each where these functions are required.

2. a) A source emits six messages with probabilities 0.3, 0.25, 0.15, 0.12, 0.1 and 0.08 respectively. Find the four ary Huffman code, average word length, code efficiency and redundancy. **10**

   b) Explain PN sequence autocorrelation. **8**

3. a) Explain Shannon's Binary Coding. **8**

   b) Explain Fano's Inequality. **8**

   OR

   c) Explain capacity of a band limited Gaussian channel. **8**

P.T.O.

SECTION – II

4. Solve **any two** : **(2×8=16)**

   a) Given that the source output is a zero mean Gaussian signal under both the Hypotheses H_0 and H_1. The variance of the signal is σ_1^2 under H_1 and σ_0^2 under H_0. Set up the LRT for this problem and write the test for a test statistics. Assume $\sigma_1 > \sigma_0$.

   b) Explain correlation receiver.

   c) Explain prewhitening.

5. a) Explain estimation of random parameters. **8**

   b) Explain pulsed radar system. **10**

6. a) Given the input signal S(t) = A$\cos \omega_c t$ and $S_{NN}(\omega) = \frac{1}{1+\omega^2}$. Find the optimal filter. **8**

   b) Explain multiple measurements for testing of hypothesis. **8**

   OR

   c) Explain maximum likehood estimators. **8**

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Seat No.	

M.E. (Electronics Engg.) (Semester – I) Examination, 2014
Paper – I : CMOS VLSI DESIGN (New)

Day and Date : Monday, 23-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any three** questions from **each** Section.*
*2) **Assume** suitable data if required.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

1. a) With the help of physical structure of PMOS enhancement transistor explain accumulation, depletion and inversion modes. **6**

   b) Explain MOS device design equations. **5**

2. a) Explain the procedure of obtaining VTC of static CMOS inverter. **6**

   b) Explain dynamic and short circuit power dissipation in CMOS inverter. **6**

3. a) Design half adder using CMOS logic. **5**

   b) What is pass transistor logic and how universal gates can be implemented using this logic. **6**

4. Write notes on **any three** of following : **(4×3=12)**

   a) Second order effects

   b) Pseudo MOS inverter

   c) Dynamic logic : Basic principle

   d) Leakage in dynamic circuits.

P.T.O.

SECTION – II

5. a) Explain the bistability principle. **5**

   b) Explain C^2MOS register. **6**

6. a) Explain timing classification methods. **6**

   b) Explain sources of skew and jitter. **5**

7. a) Explain any one method of designing fast multipliers. **6**

   b) Explain designing of SRAMs. **6**

8. Write notes on **any three** of the following : **(4×3=12)**

   a) TSPCR

   b) Clock distribution

   c) Designing arithmetic building blocks

   d) PLL for clock synchronization.

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Seat No.	

M.E. (Electronics Engg.) (Semester – I) (New) Examination, 2014
ADVANCED DIGITAL SIGNAL PROCESSING (Paper – II)

Day and Date : Wednesday, 25-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *suitable data if* ***required****.*

SECTION – I

1. 1) Explain the Levinson Durbin algorithm for computation of LPC's. **6**
   2) Draw the block diagram prediction error filter. Derive the normal equation for the coefficient of linear predictor. **6**

2. 1) Derive the equation for ARMA model for power spectrum estimation. **6**
   2) Explain relationship between the auto correlation and model parameter. **5**

3. 1) Explain the design of optimum equiripple linear phase FIR filter. **6**
   2) Design an ideal Hilbert transform with frequency response :

$$H\left(e^{j\omega}\right) = -j \quad \pi > \omega \geq 0$$
$$= j, \quad 0 > \omega > -\pi$$

   using rectangular window for N = 9. **6**

SECTION – II

4. 1) Explain IIR filter design by using pade approximation method. **6**
   2) Derive mean square error in least mean square algorithm with optimization. **6**

5. 1) Explain with timing relations the concept of sampling rate conversion. **6**
   2) Explain the process of decimation by factor 'D'. Draw the spectrum for each stage. **6**

6. 1) Discuss in detail concept of wavelet transform. **6**
   2) Explain in detail wavelet transform expansion system. **5**

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Seat No.	

M.E. (Electronics Engineering) (Semester – I) (New) Examination, 2014
ADVANCED NETWORK ENGINEERING (Paper – III)

Day and Date : Friday, 27-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

1. Answer following questions : **(3×4=12)**

   1) Explain the terms network MTU, Fragmentation and Time to Live (TTL) related to IP.

   2) Draw and explain TCP state machine.

   3) Describe the concept of manager and agent in SNMP. Draw and explain SNMP message format.

2. Answer **any two** from following questions : **(2×6=12)**

   1) Draw the message format for address resolution and explain. What are ARP encapsulation and its policies ?

   2) Describe various timers associated with TCP. Explain Kern's algorithm related to TCP.

   3) Discuss symmetrical and asymmetrical cryptography algorithm in detail.

3. Answer following questions :

   1) What is public and private key ? If N = 119, public key = 5 and private key = 77, find cipher text generated by a transmitter which uses RSA algorithm to transmit character 'K'. Also demonstrate the operation of receiver to recover plain text. **5**

   2) What are MIB categories and MIB variables ? Specify some examples of MIB categories and variable. **6**

   OR

   2) Discuss packet level filters in detail. **6**

P.T.O.

SECTION – II

4. Answer the following questions : **(3×4=12)**

   1) What is digitization of audio ? Explain audio compression.

   2) Why MPEG-21 is proposed ? Explain MPEG-21 frame work in detail.

   3) What are the needs of variable bit rate applications ? How these requirements are achieved in MPEG-4 ?

5. Answer **any two** from following questions : **(2×6=12)**

   1) Discuss Digital Video Broadcasting (DVB) over IP in detail.

   2) Explain CIF and QCIF video formats.

   3) What are the routing and QoS requirements in network layer for multimedia communication ? Explain in brief internet routing protocols.

6. Answer following questions :

   1) What is playback buffer ? Draw and explain RTP header format. **5**

   2) Explain layered media streaming in detail. **6**

   OR

   2) What is error resilient approach for real time video transport over unreliable network ? Discuss error resilient encoding. **6**

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Seat No.	

M.E. (Electronics) (Sem. – I) Examination, 2014
RANDOM SIGNALS AND PROCESSES (New) (Paper – IV)

Day and Date : Monday, 30-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions** : 1) **All** questions are **compulsory.
*2) **Assume** suitable data **whenever** necessary.*

SECTION – I

1. a) What are Bernoulli trials ? Derive the relation for binomial distribution. **5**
   b) A box contains m white and n black balls. Suppose k balls are drawn. Find the probability of drawing at least one white ball. **4**
   c) The events A and B are mutually exclusive. Can they be independent ? **3**

2. a) Define characteristic function and hence derive the characteristic function of Gaussian random variable with zero mean and unit variance. **4**
   b) Define central limit theorem. **2**
   c) Consider the following PDF

$$f_X(x) = \begin{cases} 4x & 0 \le x \le 0.5 \\ -4x + 4 & 0.5 \le x \le 1 \\ 0 & \text{elsewhere} \end{cases}$$

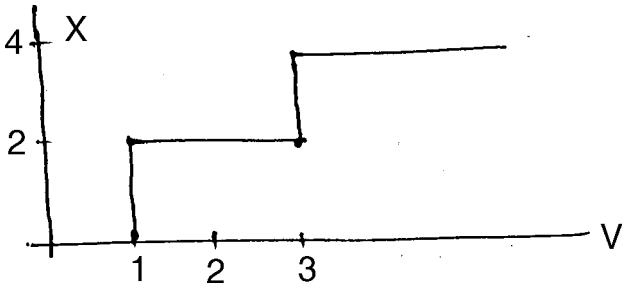
Obtain following conditional PDF's

i) $f_X(x / x \le 0.4)$

ii) $f_X(x / x \ge 0.6)$. **6**

OR

c) An analog to digital converter samples a continuous random voltage V and converts it into a discrete random variable X in accordance with the transformation shown in the sketch.



If V has an exponential probability density function with a mean value of 2.0, write the probability density function of X and find the mean value of X. **6**

3. a) Explain following :
   i) Uniform distribution
   ii) Gaussian distribution

   Obtain the mean value and variance of these distributions. **5**

b) Two statistically independent components X and Y are connected in a circuit. The failure times of X and Y are given by

$$f_{xy}(x,y) = 0.2.e^{-(0.4x+0.5y)} \quad x,y \geq 0$$

Find the probability that the circuit fails in less than 3 years if
   i) Components are connected in parallel
   ii) Components are connected in series. **6**

OR

b) Variable X is a random variable that is uniformly distributed between – 2 and + 2. Variable Y is another random variable that is uniformly distributed between – 4 and + 4. Also X and Y are statistically independent and are added to obtain Z = X + Y. **6**
   i) Sketch the probability density function for Z.
   ii) Find the correlation coefficient ρ associated with Z and X.

SECTION – II

4. a) Define and explain :
   i) Wide sense stationary process
   ii) Ergodic random process. **4**

b) A random process has sample function of the form

$X(t) = A.\ e^{-|t|}$

Where A is a random variable which is uniformly distributed between 0 and 1

i) Is this process stationary in wide sense ? Prove your conclusion. **4**

ii) Find the mean square value of the process.

c) Find the mean, variance and root mean square value of the process whose autocorrelation function is

$R_{xx}(\tau) = 4 + 6e^{-3|\tau|}$. **4**

5. a) Explain in brief how to estimate the auto correlation function using frequency domain technique. **5**

b) A stationary random process has an autocorrelation function of the form

$$R_x(\tau) = \begin{cases} 4 & |\tau| > 3 \\ 4 + \frac{2}{3}\left(1 - \frac{|\tau|}{3}\right) & |\tau| < 3 \end{cases}$$

Compute the spectral density of the process. **6**

OR

b) Given the power spectral density of a continuous process as

$$S_{xx}(w) = \frac{w^2 + 9}{w^4 + 5w^2 + 4}$$

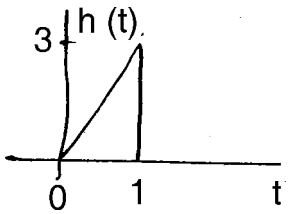
Find the mean square value of the process. **6**

6. Attempt **any two** of the following : **(2×6=12)**

a) A linear system is described by the impulse response $h(t) = \left(\frac{1}{RC} e^{-t/RC}\right) u(t)$.

Assume an input process whose autocorrelation function is $A.\delta(\tau)$. Find the mean and autocorrelation function of output of the process.

b) White noise is applied to the input of a linear system whose impulse response is shown below. Determine and sketch the autocorrelation function of the output.



c) What is Poisson random process ? Obtain its mean and variance ?

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Seat No.	

M.E. (Electronics Engineering) (Semester I) (New) Examination, 2014
Elective I – DESIGN OF WIRELESS SYSTEM (Paper – V)

Day and Date : Wednesday, 2-7-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate full marks.*
*3) Assume suitable data if **necessary**.*

SECTION – I

1. a) What are S parameters ? What is its significance ? **6**

   b) Discuss stability of wideband amplifiers. **6**

2. a) Design a Pierce Crystal Oscillator for 600 KHz to 30 MHz. How to tune it to a particular frequency ? What are issues associated with it ? **5**

   b) What are SAW filters ? What are issues associated with it ? **5**

   OR

   c) What are PLL fractional N synthesizers ? **5**

3. a) Design a passive loop PLL synthesizer with a center frequency 2.45 GHz. Assume other suitable parameters. **7**

   b) Discuss any two lumped filter circuit types in details. **6**

   OR

   c) What are digital modulation issues ? **6**

P.T.O.

SECTION – II

4. a) Design a passive single ended RF diode mixer for RF = 60 MHz and IF of 40 MHz. Assume other suitable parameters. **6**

   b) Discuss distortions in passive filter. **6**

5. a) Draw and design a SNAP frequency multiplier. **7**

   b) Discuss active and passive RF switches. **6**

   OR

   c) Discuss AGC and issues associated with it. **6**

6. a) Discuss linear RF transmitter. **5**

   b) Explain RF link budget. **5**

   OR

   c) Discuss basics of discrete event simulation. **5**

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Seat No.	

M.E. (Electronics) (Sem. – I) (New) Examination, 2014
IMAGE AND VIDEO PROCESSING (Elective – I) (Paper – V)

Day and Date : Wednesday, 2-7-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions** : 1) **All** questions are **compulsory.
*2) Figures to the **right** indicate **full** marks.*

SECTION – I

1. Solve **any two :** **(2×6=12)**
   i) What is need of sampling in image processing ? Explain 2-D sampling theory.
   ii) Define 2D-DFT of an image of size M×N and explain its properties.
   iii) Define quantization. Explain Uniform Optimum Quantizer.

2. Solve **any two** : **(2×6=12)**
   i) Give four important unitary image transforms. Explain any two unitary image transforms.
   ii) Perform K-L transform for the following matrix :

$$X = \begin{bmatrix} 4 & -2 \\ -1 & 3 \end{bmatrix}$$

   iii) What is color quantization ? Explain color image enhancement.

P.T.O.

3. Solve **any two** : **(2×6=12)**

   i) With reference to following example, explain Histogram Equalization ?

2	3	3	2
4	2	4	3
3	2	3	5
2	4	2	4

Fig. (a) Image 4*4

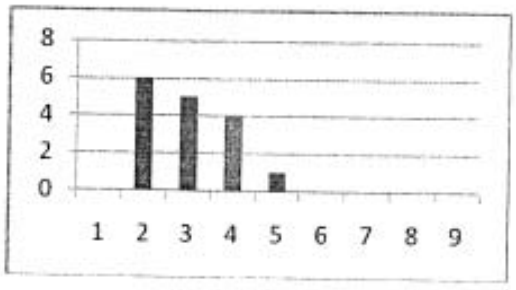

Fig. (b) Histogram

   ii) What is the use of Pseudo-inverse filter ? Explain inverse and Pseudo-inverse filtering.

   iii) Explain generalized inverse, SVD and iterative method.

SECTION – II

4. Solve **any two** : **(2×5=10)**

   i) What is spatial feature extraction ? Explain any one method of edge detection.

   ii) What is segmentation and explain it ?

   iii) Explain chain code for boundary detection.

5. Solve **any two :** **(2×6=12)**

   i) What is image compression, explain transform coding technique.

   ii) Explain Huffman coding for given below example and find out efficiency of Huffman coding.

5	6	4	3
2	6	4	4
3	3	5	2
2	3	4	4

   iii) Explain details .JPEG.

6. Solve **any two** : **(2×6=12)**

   i) Explain fundamental concept of video processing.

   ii) Explain details MPEG 1, MPEG 2.

   iii) Explain video compression technique.

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Seat No.	

M.E. (Electronics Engineering) (Semester – II) Examination, 2014
ADVANCED COMPUTER ARCHITECTURE (Old) (Paper – VI)

Day and Date : Tuesday, 24-6-2014 Max. Marks :100

Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicates **full** marks.*
*3) **Assume** suitable data **if necessary**.*

SECTION – I

1. a) Explain encoding of instruction set. **8**

   b) Explain instruction formats and load store instructions for DLX. **10**

   OR

   c) Explain basic pipeline for DLX. **10**

2. a) Explain data hazard classification. **8**

   b) Explain control hazards. **8**

3. a) Explain types of exceptions and requirements. **10**

   b) Discuss first three cycles of DLX instructions. **6**

   OR

   c) Explain different ways to classify instruction set. **6**

P.T.O.

SECTION – II

4. a) Explain directory protocol. **10**

   b) Explain implementation of locks using coherence. **8**

   OR

   c) Explain FFT Kernel and LU Kernel parallel applications. **8**

5. a) Explain spin lock with exponential back off. **8**

   b) Explain relaxed models for memory consistency. **8**

6. a) Explain basic vector architecture. **8**

   b) Explain vector execution time. **8**

   OR

   c) Discuss issue of vector length control. **8**

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Seat No.	

M.E. (Electronics) (Semester – II) Examination, 2014
EMBEDDED SYSTEM DESIGN (Paper – VII) (Old)

Day and Date : Thursday, 26-6-2014 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions** : 1) **All** questions are **compulsory.
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** suitable data if necessary.*

SECTION – I

1. Answer **any two** : **(8×2=16)**
   a) List any five CPU code features and five peripheral features of 16F877.
   b) Explain CPU registers W, STATUS, FSR, PCL and PCLATH.
   c) Explain PWM mode used in PIC microcontroller.
2. Answer **any two** : **(8×2=16)**
   a) List interrupt supported by 16F877 and discuss them in brief.
   b) Explain use of UART in PIC microcontroller.
   c) Write a programme for interfacing of stepper motor connected to PIC PORT B.
3. Answer **any two** : **(9×2=18)**
   a) Compare SPI, I^2C.
   b) Design a Test Board using 16F877, which will able to scan 8 channel analog inputs.
   c) Write a programme for Running LEDs connected to PortB.

P.T.O.

SECTION – II

4. Answer **any two :** **(8×2=16)**

   a) What is use of timer in RTOS ?

   b) Compare function queue scheduling with Round Robin with interrupt.

   c) How to use queues, mail boxes and pipes for data sharing/communication ?

5. Answer **any two** : **(8×2=16)**

   a) Explain shared data problem and use of semaphores.

   b) Explain tasks, task states and role of scheduler.

   c) Explain tool chains for embedded software design.

6. Answer **any three** : **(6×3=18)**

   a) Memory Management RTOS

   b) Semaphores and its initialization

   c) Use of semaphores for inter-task signaling

   d) Interrupt routine in RTOS environment.

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Seat No.	

M.E. (Electronics) (Semester – II) Examination, 2014
ADVANCED PROCESS CONTROL (Paper – VIII) (Old)

Day and Date : Saturday, 28-6-2014 Max. Marks :100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Figures to the **right** indicate **full** marks.*
*2) **Assume** suitable data **whenever** necessary.*

SECTION – I

1. Attempt **any two** : **(8×2=16)**

   a) Compare statically process method and process reaction curve method.

   b) Develop feed forward control design for any process control system. Draw neat diagram. What is feed forward control decision criteria explain.

   c) Explain an empirical model building procedure.

2. Attempt **any two** : **(8×2=16)**

   a) What is mathematical modeling ? Why it is necessary ?

   b) What do you mean by Degree Of Freedom (D-O-F) in process control ?

   c) Explain Ziegler-Nichols close loops first and second method of tuning PID controller.

3. Attempt **any three** : **(6×3=18)**

   a) Explain the dynamic behavior of first order system.

   b) Effect of digital control on stability, tuning and performance of feedback control system.

   c) Parallel structure of system.

   d) Explain cascaded control design criteria.

P.T.O.

SECTION – II

4. Attempt **any two** : **(8×2=16)**

   a) Explain Internal Mode Control (IMC).

   b) Explain Shewhart chart.

   c) Explain in detail PLC ladder diagram.

5. Attempt **any two** : **(8×2=16)**

   a) Explain ladder diagram development with respect to particular application of PLC.

   b) Explain the signal variable Dynamic Matrix Control (DMC) algorithm. Also show dynamic response of variables.

   c) Explain Smith predictor with a neat block diagram.

6. Write short notes on **any three** of the following : **(6×3=18)**

   a) Relative Gain Array.

   b) Model Predictive Control (MPC).

   c) Statistical Processes Control (SPC).

   d) Communication networking using PLC.

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Seat No.	

M.E. (Electronics) (Sem. – II) Examination, 2014
MOBILE COMMUNICATION ENGINEERING (Elective – II)
(Old) (Paper – IX)

Day and Date : Tuesday, 1-7-2014 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

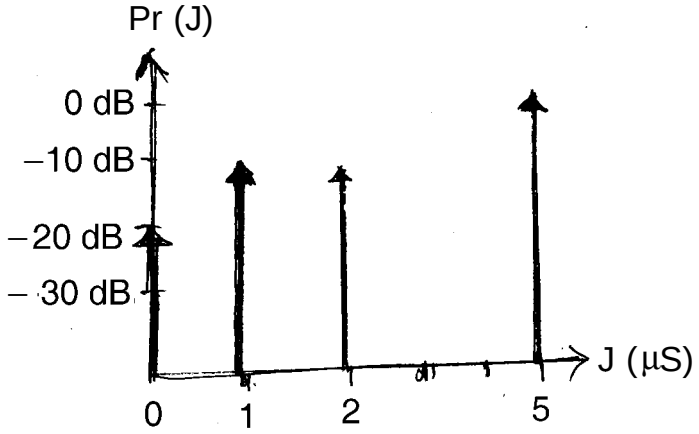
N.B. *: 1)* ***All*** *question are* ***compulsory****.*
2) ***Assume*** *suitable data* ***if necessary****.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. A) Assume a receiver is located 10 km from a 50 W transmitter. The carrier frequency is 6 GHz and free space propagation is assumed Gt = 1 and Gr = 1
   a) Find the power at the receiver
   b) Find the Magnitude of the E-field at the receiver antenna
   c) Find the rms voltage applied to the receiver input, assuming that the receiver antenna has a purely real impedance of 50 Ω and is matched to the receiver. **9**

   B) Explain different types of small scale fading. **9**

2. A) Calculate the mean excess delay, rms delay spread and the maximum excess delay (10 dB) for the multipath profile given in the figure (1). Estimate the 50% coherence bandwidth of the channel. Would this channel be suitable for AMPs or GSM service without the use of equalizer. **8**



Q. 2 (A) Figure (1)

B) Briefly explain different basic modulation techniques used in mobile communication. **8**

P.T.O.

3. Answer **any two** : **(2×8=16)**

   A) Describe the advantages and disadvantages of the two-ray ground reflection model for the analysis of path loss.

   B) Briefly write on Radio communication on flat Rayleigh fading channel.

   C) With suitable sketch explain knife edge diffraction model.

SECTION – II

4. A) Differentiate linear equalization and nonlinear equalization. Explain the structure of linear transversal equalizer and decision feedback equalization. **9**

   B) Explain TDMA frame structure used in cellular system. If GSM uses a frame structure where each frame consists of eight time slots and each time slot contains 156.25 bits and data is transmitted at 270.833 kbps in the channel find :

      a) the time duration of a bit

      b) the time duration of a slot

      c) the time duration of a frame

      d) how long must a user occupying a single time slot wait between two successive transmissions. **9**

5. A) With block diagram explain GSM system architecture. **8**

   B) Explain least mean square algorithm. **8**

6. Answer **any two** : **(2×8=16)**

   A) Write a note on DECT.

   B) Explain theoretical model for polarization diversity.

   C) Describe CT2 standards for cordless telephone.

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Seat No.	

M.E. Electronics (Semester – II) Examination, 2014
Paper – IX : DISTRIBUTED DATABASE SYSTEM (Elective – II) (Old)

Day and Date : Tuesday, 1-7-2014 Total Marks :100

Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** suitable data **if necessary**.*

SECTION – I

1. Solve following :

   A) Explain reference architecture for distributed databases. **10**

   B) Explain simplification of join between horizontally fragmented relations. **8**

   OR

   Explain design of mixed fragmentation. **8**

2. Solve following :

   A) Explain methods for optimization of general queries. **10**

   B) Explain 2-phase commitment protocol. **6**

3. Solve following :

   A) Explain failure classification and recovery for distributed databases systems. **10**

   B) Explain AHY algorithm for optimization. **6**

   OR

   Explain optimization of joint queries. **6**

P.T.O.

SECTION – II

4. Solve following :

   A) Explain commitment protocols and network partitions. **10**

   B) Explain false deadlocks. **8**

   OR

   Explain object distribution design. **8**

5. Solve following :

   A) Explain object naming and catalog management with site autonomy. **10**

   B) Explain distributed deadlock detection. **6**

6. Solve following

   A) Explain distributed object database management system. **10**

   B) Explain adaptex. **6**

   OR

   Explain about catalog in detail. **6**

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Seat No.	

M.E. Electronics (Part – I) (Semester – II) Examination, 2014
BROADBAND COMMUNICATION (Elective – III)

Day and Date : Thursday, 3-7-2014 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Figures to the **right** indicate **full** marks.*
*2) **Assume** suitable data if necessary.*

SECTION – I

1. 1) Explain effect of packet size on transmission time. Discuss control signaling for circuit switching networks. **6**

   2) Explain principles and I-series recommendation in case of ISDN. **6**

   3) What are the advantages and Intelligent Digital Networks (IDN) ? Draw and explain ISDN addressing system. **6**

2. Attempt **any two** : **(2×8=16)**

   1) What are the X.25 layers ? Discuss issues handled in these layers in detail.

   2) How many channels are there in ISDN over which data communication is possible ? Explain multi framing environment in ISDN.

   3) What is the meaning of bursty traffic ? Discuss bursty traffic model in detail.

3. Attempt **any two** : **(2×8=16)**

   1) What is rate adoption ? Explain various methods of rate adoption used in ISDN.

   2) What is interworking strategy ? Discuss ISDN-ISDN interworking strategy.

   3) Explain LAPF in detail.

P.T.O.

SECTION – II

4. 1) What are section, line and path in SONET ? Explain the benefits of add-drop multiplexers in SONET. **6**

   2) Explain different distribution services in BISDN. **6**

   3) Discuss cell delineation process in ATM. **6**

5. Attempt **any two** : **(2×8=16)**

   1) How ATM cells are coupled to ATM networks ? Explain transmission of ATM cells on ATM network.

   2) Explain error control in ATM. What are different service categories in ATM ?

   3)Explain in detail BISDN architecture and BISDN user interface.

6. Attempt **any two** : **(2×8=16)**

   1) Why ATM switching is required ? Explain basic ATM switch element. Discuss ATM cell processing in a ATM switch.

   2) Explain AAL 1 protocol in detail.

   3) How congestion is notified in ATM networks ? Explain feedback congestion control in ATM networks.

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SLR-UN – 49

Seat No.	

M.E. (Electronics Engineering) (Semester – II) Examination, 2014
RESEARCH METHODOLOGY (New) (Paper – VI)

Day and Date : Tuesday, 24-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *suitable data* ***if necessary****.*

SECTION – I

1. a) Define research. What are its objectives ? **6**
   b) With suitable example explain objective, sub objective and scope in a research proposal. **6**
2. a) With suitable example explain dynamic system modeling. **5**
   OR
   b) With suitable example explain static system modeling. **5**
   c) With suitable example explain Monte Carlo simulation. **5**
3. a) With suitable example explain why simulation is necessary in research. **7**
   b) What is significance of literature review ? How to carry it ? **6**
   OR
   c) With suitable example explain research design. **6**

SECTION – II

4. a) Explain any three statistical distributions. **6**
   b) Discuss significance of E research with suitable example. **6**
5. a) With suitable example explain how to write an abstract of technical report. **5**
   OR
   b) Discuss role of ICT at different stages of research. **5**
   c) With suitable example discuss ethical practices to be followed in research. **5**
6. a) Discuss various sections of a typical project report. **7**
   b) What are the guidelines for design of experiment ? **6**
   OR
   c) Explain statistical output analysis. **6**

SLR-UN – 50

Seat No.	

M.E. (Electronics Engg.) (Semester – II) Examination, 2014
EMBEDDED SYSTEM DESIGN (New) (Paper – VII)

Day and Date : Thursday, 26-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instruction** : **All** questions are **compulsory**.*

SECTION – I

1. Explain the following instruction (**any five**) : **(5×3=15)**
   1) BIC
   2) BX
   3) CDP
   4) CMN
   5) RSC
   6) MVN.

2. Draw diagram for interfacing of LCD display (2 lines and 16 characters) and display "COLLEGE SOLAPUR" using ARM 9 and write the programme in C. **10**

3. With the help of diagram explain ARM 9 architecture. **10**

   OR

3. Explain embedded system design process.

SECTION – II

4. Explain software development process life cycle and its model in detail. **10**

5. What is linux kernel configuration ? Explain the steps in Linux kernel configuration. **10**

6. Explain system analysis and architecture design. **15**

SLR-UN – 51

Seat No.	

M.E. (Electronics Engineering) (Semester – II) (New) Examination, 2014
PERIPHERAL SYSTEM DESIGN AND INTERFACING (Paper – VIII)

Day and Date : Saturday, 28-6-2014 Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Figures to the **right** indicate **full** marks.*

*2) **Assume** necessary data, **if required**.*

SECTION – I

1. Answer following questions : **(3×4=12)**

   1) Explain various handshake signals use in RS 232. How multiple RS 232 devices can be connected ?

   2) What is the purpose of expansion bus ? List popular expansion buses. Draw and explain briefly I/O read operation in ISA bus cycle.

   3) Discuss arbitration between two bus masters in case of EISA.

2. Answer **any two** from following questions : **(2×6=12)**

   1) Draw block diagram of PCI system and discuss in detail. Explain PCI addressing and bus commands.

   2) Draw diagram showing multi-drop connection in RS 485 standard and explain it in detail.

   3) Explain handshake protocol related to GPIB. Discuss GPIB capabilities and commands.

3. Answer following questions :

   1) Draw and explain I/O read and I/O write in case of ST-100. **6**

   2) What is standard parallel port ? What are the registers and signals associated with SPP ? Draw and explain timing for data transfer for SPP. **5**

   OR

   2) Explain USB signaling and USB communication in detail. **5**

P.T.O.

SECTION – II

4. Answer following questions : **(3×4=12)**
   1) Explain operations of different system and peripheral control chips in PC.
   2) Compare between P, PI, PD and PID controllers.
   3) What are the criteria for PLC selection and its installation in process control industry ?

5. Answer **any two** from following questions : **(2×6=12)**
   1) Explain in detail PC based data acquisition system.
   2) Explain data transmission and reception in case of universal receiver transmitter. Discuss different registers involved in UART.
   3) Describe basic DMA operation in PC. What are various DMA channels available in PC ?

6. Answer following questions :
   1) Name the layers involved in HART communication. Draw and explain structure of HART telegram. **6**
   2) Which layers are used in MODBUS TCP/IP protocol ? Explain message format of MODBUS TCP/IP. **5**

      OR

   2) Draw network structure of DeviceNet. Explain message format used in DeviceNet communication. **5**

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SLR- UN – 52

Seat No.	

M.E. (Electronics) (Semester – II) Examination, 2014
ADVANCED CONTROL SYSTEMS (New) (Paper – IX)

Day and Date : Tuesday, 1-7-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the **right** indicate **full** marks.*
*2) **Assume** suitable data **whenever** necessary.*

SECTION – I

1. Attempt **any two** : **(6×2=12)**

   a) Discuss the advantages of state space techniques over the transfer function techniques of analyzing the control systems.

   b) Determine the contalability and observability properties for following system

$$A=\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 1\\ 0 & -2 & -3\end{bmatrix}\ B=\begin{bmatrix}0\\0\\1\end{bmatrix}\ C=\begin{bmatrix}10 & 0 & 0\end{bmatrix}.$$

   c) Find inverse Z-transform for

   i) $\dfrac{2z^2+2z}{z^2+2z-3}\ |Z|>3$ ii) $\dfrac{z^2+2z}{(z-2)\ (z+1)^2}$

2. Attempt **any two** : **(6×2=12)**

   a) Find transfer function of the system for following state matrices.

$$A=\begin{bmatrix}-2 & 1 & 0\\ 0 & -3 & 1\\ -3 & -4 & -5\end{bmatrix}\ B=\begin{bmatrix}0\\0\\1\end{bmatrix}\ C=\begin{bmatrix}0 & 1 & 0\end{bmatrix}$$

   b) Find the response y(k) as function of k for following transfer function model with given inputs.

$$G(z)=\frac{y(z)}{R(z)}=\frac{2z-3}{(z-0.5)\ (z+0.3)}\quad r(k)=\begin{cases}1, & k=1\\ 0, & K=0,\ 1,\ 2,\ 3...\end{cases}$$

   c) Explain sampling, quantization effect in detail.

P.T.O.

3. a) Find the state equation for R-L-C series circuit. Consider V_i (t) input voltage, V_O as output voltage and current flowing through series circuit is I (t). **5**

   b) Obtain Eigen vectors for following matrices. **6**

   $$A = \begin{bmatrix} -3 & 1 \\ -1 & -3 \end{bmatrix}.$$

SECTION – II

4. Attempt **any two** : **(6×2=12)**

   a) Consider the system with transfer function $\frac{Y(s)}{U(s)} = \frac{16}{s^2 - 16}$. Find matrices A, B, C in observable canonical form.

   b) Explain state observer and it's design.

   c) Explain conversion of MIMO problem to SISO problem.

5. Attempt **any two** : **(6×2=12)**

   a) The negative feedback control system has the forward path transfer function as $\frac{Y(s)}{U(s)} = \frac{8}{s(s+2)}$. While the feedback path transfers function H(s) is 4. Determine the sensitivity of the closed loop transfer function with respect to G and H at ω = 1 rad/sec.

   b) Write a note on basic MIMO control loop.

   c) Explain servo systems.

6. Write short notes of the following :

   a) Write a note on pole placement by state feedback. **5**

   b) Explain robust stability of the control system. **6**

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SLR-UN – 53

Seat No.	

M.E. (Electronics Engineering) (Sem. – II) (New) Examination, 2014
Elective – II : MOBILE TECHNOLOGY (Paper – X)

Day and Date : Thursday, 3-7-2014 Max. Marks :70

Time : 10.00 a.m. to 1.00 p.m.

N.B. : *1)* ***All*** *questions are* ***compulsory****.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

3) ***Assume*** *suitable data* ***if necessar****y.*

SECTION – I

1. Answer **any two** : **14**

   a) With block diagram explain GSM architecture.

   b) Explain functional groups of GPRS and its architecture.

   c) Describe the basic locations update procedure in GSM.

2. Answer **any two** : **12**

   a) Describe any two failure restoration procedures for both the VLR and the HLR.

   b) Explain any three WAP protocol.

   c) List the functions of GPRS support node.

3. a) What are the different types of control channels in GSM ? **5**

   b) Explain usefulness of WAP developer toolkits. **4**

P.T.O.

SECTION – II

4. Answer **any two** : **14**

   a) Explain the architecture of UTRAN.

   b) Discuss forward link and reverse link of EVDO.

   c) Explain uplink spreading and scrambling in air interface.

5. Answer **any two** : **12**

   a) Describe different types of attacks observed in mobile computing.

   b) With suitable sketch explain 'Public Key Cryptography' in GSM.

   c) Explain phases of Evolution of CDMA 2000.

6. a) Explain the architecture of CDMA 2000 packet data transport flow. **5**

   b) Explain the 3 GPP release 4 N/W architecture in detail. **4**

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SLR-UN – 55

Seat No.	

M.E. (Electronics Engg.) (Sem. – II) (New) Examination, 2014
Elective – II : VLSI IN SIGNAL PROCESSING (Paper – X)

Day and Date : Thursday, 3-7-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. Solve **any four** : **20**

a) Draw the block diagram, SFG and DFG for $y(n) = ax(n) + bx(n-1) + cx(n-2)$.

b) Explain the following :

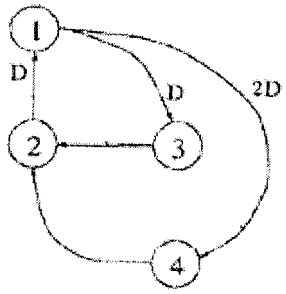
i) Critical path

ii) Loop bound

iii) Iteration bound.

c) Define pipelining and parallel processing. Explain their advantages.

d) Perform the retiming for the following DFG shown in fig.

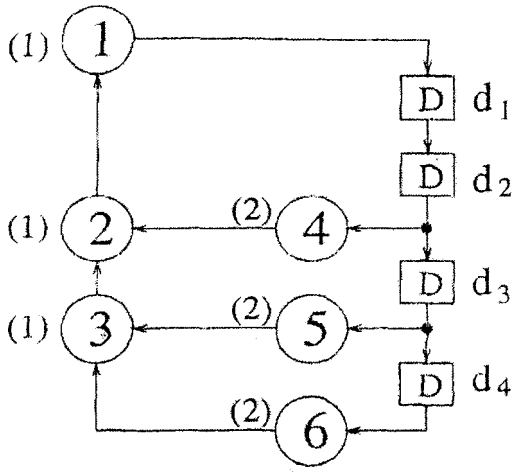


e) What is retiming of DFG ? Explain properties of retiming.

P.T.O.

2. Solve the following :

a) For DFG shown below find iteration bound using LPM algorithm. **8**



b) In the SFG shown in fig(a) the computation time for each node is assumed to be 1 u.t.

i) Calculate critical path computation time.

ii) The critical path has been reduced to 2 u.t. by inserting 3 extra delay element as shown in fig. (b).

iii) Is this valid pipelining if not obtaining an appropriate pipelining ckt with critical path of 2 u.t. **7**

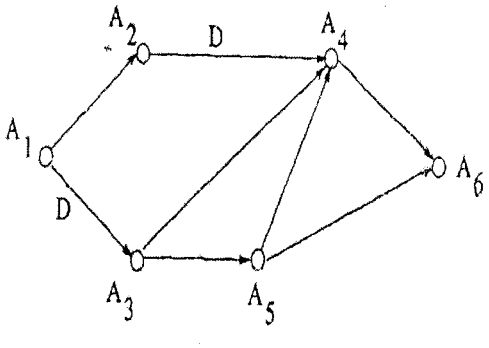


Fig. a

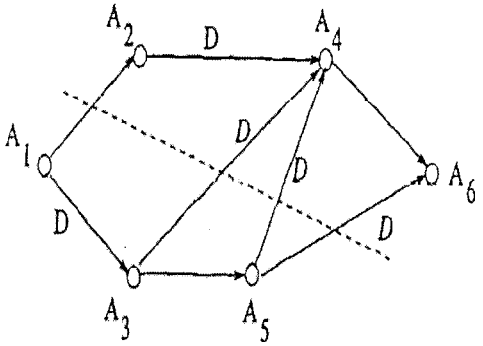


Fig. b

OR

b) Write a note on retiming for register minimization and retiming for clock period minimization. **7**

SECTION – II

3. Solve **any four** : **20**

a) Write a note on folding transformations.

b) Mention the step to minimize register in folding architecture.

c) Prove the relationship with suitable example that unfolding preserves number of delay.

d) State the properties of unfolding.

e) Explain parallel carry ripple array multipliers.

4. Solve the following :

a) Design R1 filter for FIR systolic array. **8**

b) Draw the constraint graph and use it to determine if the following system inequalities have a solution and find the solution if one exists using Floyd-Warshall algorithm.

$r_1 - r_2 \leq 0$

$r_3 - r_1 \leq 5$

$r_4 - r_1 \leq 4$

$r_4 - r_3 \leq -1$

$r_3 - r_2 \leq 2$ **7**

OR

b) Draw the circular life time chart for following with period N = 8.

Variable name	Tin
a	0
b	1
c	2
d	3
e	4
f	5
g	6

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Seat No.	

M.E. (C.S.E.) (Sem. – I) Examination, 2014
THEORY OF COMPUTER SCIENCE (Old) (Paper – I)

Day and Date : Monday, 23-6-2014 Max. Marks : 100

Time : 10.00 a.m. to 1.00 p.m.

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. Answer **any two** : **16**

   a) Define a proper set and a multiset with examples. Show that $A \cup B > A \cap B$ using Venn. diagrams.

   b) Illustrate functions and relations with examples.

   c) For every graph G, the sum of the degrees of all the nodes in G is an even number.Prove the theorem by induction.

2. Answer **any two** : **16**

   a) Prove the theorem by induction for each $t \geq 0$ $P_t = PM^t - y\left(\frac{M^t - 1}{M - 1}\right)$.

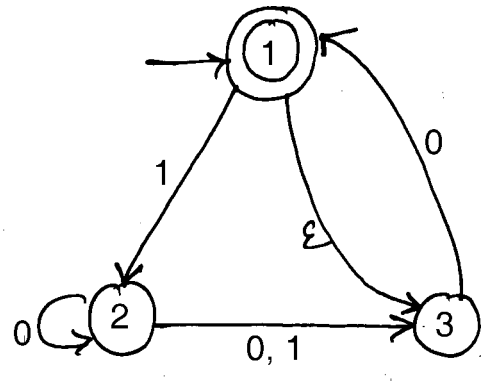
   b) Prove that the class of regular languages is closed under the union and concatenation operation.

   c) What is a CFG ? How the ambiguity in grammars can be eliminated ? Explain with example.

P.T.O.

3. Answer the following : **18**

   a) Define NFA and DFA. Construct a DFA for a following NFA.



   b) Define a Turing machine. Construct and illustrate a turing machine accepting a string $\{x \# x \mid x \in \{0, 1\}^*\}$

SECTION – II

4. Answer **any two** : **16**

   a) Prove that A_{CFG} and E_{CFG} are decidable languages.

   b) What is diagonalization method ? Explain. Prove that R is uncountable.

   c) Explain reduciability. Show that $REGULAR_{TM}$ is undecidable.

5. Answer **any two** : **16**

   a) What is undecidability ? Show that ALL_{CFG} is undecidable.

   b) State and prove the Recursion theorem.

   c) Explain mapping reducibility with example.

6. Answer the following : **18**

   a) How the algorithms are analyzed ? Explain the measures of complexity.

   b) Explain the class NP with the example problems.

SLR- UN – 5A

Seat No.	

M.E. (Civil-Structures) (Sem. – I) Examination, 2014
Elective – I : DESIGN OF FOUNDATIONS (Paper – V)

Day and Date : Wednesday, 2-7-2014 Total Marks : 70
Time : 10.00 a.m. to 2.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) ***Make*** *suitable assumption* ***if necessary*** *and mention it* ***clearly****.*
3) Figures to the ***right*** *indicates* ***full*** *marks.*

SECTION – I

1. A) Explain the IS code equation to determine the bearing capacity. How the shape factor, depth factor and inclination factors are calculated in this equation ? **6**

   B) A plate load test was performed on a uniform deposit of sand and the following observations were recorded.

Load (kN/m²)	50	100	200	300	400	500	600
Settlement (mm)	4.5	8.5	16	31.3	50	74	104

   Size of plate was 20 × 20 cm. Plot load settlement curve and determine the load on a footing of size 1.75 m × 1.75 m can carry safely if the settlement is not to exceed 30 mm. **6**

2. A) Describe the procedure for the design of strap footing (Geometry only). **4**

   B) Two reinforced column 800 × 800 mm and 600 × 600 mm in size carry axial load of 2850 kN and 1700 kN respectively. The columns are spaced 2.8 m apart. The available space by side of 1700 kN column is 1.3 m only from centre of column. The SBC of soil is 250 kN/m^2. Use M-20 concrete and Fe-415 steel. Design combined trapezoidal footing (Geometry only). **7**

P.T.O.

3. A) Describe conventional method of design of raft foundation. **4**

   B) Design a raft foundation (beam column type) for 4 columns spaced at a distance of 4 m center to center in either direction (square pattern). All four columns carry an equal load of 800 kN. Assume SBC = 110kN/m^2. Use M–20 concrete and Fe-415 steel. **8**

SECTION – II

4. A) What is negative skin friction ? Where it is developed ? What is it's effect on the load carrying capacity of pile ? **4**

   B) A square group of 9 piles was driven into a soft clay extending to a large depth. The diameter and length of the piles were 30 cm and 9 cm respectively. If the unconfined compressive strength of clay is 90 kN/m^2, and the spacing is 90 cm centre to centre, What is the capacity of group ? Assume FOS 2.5 and adhesion factor 0.75. **8**

5. A) A column carries load of 1800 kN is supported by four piles of 450 mm dia. The size of the column is 400 mm × 400 mm. The center to center distance between the pile is 1.3 m in either direction. Design suitable pile cap. Assume M-20 concrete and Fe-415 steel. **8**

   B) Describe the load transfer mechanism in case of drilled pier. **4**

6. A) What do you understand by scour depth and grip length ? What is its importance in Well foundation ? **4**

   B) Show Yawing, Rocking and pitching with neat sketch. **4**

   C) Discuss the criteria for satisfactory performance of machine foundation. **3**

SLR-UN – 5B

Seat No.	

M.E. (Civil Structures) (Semester – I) Examination, 2014
ADVANCES IN CONCRETE COMPOSITES (Elective – I) (Paper – V)

Day and Date : Wednesday, 2-7-2014 Max. Marks : 70
Time : 10.00 a.m. to 2.00 p.m.

***Note** : Answer **any two full** questions from **each** Section.*

SECTION – I

1. a) What are the basic properties of fiber reinforced concrete, which can be made use of in the design of structural elements ? **10**
   b) Explain the materials used in Ferro cement. **8**

2. a) What are the merits of Ferro cement and explain in detail ?
   b) Why should FRC be used only with regular reinforcement ?
   c) Write a note on Workability test on FRC. **(6×3)**

3. State and explain :
   a) Properties of freshly mixed FRC.
   b) Mechanical properties of FRC. **(9×2)**

SECTION – II

4. What is Silica Fume Concrete and explain in detail its properties with respect to
   a) Physical properties. **6**
   b) Properties of fresh concrete. **5**
   c) Durability of concrete. **6**

5. a) State the applications of Silica Fume Concrete. **9**
   b) Explain the comparison of important properties of normal concrete with those of polymer concrete. **8**

6. a) What are the applications of polymer impregnated concrete and polymer concrete ? **9**
   b) Briefly explain the following : **(4×2)**
      i) Classification of polymer concrete
      ii) Advantages of silica fume concrete.

SLR-UN – 6

Seat No.	

M.E. (Civil Structures) (Semester – II) Examination, 2014
THEORY OF PLATES AND SHELLS (Paper – VI)

Day and Date : Tuesday, 24-6-2014 Total Marks : 70
Time : 10.00 a.m. to 2.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *suitable data if required and mention* ***it clearly****.*

SECTION – I

1. a) Give comparison between behavior of Plates and behavior of shells under the effect of external loading. **4**

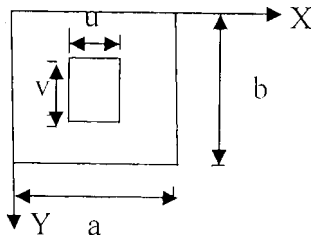
   b) Obtain relationship between slope and curvature of slightly bent plates. **10**

   c) Differentiate between rectangular and circular plates. **4**

2. Calculate moments and deflections at various points of a uniformly loaded square plate by dividing the plate suitably into small squares. Use finite difference method. **17**

3. a) Write a note on Navier's solution as applied to solution of rectangular plate problems. **4**

   b) Using Navier's solution obtain expression for maximum deflection of a simply supported rectangular plate subjected to patch load. **13**



P.T.O.

SECTION – II

4. a) State and explain Finsterwalder's theory. Also give assumptions made in this theory. **12**

   b) How are the shells classified based on geometry ? Draw neat sketches. **6**

5. a) Describe membrane theory of shells. **5**

   b) Using Membrane theory derive differential equation of equilibrium for an arbitrarily loaded shell of revolution. **12**

6. a) Evaluate stress resultants for thin shell surfaces. **12**

   b) Describe thin shell theory. **5**

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SLR-UN – 60

Seat No.	

M.E. (Computer Science and Engg.) (Sem. – I) Examination, 2014
Paper – II : ADVANCED OPERATING SYSTEM (Old)

Day and Date : Wednesday, 25-6-2014 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Question No.* ***4*** *and* ***8*** *are* ***compulsory****.*
2) Attempt ***any two*** *from* ***remaining*** *questions of* ***each*** *Section.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) ***Assume*** *suitable data* ***wherever*** *necessary.*

SECTION – I

1. a) What were the major technological, economical and social factors that motivated the development of distributed computing systems ? What are some of the main advantages and disadvantages of distributed computing systems over centralized ones ? **6**

   b) Suppose a component of a distributed system suddenly crashes. How will this event inconvenience the user when :

      i) The system uses the processor-pool model and the crashed component is a processor in the pool.

      ii) The system uses the processor-pool model and the crashed component is a user terminal.

      iii) The system uses the workstation-server model and the crashed component is a server machine.

      iv) The system uses the workstation-server model and the crashed component is a user workstation. **10**

2. a) Describe blocking and non-blocking types of IPC. Which is easier to implement and why ? Discuss their relative advantages and disadvantages. **6**

   b) A linked list of characters is to be sent across a network in the form of a stream of bytes. Write the code in any suitable programming language for encoding the data structure on the sender side and decoding it on the receiver side. **10**

P.T.O.

3. a) What is a "stub" ? How are stubs generated ? Explain how the use of stubs helps in making an RPC mechanism transparent. **6**

   b) Write pseudo code descriptions for handling a block fault in each of the following types of DSM systems :

      i) A DSM system that uses the NRNMB strategy.

      ii) A DSM system that uses the RMB strategy. **10**

4. a) Suggest whether may-be, last-one, last-of-many, at-least-once, or exactly-once call semantics should be used for each of the following applications (Give reasons) :

      i) For making a request to a node's resource manager to get the current status of resource availability of its node.

      ii) For making a request to a computation server to compute the value of an equation.

      iii) For making a request to a file server to append a record to an existing file. **9**

   b) Why is a global sequencer needed in a sequentially consistent DSM system that employs the write-update scheme ? Give proper examples to justify your answer. **9**

SECTION – II

5. a) Comment on the practical applicability of the task assignment approach as a scheduling scheme for distributed systems. **6**

   b) A distributed operating system designer is of the opinion that the state information in a distributed system is typically gathered at a high cost. Therefore, for a distributed system based on the processor-pool model, he or she decides to use a load-balancing policy that uses the following simple process placement rule : *Execute all processes originating from terminal i on processor j(j << i). The value of j is defined for all values of i, and for several values of I, the value of j may be the same*.
   In your opinion, is the designer's choice of the scheduling algorithm appropriate for this system ? Give reasons for your answer. What drawbacks, if any, does this scheduling algorithm have ? If you feel this algorithm is not appropriate for this system, suggest a suitable global scheduling algorithm for this system. **10**

6. a) From the point of view of supporting preemptive process migration facility, is stateless of stateful file server preferable ? Give reasons for your answer. **6**

   b) When a migrant process is restarted on its destination node after migration, it is given the same process identifier that it had on its source node. Is this necessary ? Give reasons for your answer. **10**

7. a) What is a transaction ? What are the two main factors that threaten the atomicity of transactions ? Describe how atomicity is ensured for a transaction in both commit and abort. **6**

   b) Explain how symmetric and asymmetric cryptosystems work ? Discuss their relative advantages and disadvantages. Which of the two is more suitable for each of the following cases (Give reasons) :

      i) Where different subjects perform the encryption and decryption.

      ii) For exchange of messages between two communicating entities in a distributed system. **10**

8. a) In your opinion, where (in server memory, in client disk, or in client memory) should a cache for caching data be located in the following types of distributed file systems (give reasons for your answer) :

      i) One that is designed to occasionally support disconnected operation.

      ii) One in which the ratio of number of clients to number of file servers is very large.

      iii) One that has to handle fairly large files. **9**

   b) The password mechanism is used in a distributed system to authenticate users at login time. State the most suitable locations (according to you) for storing the login program and the password file in the following cases :

      i) The distributed system is based on the workstation-server model. Some of the workstations are diskless and others have a small hard disk of about 20 megabytes capacity.

      ii) The distributed system is based on the processor-pool model. **9**

SLR-UN – 61

Seat No.	

M.E. (Computer Science and Engineering) (Semester – I) Examination, 2014

DESIGN AND ANALYSIS OF ALGORITHMS (Old) (Paper – III)

Day and Date : Friday, 27-6-2014 Total Marks : 100

Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any three** questions from **each** Section.*

*2) **Assume** suitable data if needed.*

*3) Figures to the **right** indicate **full** marks.*

SECTION – I

1. a) State and prove the time complexity of Merge Sort. **8**

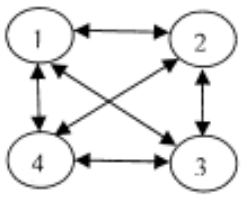
   b) State and explain Graham's scan algorithms with an example. **8**

2. a) Write and explain the greedy algorithms for sequencing with time job with deadlines and profits. **8**

   b) Obtain a set of optimal Huffman codes for the messages (y1 y2 y3 ....y7) with relative frequencies (r1 r2 .....r7) = (3, 4, 6, 8, 10, 14, 18). **8**

   Draw the decode tree for the set of codes.

3. a) Consider following directed graph and edge lengths are given by matrix. Find optimal tour length of travelling sales person problem of Fig. (a). **8**



$$\begin{bmatrix} 8 & 8 & 4 & 2 \\ 6 & 13 & 0 & 12 \\ 5 & 0 & 9 & 10 \\ 0 & 10 & 15 & 20 \end{bmatrix}$$

Fig. (a)

   b) Write a short note on flow shop scheduling with suitable example. **8**

P.T.O.

4. Write a short note on **any three** : **18**

   a) Randomized algorithm

   b) Comparison trees

   c) Convex hull

   d) Reliability design

   e) Prim's algorithm.

SECTION – II

5. a) Write and explain non-deterministic knapsack algorithm with example. **8**

   b) Explain Clique Decision Problem (CDP) in NP Hard Graph with example. **8**

6. a) Explain in detail the Cook's theorem with example. **8**

   b) Prove the theorem FNS $\propto$ the minimum cost realization in NP hard code generation problems. **8**

7. a) Explain fundamental techniques and algorithms with respect to PRAM. **8**

   b) Explain AND/OR graph decision problem with example. **8**

8. Write a note on **any three** : **18**

   a) Packet routing in MESH algorithm

   b) Lower bound in PRAM

   c) Broadcasting in MESH

   d) PPR routing fundamental algorithm in hypercube

   e) NP complete problems.

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SLR- UN – 68

Seat No.	

M.E. (Computer Science and Engineering) (Sem. – I) Examination, 2014
Paper – V : DATA MINING (Elective – II) (Old)

Day and Date : Wednesday, 2-7-2014 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Question **1** and **8** are **compulsory**.*
*2) Attempt **any five** questions from **remaining** questions in **each** Section.*
*3) Figures to the **right** indicate **full** marks.*
*4) **Assume** suitable data **if necessary**.*

SECTION – I

1. Give an example for Apriori with transactions and explain Apriorigen-algorithm. **10**
2. Explain fuzzy sets and fuzzy logic. **8**
3. a) What is normalization ? Explain in brief first, second and third normal form. **8**
   b) Explain issues in data mining.
4. Explain agglomerative algorithm. **8**
5. Explain DBSCAN and CURE algorithm with suitable example. **8**
6. What do you mean by rule based algorithm ? **8**
7. What do you mean by BIRCH ? **8**

SECTION – II

8. What do you mean by SPADE ? **10**
9. Explain Markov Model (MM) for temporal mining. **8**
10. What are spatial data mining primitives ? **8**
11. Explain pattern discovery in Web Usage Mining. **8**
12. Explain web usage mining. **8**
13. What do you mean by Harvest system ? **8**
14. Explain SD (CLARANS) algorithm. **8**

SLR-UN – 7

Seat No.	

M.E. (Civil-Structures) (Semester – II) Examination, 2014
FINITE ELEMENT METHOD (Paper – VII)

Day and Date : Thursday, 26-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 2.00 p.m.

Instructions *: 1) Solve **any two** questions from Section – **I**.*
*2) In Section – **II** Question No. **4** is **compulsory**. Solve **any one** of the remaining **2** questions.*
*3) Use of non-programmable calculator is **allowed**.*
*4) Assume additional data, suitably if required and mention **it clearly**.*

SECTION – I

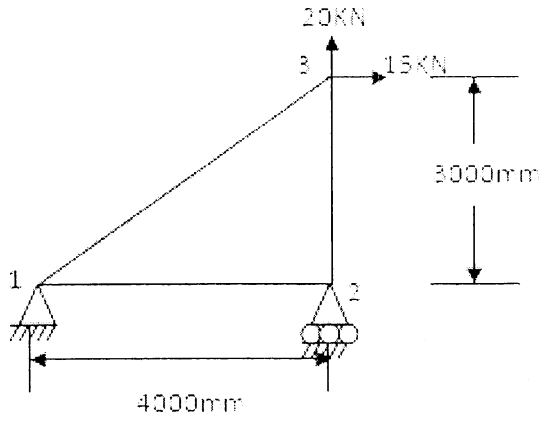
1. a) Using an appropriate polynomial for a 2 node straight prismatic beam : **14**
   - Find shape functions for the beam
   - Using shape functions find strain displacement matrix[B]
   - Using Strain displacement matrix, find elements K 11 and K 33 of stiffness matrix [K].

   b) Explain the various steps involved in finite element analysis. **4**

2. a) State and explain convergence requirements of polynomial shape functions. **4**

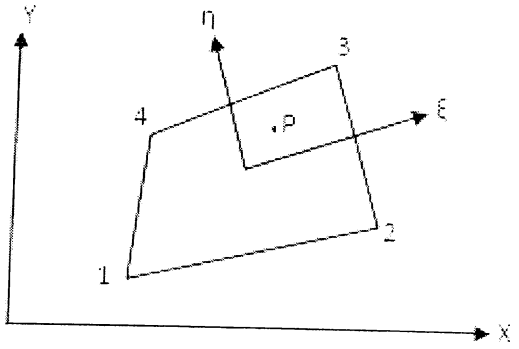
   b) Determine the displacements and reactions in the plane truss shown in Fig. **13**

   Take youngs modulus E = 2×10^5 N/mm^2 and Cross sectional area of the members = 2000 mm^2.



P.T.O.

3. a) In the element shown below with the nodes 1(2, 1), 2(8, 3), 3(7, 7), 4(3, 5), P is the point (6, 5). On this point load components in x and y directions are 8KN and 12KN respectively. Determine its nodal equivalent forces. **13**



b) Give a brief note on constant strain triangle and linear strain triangle. **4**

SECTION – II

4. a) Write a note on Jacobian Matrix and its usefulness in finite element method. **8**

b) Find the elements B11, B22, B33 of strain displacement matrix [B] of a 4 node isoparametric quadrilateral element with nodes (0, 0), (60, 0), (65.7735, 10), (5.7735, 10) at gauss point (0.57735, 0.57735). **10**

5. a) Derive Stiffness matrix of a triangular Axis symmetric ring element. **13**

b) Explain the different types of Shell elements used in finite element method. **4**

6. a) Explain the procedure to arrive at the element stiffness matrix of a plate bending element. **8**

b) Write lumped mass matrix and consistent mass matrix for a beam element. **9**

Using shape functions of a 2 node beam element, derive first 2 elements of consistent mass matrix m11, m12.

SLR-UN – 70

Seat No.	

M.E. (Computer Science and Engg.) (Semester – I) Examination, 2014
THEORY OF COMPUTATION (New) (Paper – I)

Day and Date : Monday, 23-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instruction** : **All** questions are **compulsory**.*

SECTION – I

1. Answer **any two** : **12**

   a) Define a proper subset and a null set with examples. Draw Venn diagrams for $A \cup B$, $A \cap B$, $A \subseteq B$, $A - B$, $A + B$.

   b) What are reflexive, symmetric, transitive and equivalence relations ? Give examples.

   c) Show that, for every graph G, the sum of the degrees of all the nodes in G is an even number.

2. Answer **any two** : **12**

   a) Compare proof by construction, proof by contradiction and proof by induction.

   b) What are the programming techniques for Turing machines ?

   c) Show that, if a language L is accepted by a multi-tape Turing machine, it is accepted by a single-tape Turing machine.

3. What is the Halting Problem ? Show that A_{TM} is undecidable. **6**

   OR

   Show that R is uncountable.

4. What is decidability ? Show that E_{DFA} is a decidable language. **5**

   OR

   Show that A_{NFA} is a decidable.

P.T.O.

SECTION – II

5. Answer **any two** : **12**

   a) What is reducibility ? Show that $HALT_{TM}$ is undecidable.

   b) What is linear bounded automaton ? Show that E_{LBA} is undecidable.

   c) What is PCP ? Show that PCP is undecidable.

6. Answer **any two** : **12**

   a) Show that $REGULAR_{TM}$ is undecidable.

   b) What is the recursion theorem ?

   c) What are primitive recursive functions ?

7. Comment on growth rates of functions with examples. **6**

   OR

   Prove that $f(n) = O(n^3)$. Where $f(n) = 4n^3 + 5n^2 + 7n + 3$.

8. What are tractable and intractable problems ? Give example. **5**

   OR

   How time complexity of non-deterministic Turing machine be measured ?

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SLR-UN – 71

Seat No.	

M.E. (Sem. – I) (Computer Science and Engg.) Examination, 2014
Paper – II : ADVANCED OPERATING SYSTEMS (New)

Day and Date : Wednesday, 25-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Q.* ***4*** *from Section –* ***I*** *and Q.* ***5*** *from Section –* ***II*** *are* ***compulsory****.*
2) Attempt ***any 2*** *from* ***remaining*** *questions from* ***each*** *Section.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. a) In what respect are distributed computing systems better than parallel processing systems. Illustrate with examples of 2 applications for which distributed computing systems will be more suitable than parallel processing systems. **6**

   b) Discuss the most important design factor that influences the flexibility in design of distributed operating systems. **6**

2. a) Consider the case of a distributed computing systems based on processor-pool model that has P processors in the pool. In this system suppose a user starts a computation job that involves compilation of a program consisting of F source files (F<P). Assume that at this time this user is the only user using the system. What maximum gain in speed can be hoped if all the processors we are talking about are of equal capability ? What factors might cause the gain in speed to be less than this maximum. **6**

   b) Why is scalability an important feature in design of distributed system ? Discuss any two the guiding principles for designing a scalable distributed system. **6**

3. a) Explain the models used for Kernel design in distributed OS. **6**

   b) Discuss three process addressing mechanisms with their advantages and disadvantages. **6**

P.T.O.

4. a) Explain general architecture of DSM systems. **6**

   b) Discuss the relative advantages and disadvantages of NRNMB, NRMB. **5**

SECTION – II

5. a) A system consists of three processors P1, P2, P3 and a process having four tasks t1, t2, t3, t4 to be executed on this system. Suppose Eij is the cost of executing task I on processor Pj and Cij is the communication cost between tasks ti and tj when the two tasks are assigned to different processors. Let E11=31, E12=4, E13=14, E21=1, E22=5, E23=6, E31=2, E32=4, E33=24, E41=3, E42=28, E43=10, C12=35, C13=3, C14=8, C23=6, C24=4, C34=23. Find an optimal assignment of tasks to the processors and calculate the cost of optimal assignment. **6**

   b) Discuss various process transfer policies used in load balancing algorithms. **5**

6. a) What are some of the main issues involved in freezing a migrant process on source node and restarting it on the destination node ? **6**

   b) What are some of the main issues involved in designing a process migration facility for a heterogeneous distributed system. **6**

7. a) Explain the static load balancing algorithm and its types. **6**

   b) What are the main advantages and disadvantages of using threads instead of multiple processes ? **6**

8. a) Explain tree structured directories and acyclic graph directories in file system of Linux. **6**

   b) Explain the concept of slab layer allocation and high memory mappings in Linux. **6**

SLR-UN – 72

Seat No.	

M.E. (Computer Science and Engg.) (Semester – I) Examination, 2014
ANALYSIS OF ALGORITHM (New) (Paper – III)

Day and Date : Friday, 27-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instruction *: Solve* ***any three*** *questions from* ***each*** *Section.*

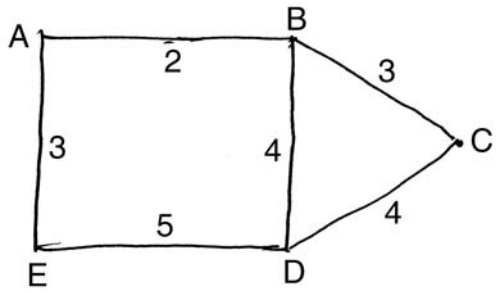
SECTION – I

1. A) Compare the growth rate of the following functions. **6**

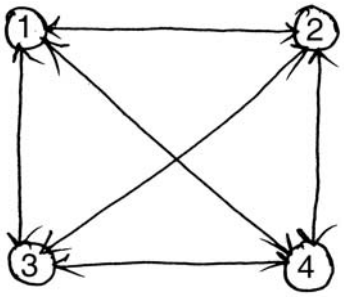
   log n, n, n log n, n^2, n^3, 2^n.

   B) Show that the following equality is correct $5n^2 - 6n = \theta(n^2)$. **5**

2. A) How many minimum spanning trees does the following graph have ? Draw them. **6**



   B) Consider the directed graph and cost matrix. **6**

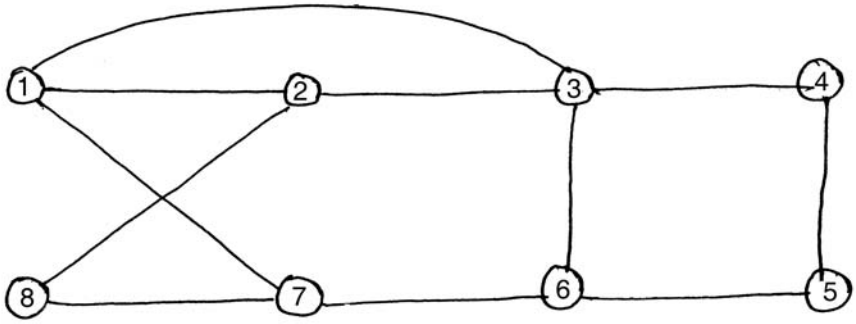


$$\begin{bmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{bmatrix}$$

   Find tour of minimum cost.

P.T.O.

3. A) What is Hamilton cycle ? Does the following graph has it. **6**



B) Explain : Optimal search binary tree. **6**

4. Compare : **12**
   A) Prim's and Kruskals algorithm
   B) Greedy algorithms and dynamic programming
   C) O/I knapsack and greedy knapsack.

SECTION – II

5. A) Explain : NP-Hard code generation problem. **6**
   B) What are AND-OR graphs ? Explain the steps involving in construction of such graph. **6**

6. A) Explain lower bound for PRAM. **6**
   B) Explain odd-even merge algo with example for PRAM. **6**

7. A) Explain : Convex hull. **6**
   B) Explain : Voronoi diagrams. **6**

8. Write a short note on : **11**
   A) List ranking
   B) Computational geometry.

SLR-UN – 73

Seat No.	

M.E. (Computer Science and Engineering) (Semester – I) Examination, 2014

Paper – IV : RESEARCH METHODOLOGY (New)

Day and Date : Monday, 30-6-2014 Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

Instructions** : 1) Q. No. **(4)** and Q. No. **(8)** are **compulsory.

*2) Attempt **any two** from remaining questions in **each** Section.*

*3) **Assume** suitable data if needed.*

*4) Figures to the **right i**ndicate **full** marks.*

SECTION – I

1. a) List objectives of research and what are the motivations in research. **6**

   b) Define research and explain the types of research with an example. **6**

2. a) Explain the features of good design. **6**

   b) Explain the important concepts related to research design. **6**

3. a) How to collect the primary data using observation method ? Explain in detail. **6**

   b) What are the chief merits and weaknesses of the interview method ? **6**

4. a) What are the problems encountered by the researchers in India ? **5**

   b) Describe the process of collection of secondary data. What are the desirable characteristics of secondary data ? **6**

P.T.O.

SECTION – II

5. a) Describe the different processing operations in short. **6**

   b) Write a short note on problems in processing. **6**

6. a) Compare between survey paper and review paper. **6**

   b) Write a short note on poster paper. **6**

7. a) Explain the significance of report writing. Also, mention the different steps involved in report writing. **6**

   b) What are the precautions that need to be taken while writing a research report ? **6**

8. a) Define mean and geometric mean. Find the mean and geometric mean of the following data : **6**

      4, 5, 10, 15, 25, 30, 35

   b) What are the steps to be followed while writing a scientific paper. **5**

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SLR-UN – 74

Seat No.	

M.E. (Computer Science and Engineering) (Sem. – I) Examination, 2014
DATA MINING (Elective – I) (New) (Paper – V)

Day and Date : Wednesday, 2-7-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Question **1** and **8** are **compulsory**.*
*2) Attempt **any five** questions from remaining questions in **each** Section.*
*3) Figures to the **right** indicate **full** marks.*
*4) Assume suitable data **if necessary**.*

SECTION – I

1. Give details of data mining versus knowledge discovery in databases. **5**
2. Discuss data mining issues. **6**
3. Explain fuzzy sets and fuzzy logics. **6**
4. What are similarity measures ? **6**
5. What do you mean genetic algorithms ? **6**
6. Explain what do you mean by CART. **6**
7. Give an example of K-means clustering. **6**

SECTION – II

8. Explain spatial data structure. **5**
9. Explain sting build algorithm. **6**
10. Explain and define Markav Model (MM). **6**
11. What do you mean by SPADE ? **6**
12. Explain temporal association rules. **6**
13. State and explain data mining applications for the retail industry. **6**
14. Explain trend dependencies. **6**

SLR-UN – 75

Seat No.	

M.E. (Semester – I) (Computer Science and Engineering) Examination, 2014
MOBILE COMPUTING (Elective – I) (New) (Paper – V)

Day and Date : Wednesday, 2-7-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instruction** : Solve **any three** of the following from **each** Section.*

SECTION – I

1. a) Explain working of DSSS transmitter and receiver. **6**
   b) Explain radiation patterns using different axis pairs for half wave dipole. **6**

2. a) Explain implicit reservation TDMA schemes. **6**
   b) Explain GSM handover in detail. **5**

3. a) What is multicarrier modulation ? Explain. **6**
   b) Explain GSM protocol layer for signaling with neat diagram. **5**

4. a) Explain security in GSM. **6**
   b) Discuss different problems in propagating signal in wireless medium. **6**

SECTION – II

5. a) Explain 802.11 layers and functions in brief. **6**
   b) Explain basic DFWMAC-DCF mechanism. **6**

6. a) Explain snooping TCP. **5**
   b) Draw and explain datagram protocol of WAP. **6**

7. a) Explain WML script with example. **6**
   b) Explain Android OS architecture. **5**

8. a) How packet delivery to and from the mobile node is done in mobile IP ? **6**
   b) Write a note on Blue tooth technology. **6**

SLR-UN – 78

Seat No.	

M.E. (Computer Sci. and Engineering) (Semester – II) Examination, 2014
COMPUTER NETWORK ADMINISTRATION (Old) (Paper – VI)

Day and Date : Tuesday, 24-6-2014 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Attempt* ***any three*** *questions from* ***each*** *Section.*
2) ***Assume*** *suitable data if needed.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. a) What are the functions of network operator as defined by ISO ? Explain in detail. **8**

   b) What is an Information model ? Explain management information trees. **8**

2. What is network management ? How communication model works ? Explain management communication model and management communication transfer protocols by neat diagram. **16**

3. a) Explain in detail the elements of system group in MIB – II. **8**

   b) With neat diagram explain SNMP network management architecture. **8**

4. Write a short note on **any three** : **18**

   a) Functional Model

   b) Distributed computing environment with WANs

   c) Internet fabric model

   d) ASN.1 Encoding structure.

P.T.O.

SECTION – II

5. a) What is management information base ? Explain with respect to RMON2. **8**

   b) Compare RMON1 and RMON2. **8**

6. What is ATM remote monitoring ? Explain ATM remote monitoring with ATM probe location and ATM RMON MIB. **16**

7. a) Explain major changes in SNMPv2 and v3. **8**

   b) What are the issues concerned with security management ? Explain in detail. **8**

8. Write a short note on **any two** : **18**

   a) The protocol analyzer

   b) Enterprise management solutions

   c) SNMP v2 system architecture.

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SLR-UN – 79

Seat No.	

M.E. (Computer Science and Engineering) (Semester – II) Examination, 2014
ADVANCED DATABASE DESIGN (Old) (Paper – VII)

Day and Date : Thursday, 26-6-2014 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Question **1** and **5** are **compulsory**.*
*2) Attempt **any two** questions from question **2** to **4** from Section **I**.*
*3) Attempt **any two** questions from question **6** to **8** from Section **II**.*
*4) Figures to the **right** indicate **marks** to a question.*
*5) **Assume** suitable data **wherever** necessary.*

SECTION – I

1. a) Consider the following global, fragmentation schema : **15**

Global Schema : DOCTOR (DNUM, NAME, DEPT)

PATIENT (PNUM, NAME, DEPT, TREAT, DNUM)

CARE (PNUM, DRUG, QUAN)

Fragmentation schema :

$DOCTOR_1 = SL_{DEPT = \text{“SURGERY”}}$ DOCTOR

$DOCTOR_2 = SL_{DEPT = \text{“PEDIATRICS”}}$ DOCTOR

$DOCTOR_3 = SL_{DEPT <> \text{“SURGERY” AND DEPT } <> \text{“PEDIATRICS”}}$ DOCTOR

$PATIENT_1 = SL_{DEPT = \text{“SURGERY” AND TREAT = “INTENSIVE”}}$ PATIENT

$PATIENT_2 = SL_{DEPT = \text{“SURGERY” AND TREAT <> “INTENSIVE”}}$ PATIENT

$PATIENT_3 = SL_{DEPT <> \text{“SURGERY”}}$ PATIENT

$CARE_1$ = CARE $SJ_{PNUM = PNUM}$ $PATIENT_1$

$CARE_2$ = CARE $SJ_{PNUM = PNUM}$ $PATIENT_2$

$CARE_3$= CARE $SJ_{PNUM = PNUM}$ $PATIENT_3$

P.T.O.

Assume that a patient is always assigned to same department as her or his doctor.

Translate following global query into fragment queries and use 6 criteria to simplify queries.

PJ_{NAME} (PATIENT NJN $SL_{DRUG = \text{“ASPIRIN”}}$ CARE)

b) Which objectives should be taken into account in design of data distribution ? **5**

2. a) How cost and benefits of allocation of fragments of a global relation are evaluated ? **8**

   b) What is database profile ? How selection and projection operations affect database profile ? **7**

3. a) What are the goals of transaction management ? **8**

   b) What are different kinds of failures which can occur in centralized database ? **7**

4. a) Explain different communication structures for commit protocol. **8**

   b) Explain basic timestamp mechanism with its disadvantages. **7**

SECTION – II

5. a) What are the structured types ? Explain the operations on structured data with example. **12**

   b) Explain transaction management in mobile database systems. **8**

6. a) Explain architecture of multimedia database management systems. **8**

   b) Explain storage of multimedia data. **7**

7. a) How inheritance is handled in object database systems ? Explain with example. **8**

   b) Compare RDBMS with ORDBMS with proper example. **7**

8. a) Explain storage of XML data with different techniques. **8**

   b) What are the challenges for designing web based user interfaces ? **7**

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SLR-UN – 8

Seat No.	

M.E. (Civil-Structure) (Semester – II) Examination, 2014
EARTHQUAKE ENGINEERING (Paper – VIII)

Day and Date : Saturday, 28-6-2014 Max. Marks : 70

Time : 10.00 a.m. to 2.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*

2) Use of IS 1893:2002 is ***permitted****.*

3) Figures to ***right*** *indicate* ***full*** *marks.*

4) Assume suitable data ***if necessary*** *and state* ***it clearly****.*

SECTION – I

1. a) Explain the soil liquefaction. What are effects and remedial measures for soil liquefaction ? **10**

   b) Explain the elastic rebound theory as cause of an earthquake. **7**

2. a) State and explain the concept of response spectrum and various types of response spectra. **10**

   b) What is combined spectrum ? What are its characteristics ? **7**

3. Derive the governing differential equation for two storied building subjected to ground acceleration ÿg and solve the above equation if the amount of damping present is 5%. Assume the damping is stiffness proportional. **18**

P.T.O.

SECTION – II

4. It is proposed to construct a R.C.C. three storied residential building having plan dimensions as shown in Fig. 1 in zone III with following data. Determine the lateral forces and base shear. The all column sizes are 300 × 450 mm and beams sizes are 230 × 450 mm. The slab thickness is 120 mm and thk. of walls is 230 mm. The ht. Of floor is 3.0 m and Live load is 2.5 kN/m^2. The type of frame is OMRF and strata is hard. **18**

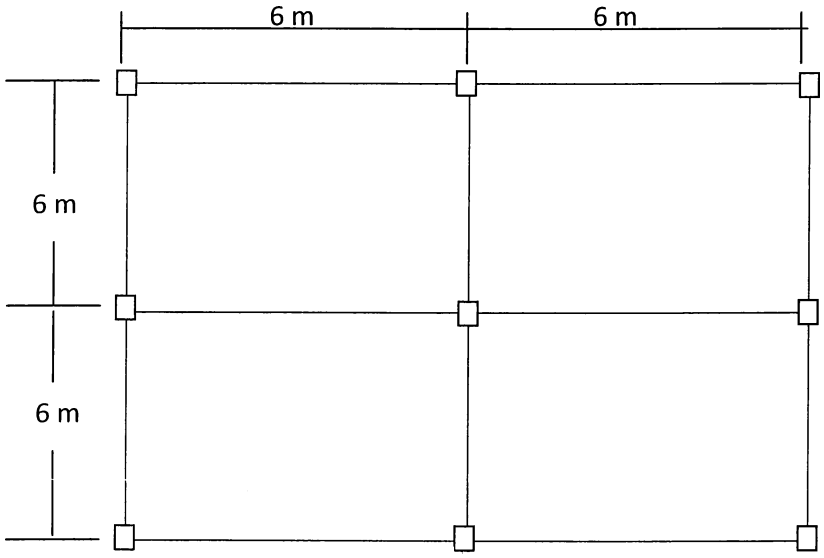

Figure No. 1

5. a) What are the general principles to be followed to make a RCC building earthquake resistant ? **10**

   b) What are different types of irregularities which may present in buildings ? Suggest methods to minimize effect of these irregularities. **7**

6. What do you understand by ductility of the structure ? Give a mathematical definition of ductility. Explain in detail the importance of ductility. **17**

SLR-UN – 80

Seat No.	

M.E. (Computer Science and Engineering) (Semester – II) Examination, 2014
Paper – VIII : ADVANCED COMPUTER ARCHITECTURE (Old)

Day and Date : Saturday, 28-6-2014 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **4** and Q. No. **8** are **compulsory**. Answer **any two** questions from Q. **1** to Q. **3** and **any two** from Q. **5** to Q. **7**.*
*2) Figures to **right** indicate **full** marks.*
*3) Assume data, **if necessary**.*

SECTION – I

1. a) What are the different ways for creating and terminating thread ? **8**
   b) Discuss types and levels of parallelism. **8**

2. a) State dependencies between instructions. Explain data dependency in detail. **8**
   b) Discuss the different phases involved in evolution of ILP processors. **8**

3. a) Draw and explain DS of instruction processing of pipeline. **8**
   b) Discuss the key aspects of general layout of pipeline. **8**

4. Write short notes on (**any 2**) : **18**
   a) Instruction scheduling
   b) Comparison in RISC and CISC
   c) Sequential consistency.

P.T.O.

SECTION – II

5. a) Explain the basic principle of VLIW. **8**

   b) Discuss principle of shelving. **8**

6. a) What is predecoding ? Explain with respect to superscalar processor. **4**

   b) What is 'Master-pipeline' ? What are its advantages – disadvantages. **4**

   c) Draw 6 – stage pipeline. Show what stages are used for executing : **8**

      i) Load instruction

      ii) Store instruction.

7. What is the register renaming method ? Explain in detail. **16**

8. Write short notes on (**any 2**) : **18**

   a) Principle of ROB

   b) R 10000

   c) Instruction issue policies of superscalar processors.

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Seat No.	

M.E. (Computer Science and Engineering) (Semester – II) Examination, 2014
Elective – III : WEB TECHNOLOGY (Paper – IX) (Old)

Day and Date : Tuesday, 1-7-2014 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Questions **1** and **8** are **compulsory**.*
*2) Solve **any five** questions from **each** Section. **Each** question carried **eight** marks.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

1. Write an application using ASP to automatically rotate the images in a web page for every 3 seconds. **10**
2. How HTML differs from DHTML ? **8**
3. Explain in detail function of web server. **8**
4. Describe Asp with examples. **8**
5. Explain the way in which JavaScript handles arrays with example. **8**
6. Write notes on (i) DOM methods (ii) XML vocabularies. **8**
7. Explain the features of XML path languages and what is Xpath and Xquery ? **8**

SECTION – II

8. Design an online book selling application using JSP consider a login validation page and also a search page for searching a book. **10**
9. With suitable coding explain how a Servlet is used for server side programming. **8**
10. Explain N-layer client/server architecture. **8**
11. Write a sample JSP code to illustrate JDBC connection establishment procedure. **8**
12. Explain service provide security issues. **8**
13. Write short on Blogs and RSS. **8**
14. With suitable code snippets explain how cookies are created and sessions are tracked by Servlet. **8**

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Seat No.	

M.E. (C.S.E.) (Sem. – II) Examination, 2014
NATURAL LANGUAGE PROCESSING (Elective – IV) (Paper – X) (Old)

Day and Date : Thursday, 3-7-2014 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to **right** indicate **full** marks.*
*3) **Assume** suitable data **if necessary**.*

SECTION – I

1. Define the following w.r.t. case grammars : **(1×10=10)**
   i) Agent ii) Instrument
   iii) Dative iv) Factive
   v) Locative vi) Source
   vii) Goal viii) Beneficiary
   ix) Time x) Object.

2. Compare between : **4**
   a) Noun groups and verb groups.
   b) Panninian and pragmatic approach.

3. a) Develop algorithms to **8**
      a) Create paradigm table.
      b) Generating a word form
      c) Morphological analysis using paradigm tables.
      d) Perform morphological analysis using sorted reverse suffix table.
   b) How does a Karaka Vibhakti model work ? **8**

4. a) Give reasons : **10**
      i) Panninian parser is innovative.
      ii) Compilation speeds up morphological analysis.
      iii) Karka relations bring about simplicity.
      iv) There are six modifier-modifier structures.
      v) Morphological analyzers have additional issues.

P.T.O.

5. Write a note on : **10**
   a) Production segments
   b) Management segment.

SECTION – II

6. a) What is machine translation ? Why is it a difficult task ? **10**
   b) Explain in detail the use of Kriya Rupa charts. **10**

7. a) Compare and contrast between : **15**
      i) GB and PG
      ii) PG and TSG
      iii) F structure and C structure of LFG.

8. Explain with examples of the following w.r.t. system models. **15**
   a) Static physical models.
   b) Dynamic physical models.
   c) Static and dynamic mathematical model.

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Seat No.	

M.E. (CSE) (Semester – II) Examination, 2014
INTERNET ROUTING ALGORITHM (New) (Paper – VI)

Day and Date : Tuesday, 24-6-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1)* ***Diagrams*** *should be drawn* ***where*** *required.*
2) ***Data*** *can be assumed,* ***wherever*** *missing or necessary.*

SECTION – I

I. Answer **any two** : **(2×5=10)**

a) Write a short note on Data Link Protocols.

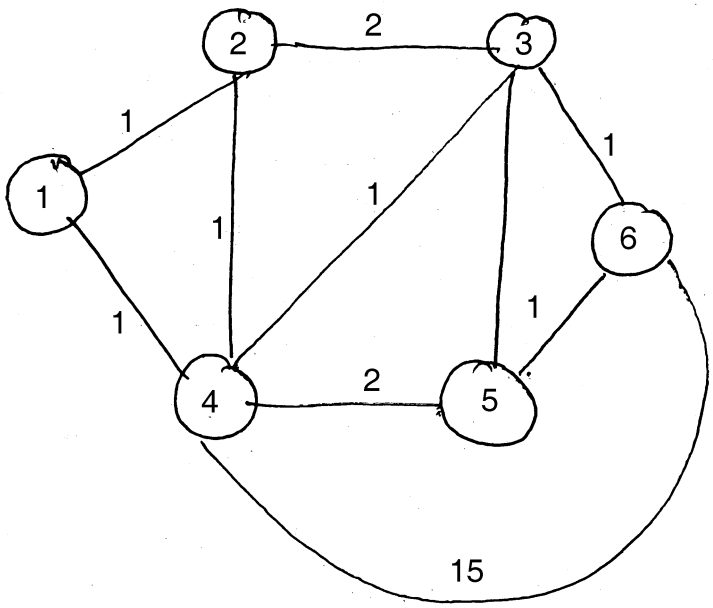
b) What is subnetting ? Given the IP address of a host and the net mask, explain how network address is determined ?

c) In what ways are the Bellman Ford Algorithm and distance vector algorithm different ?

II. Answer **any two** : **(2×5=10)**

a) Draw the functional view of Router architecture and state three functions of the Router.

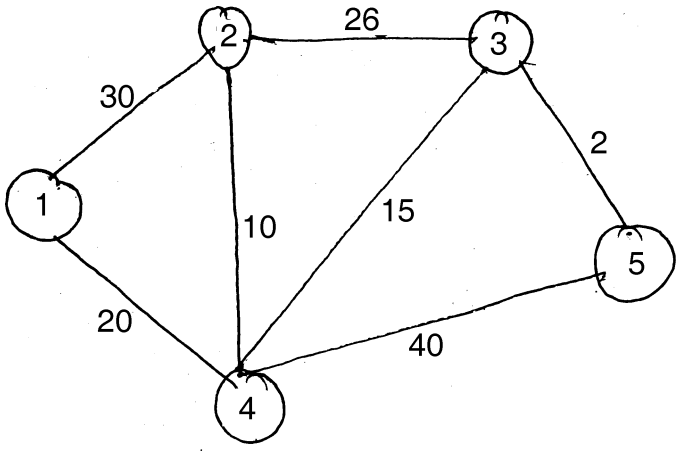
b)



Calculate the shortest paths from node 2 to other nodes using centralized Bellman-Ford Algorithm.

P.T.O.

c)



The numbers listed next to the links are link costs.

Determine the shortest path from node 1 to node 5 using Dijkstra's shortest path first algorithm (centralized approach). Generate an iterative view.

III. a) Explain message types of BGP : Open, Update, Keepalive, Notification and Route-refresh. **10**

b) List the main differences between RIPVI and RIPV2. **5**

SECTION – II

IV. Solve **any two** : **(2×5=10)**

a) Explain the concept of link-state Routing Protocol.

b) What is Policy Based Routing ? State its three phases.

c) With diagram explain Point-of-presence (Pop) topological architecture.

V. Solve **any two** : **(2×5=10)**

a) What are the basic requirements of Longest Prefix matching algorithm ?

b) Explain Naive's solution for Packet Classification.

c) With diagram, explain shared nothing architecture of routers.

VI. a) Explain elements of Router with diagram. **10**

b) Explain Packet Forwarding in routers. **5**

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Seat No.	

M.E. (Civil Structures) Sem. – II Examination, 2014
ADVANCED DESIGN OF STEEL STRUCTURES (Paper – IX)

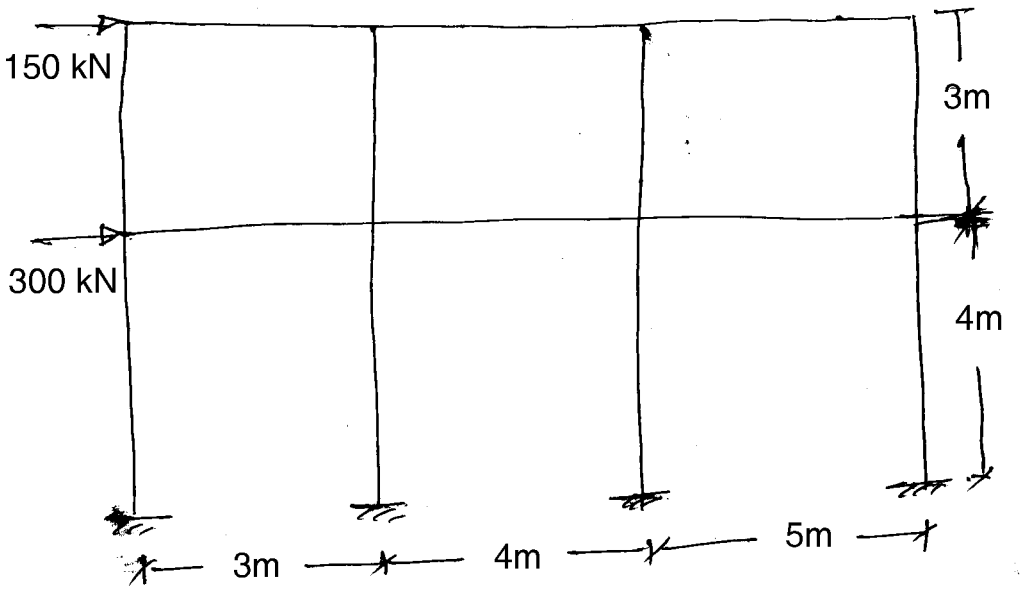
Day and Date : Tuesday, 1-7-2014 Max. Marks : 70
Time : 10.00 a.m. to 2.00 p.m.

N.B. *: i) Answer **any two** questions from **each** Section.*
*ii) **Use** of IS **800**, IS **801**, IS **811**, Steel table and calculator are allowed.*
*iii) **Assume** suitable data **if necessary** and state **it clearly**.*
*iv) Draw **neat** sketches **wherever** necessary.*

SECTION – I

1. The effective span of a through type house girder railway bridge in 53m for a single lane B.G. track. The cross girders are spaced at 5.3 m apart. The stringers are spaced 2 m. between centrelines. The stock rails of weight 0.56 kN/m and check rail of wt. 0.45 kN/m are provided. Sleeper are provided at 0.45 m c/c. The wt. of PSC sleepers (2.5m × 0.25m × 0.25m) is 25 kN/m^3. The main girders are provided at a spacing of 7m. between their centrelines. Determine the forces in central top, bottom, vertical and diagonal members of central panel. Design bottom chord and vertical members of central panel. Also design the joint where bottom chord, vertical and diagonal members meet. The bridge is to carry a Std. M. L loading for B.M = 4680 kN and for S.F = 5013 kN. **17**

2. Determine the shears and moments in columns and beams of a building frame with moment resisting joints as shown in fig. 1, by cantilever method. Assume the area of bottom storey columns as 2A and the area of top storey columns as A. **18**



P.T.O.

3. a) A light guage steel rectangular box section 200 mm × 100 mm × 2mm is used as column. The effective length of column is 3.6 m. Determine the safe load carrying capacity of the section. Take basic design stress as 125 N/mm^2. **8**

   b) Two channel sections without bent lips 200 mm × 50 mm are connected with webs to act as beam. The thickness of channel in 2.5 mm. The effective span of simply supported beam in 4.00 m. Determine the maximum uniformly distributed load inclusive of self weight which can be supported by the beam. The beam in laterally supported throughout its length. **9**

SECTION – II

4. a) A continuous beam ABCD in loaded with 55 kN/m over portion AB, 65 kN/m over BC portion and 75 kN/m over CD portion of beam. The span AB = 5 m, BC = 5.5 m, CD = 6m. Determine the collapse load in case the beam in of uniform section. **9**

   b) Define load factor and shape factor. Find also shape factor for a rectangular section. **8**

5. a) Determine the value of fully plastic moment of frame, when loaded up to collapse. The portal frame has verticals PQ = 2.1 m and Rs = 4.2 m and horizontal portion QR = 5.5 m. The ends P and S are fixed. A horizontal load of 30 kN towards Q in acting at Q and a vertical load of 60 kN acting downwards at 2 m from Q on QR portion. The plastic moment of the frame in uniform throughout. Draw BMD. **10**

   b) Explain with neat sketches different collapse mechanisms. **8**

6. a) Design a composite foot bridge having clear span of 2.8m and effective span of 14m. The bridge in to be designed for live load of 4kN/m^2. Assume Kerb of 450 mm × 300 mm and two steel girders at 2.2 m c/c are provided. **9**

   b) Design a encased column to carry a load of 1500 kN. The effective length in 4m. **8**

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Seat No.	

M.E. (Computer Science and Engg.) (Sem. – II) New Examination, 2014
ADVANCED DATABASE CONCEPTS (New) (Paper – VII)

Day and Date : Thursday, 26-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. **4** from Section **I** and Q. **8** from Section **II** are **compulsory**.*
*2) Attempt **any two** from remaining questions from **each** Section.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

1. a) Discuss in detail various design strategies and fragment allocation strategies in a DDB. **6**

   b) Discuss in detail framework for query optimization. **6**

2. a) Draw and discuss system architecture for distributed transactions. **6**

   b) Explain in detail how a consistent view of network is determined in DDB. Also discuss how inconsistencies are detected. Consider various scenarios. **6**

3. a) Discuss in detail interquery parallelism. **6**

   b) Discuss in detail intraoperation parallelism. **6**

4. a) List and discuss at least four features of distributed DB. **6**

   b) Discuss following locking protocols, with advantages and disadvantages, for a DDB. **5**

      1) Primary copy
      2) Quorum consensus protocol.

P.T.O.

SECTION – II

5. a) Define and explain with examples following structured data types : **6**
   1) Type
   2) Final and not final
   3) Method and instance
   4) Overriding method.

   b) Discuss in detail the persistent C++ systems. **6**

6. a) Discuss with examples at least four characteristics of Multimedia DBMS. **6**

   b) Discuss in detail the distributed MDBMS architecture. **6**

7. a) Discuss in detail following types of spatial data with examples and applications : **6**
   1) Geometric data
   2) CAD data
   3) Geographic data.

   b) What is a space filling curve ? Discuss its properties and applications. **6**

8. a) What is table inheritance ? Discuss in detail with examples of defining, and querying. **6**

   b) Discuss with examples and figures the R-trees. **5**

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Seat No.	

M.E. (Computer Sci. and Engg.) (Sem. – II) Examination, 2014
Paper – VIII : PARALLEL COMPUTER ARCHITECTURE (New)

Day and Date : Saturday, 28-6-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions from Section – **I** and **II** are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** data **if necessary**.*

SECTION – I

1. A) Write a concept and impact of control dependencies. Give example. **5**
   B) Explain the interpretation of the concept of instruction scheduling in ILP-Processors. **5**
   C) Draw a diagram of showing specific tasks of superscalar processing. **5**
2. Illustrate two major aspects of superscalar instruction issue. Explain in detail issue policies involved in superscalar instruction issue. **10**
3. Explain in detail three methods for preserving sequential consistency when multiple pipelines are writing back results ? **10**

SECTION – II

4. A) What is annulment ? State four variants which are distinguished by whether the delay slot is annulled or not. **5**
   B) Draw a layout of the R10000 pipelines. Explain its stages. **5**
   C) List the main features of the PentiumPro. **5**
5. Explain and assess the basic delayed branching scheme. **10**
6. Explain the main features of R10000. Draw a diagram of core part of the microarchitecture of the R10000. **10**

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Seat No.	

M.E. (Computer Science and Engineering) (Sem. – II) Examination, 2014
Paper – IX : REAL TIME OPERATING SYSTEM (Elective – III) (New)

Day and Date : Tuesday, 1-7-2014 Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any five** questions from **each** Section.*

*2) Figures to the **right** indicate **full** marks.*

*3) **Assume** suitable data if necessary.*

SECTION – I

1. What is a real time system ? Explain its various components with a suitable block diagram. **7**
2. Explain mail boxes and its implementation and operations. **7**
3. Write a pseudocode algorithm that allocates pages of memory on request. Assume that 100 pages of the size 1 megabyte, 2 megabyte and 4 megabytes are available. The algorithms should take size of the page responded as an alignment, and return a pointer to the desired page. The smallest available page should be used; but if the smallest size is unavailable, the next available should be used. **7**
4. Expalin state/driven code along with coroutines. **7**
5. Write DeMarco's rules and draw data flow diagram for navigation system. **7**
6. State and explain Petri Nets. **7**

SECTION – II

7. State and explain real time databases. **7**
8. Explain multimedia with reference to real time applications. **7**
9. State and explain software Heisenberg uncertainty principle. **7**
10. Explain Systolic Processors. **7**
11. State and explain Non-Von Neumann Architectures. **7**
12. What is reliability and explain how to calculate system reliability ? **7**

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Seat No.	

M.E. (Computer Science and Engineering) (New) (Semester – II) Examination, 2014
NATURAL LANGUAGE PROCESSING
(Elective – III) (Paper – IX)

Day and Date : Tuesday, 1-7-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Question **1** and **5** are **compulsory**.*
*2) Answer **any three** questions in **each** Section.*
*3) **Use** suitable data **wherever** necessary.*

SECTION – I

1. Answer briefly : **15**
   a) Illustrate case grammars.
   b) Give examples of nominal structure with principal verb as modifier of a noun.
   c) What are Pasargs ? Give examples.
   d) Generate a word form table.
   e) How is Karaka sharing dealt with ?

2. a) Compare Chart parsers with Link parsers. What are the phases involved in the analysis of sentences ? Give illustrations of each. **10**
   b) What are Karaka relations ? Explain its six structures.

3. a) What is Augmented Transition Network ? How does it work ? **10**
   b) Give the steps to perform morphological analysis using sorted reverse suffix table.

4. a) How is a default Karaka chart drawn ? **10**
   b) Convert a constraint parser representation to a Bipartite graph.

P.T.O.

SECTION – II

5. Answer briefly : **15**

   a) State the basic properties of LFG.

   b) Give the difference between North Indian and South Indian Languages.

   c) Explain the components of Anusaraka System.

   d) Compare TAG and TSG.

   e) Illustrate the use of TAM Labels.

6. a) What are the components of LFG ? Illustrate. **10**

   b) State the theories behind GB. Draw necessary structures.

7. a) Are CFG suitable for representing Indian Languages ? Justify. **10**

   b) Why is LFG not Lexicalised ?

8. a) Give the characteristics of Indian Languages. Which representation is most suitable for them ? **10**

   b) Compare PG with TAG, TSG and LFG.

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Seat No.	

M.E. (Computer Science and Engineering) (Sem. – II) Examination, 2014
WEB TECHNOLOGY (Elective – IV) (New) (Paper – X)

Day and Date : Thursday, 3-7-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Attempt* ***any five*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *suitable data* ***if necessary****.*

SECTION – I

1. Create HTML document that has your image and friend's image that has specific height and width. Also when clicked in the images it should navigate to their respective profiles. **7**
2. Write a neat diagram to show the relationship between SGML, XML, HTML and XHTML. **7**
3. Define an XML schema. Show how an XML scheme can be created. **7**
4. Explain the basic process of event-driven computation in creating javascript. **7**
5. Explain session tacking and cookies in ASP. **7**
6. Design a homepage of your college website using HTML and CSS. **7**

SECTION – II

7. Write a JSP that handles empty form values. **7**
8. What are limitations of servlets and how JSP overcomes these problems ? **7**
9. Develop JSP to act as a simple search engine with the support of necessary database. Web page will accept the topic name and JSP will be activated by a 'submit' button click. JSP will open relevant page with a set of relevant URLs for that topic. **7**
10. Describe various steps that are needed for accessing a database from a JSP page. **7**
11. Write short notes on :
    a) Widgets and
    b) Web 2.0 and Web 3.0. **7**
12. Explain the methods of error handling and debugging routines of JSP applications development environment. **7**

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Seat No.	

M.E. (Computer Science and Engineering)
(Semester – II) (New) Examination, 2014
Elective – IV : OBJECT ORIENTED SOFTWARE ENGINEERING AND DESIGN PATTERNS (Paper – X)

Day and Date : Thursday, 3-7-2014 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Question **1** and **5** are **compulsory**.*
*2) Answer **any three** questions in **each** Section*
*3) **Use** suitable data **wherever** necessary.*

SECTION – I

1. Answer briefly : **15**
   a) What is a domain object ? What are its characteristics ?
   b) What is use case modeling ?
   c) Illustrate objects and classes in UML.
   d) How are analysis classes found ? State the steps.
   e) When are activity diagrams used ?

2. a) Draw a use case and activity diagram related to a library automation system. **5**
   b) List and explain the different software architectures. **5**

3. a) Illustrate the overall software life cycle with a case study. **5**
   b) Explain the working of a state machine w.r.t. a network model. **5**

4. a) What are relationships ? Explain them in an appropriate model. **5**
   b) What are the factors involved while practicing Domain Model Engineering ? **5**

P.T.O.

SECTION – II

5. Answer briefly : **15**

   a) What is an execution architecture view ? Explain.

   b) How is behaviour documented in software architecture design ?

   c) What are structural patterns ? Explain.

   d) What are the different pattern types ?

   e) What are frameworks ? How are they related to patterns ?

6. a) What are the steps in software Architecture design ? Illustrate each step. **5**

   b) What are component and connector view types ? Explain their styles. **5**

7. a) What steps are followed in IS 2000 standards ? Describe each step. **5**

   b) How are software interfaces and behaviour documented ? **5**

8. a) Compare between product and quantity archetype patterns. **5**

   b) What are communication patterns ? Illustrate. **5**

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Seat No.	

M.E. (Computer Science and Engineering) (Sem. – II) Examination, 2014
Paper – X : WIRELESS AD-HOC NETWORK (Elective – IV) (New)

Day and Date : Thursday, 3-7-2014 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Q. No. (**4**) and Q. No. (**8**) are **compulsory**.*
*2) Attempt **any two** from remaining questions in **each** Section.*
*3) **Assume** suitable data **if needed**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

1. A) What is electromagnetic spectrum ? High frequency X-rays and gamma rays are not normally used for wireless communication. Explain Why ? **6**

   B) Why CSMA/CD is not generally used in wireless LAN ? Explain Hidden and Exposed terminal problems in details. **6**

2. A) Discuss Technical Challenges if Packet radio network and explain the Architecture of PRNETs. **6**

   B) Explain in detail the security and energy management challenges in Ad-wireless network. **6**

3. A) Explain in detail the difference between Cellular and Ad-hoc wireless network. **6**

   B) Describe in detail common method used in alleviation the hidden terminal problem at the MAC layer. **6**

4. A) Discuss various classification criteria for routing protocols in Ad-hoc WANs. **6**

   B) Explain with neat diagram Zone Routing Protocol (ZRP). **5**

P.T.O.

SECTION – II

5. A) What it is difficult to design a multicast routing protocol ? Explain with diagram receiver- initiated multicast protocols. **6**

   B) Explain with diagram tree initialization, maintenance and route optimization phases in BEMRP. **6**

6. A) List and explain major reasons behind throughput degradation in TCP when used in Ad-hoc WANs. **6**

   B) Explain ad-hoc TCP and split TCP in details. **6**

7. A) List and explain various network layer attacks in Ad-hoc WANs. **6**

   B) Explain issues in secure routing in ad-hoc wireless networks. **6**

8. A) Explain with neat diagram the architectural framework of an ad-hoc multicast protocol. **6**

   B) Give the comparison of various TCP solutions for ad-hoc wireless networks. **5**

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