M 25961

Reg. No. : .....

Name : .....

Third Semester B.Tech. (Reg./Sup./Imp. – Including Part Time) Degree Examination, November 2014
(2006 and Earlier Admn.)
CS/IT2K 301 – ENGINEERING MATHEMATICS – III

Time : 3 Hours Max. Marks : 100

Instructions : *i) Answer* ***all*** *questions.*
ii) ***Assume*** *suitable data that are not given.*

I. a) Show that the vectors (1, 2, 3), (1, 0, 1) and (0, 1, 0) are linearly independent. **5**

b) If V be the vector space of all functions from $\mathbb{R}$ to $\mathbb{R}$ and $w = \{f : f(5) = 0\}$ then show that w is a subspace of V. **5**

c) Define the rank of a matrix and show that rank of A = rank of A^T (A^T is the transpose of A). **5**

d) Show that $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ is a zero of $f(t) = t^2 - 4t - 5$. **5**

e) Show that polar form of Cauchy-Riemann equations are

$$\frac{\partial u}{\partial r} = \frac{1}{r}\frac{\partial v}{\partial \theta}, \quad \frac{\partial v}{\partial r} = \frac{-1}{r}\frac{\partial u}{\partial \theta}.$$ **5**

f) Show that if $f(2) = u + iv$ is analytic then u is harmonic. **5**

g) Evaluate $\int_c \frac{z^2 - z + 1}{z - 1} dz$ where c is the circle $|z| = 1$. **5**

h) Find the poles and residue at each pole of $f(z) = \frac{z^2 + 1}{z^2 - 2z}$. **5**

P.T.O.

II. a) A set of vectors $\{v_1, v_2, \ldots v_n\}$ is a basis of a vector space V iff each vector in V is uniquely expressible as a linear combination of $v_1, v_2, \ldots v_n$. **8**

b) Find the basis and the dimension of the subspace w of $\mathbb{R}^4$ generated by $(1, -2, 5, -3)$, $(2, 3, 1, -4)$ and $(3, 8, -3, -5)$. **7**

OR

c) Show that the set U of all linear combinations of n arbitrary vectors $v_1, v_2, \ldots v_n$ of a vector space V is a subspace of V and each vectors $v_1, v_2, .., v_n$ is in V. **8**

d) Find the coordinate vector of $v = (4, -3, 2)$ relative to the basis $\{(1, 1, 1), (1, 1, 0), (1, 0, 0)\}$ of $\mathbb{R}^3$. **7**

III. a) What do you mean by equivalence of two matrices ? Determine the rank of the matrix $A = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 2 & 3 & 4 & 5 & 6 \\ 3 & 4 & 5 & 6 & 7 \\ 4 & 5 & 6 & 7 & 8 \end{bmatrix}$ by reducing to its equivalent form. **8**

b) Classify the following quadratic form

$-x_1^2 - 3x_2^2 - 5x_3^2 + 2x_1x_2 + 2x_1x_3 + 2x_2x_3$. **7**

OR

c) Show that a characteristic vector of a square matrix cannot correspond to two distinct characteristic values. **8**

d) Find the eigen value and corresponding eigen vectors of the matrix

$A = \begin{bmatrix} -3 & -7 & -5 \\ 2 & 4 & 3 \\ 1 & 2 & 2 \end{bmatrix}$. **7**

IV. a) If f (z) is analytic, prove that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4|f'(z)|^2$. **8**

b) Determine the analytic function whose real part is $e^{2x}(x\cos 2y - y\sin 2y)$. **7**

OR

c) If f (z) = u + iv is an analytic function, find f (z) if $u - v = (x - y)(x^2 + 4xy + y^2)$. **8**

d) Find the bilinear transformation which maps z = 1, i, –1, onto w = i, o, – i. **7**

V. a) State and prove Cauchy's theorem. **8**

b) Using Cauchy's integral formula evaluate $\int_C \frac{z^4\,dz}{(3z+1)^4}$ where C is the circle $|z| = 1$. **7**

OR

c) Expand $f(z) = \frac{z}{(z-1)(z-3)}$ in a series of powers of z that valid in the region :

i) $1 < |z| < 3$

ii) $0 < |z-1| < 2$. **8**

d) State Cauchy's residue theorem. Use it to evaluate $\int_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)^2(z-2)}\,dz$ where C : $|z| = 3$. **7**

M 25964

Reg. No. : .....

Name : .....

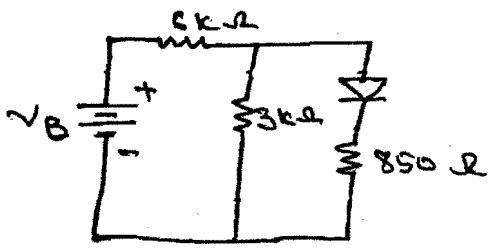
Third Semester B.Tech. (Reg./Sup./Imp. – Including Part Time) Degree Examination, November 2014
(2006 and Earlier Admn.)
CS/IT 2K 304 : BASIC ELECTRONICS ENGINEERING

Time: 3 Hours Max. Marks: 100

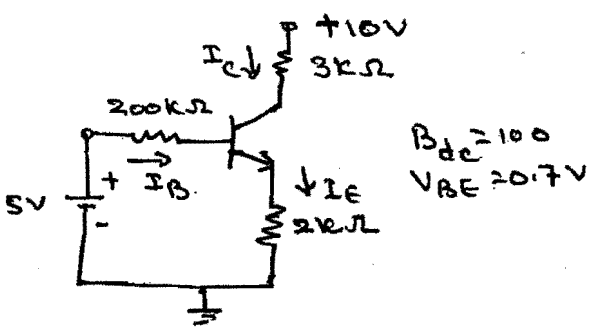
***Instruction** : Answer **all** questions.*

I. a) Making use of diode current eqn. explain the V-I characteristics of the diode under forward and reverse bias conditions. **5**

b) The p-n junction diode used in fig. below has a cut-in voltage of 0.6 V and a forward resistance of 150 Ω . If the diode can dissipate a maximum power of 200 mW. Calculate the maximum permissible value of the battery voltage V_B. **5**



c) Find the transistor currents in the circuit shown in fig. below. **5**



d) Show that over all gain of 3 stage amplifier is the sum of decibel voltage gains of the individual stages. When more stages are cascaded to obtain high gain does the bandwidth of the multistage amplifier remain same as that of individual stages ? If not why ? **5**

e) Explain the concept of feed back in amplifiers. What do you mean by positive and '–'ve feedback ? List any four advantages of negative feedback. **5**

f) Explain the Barkhausen criterion for oscillations. **5**

g) Explain with ckt diagram and expression for o/p voltages op-amp non-inverting amplifier. **5**

h) Explain with ckt dia and wave form zero crossing detector. **5**

II. a) i) Draw the o/p characteristics of a transistor in CE configuration. Indicate various regions of operation and explain the shapes of the curve qualitatives. **7**

ii) Explain the following : **8**

a) Emitter region is heavily doped

b) Base region is narrow

c) Transistor is called "transfer resistor"

d) α_{dc} is always less than unity.

OR

b) Write short notes on : **15**

i) Avalanche breakdown

ii) Zener breakdown

iii) Early effect

iv) Thermal runaway

v) LED.

III. a) i) What is a RC coupled amplifier ? Draw and explain the ckt of a two stage RC coupled amplifier and clearly indicate the coupling elements. In what ways does its performance differ from that of a single stage amplifier ? **8**

ii) Draw the circuit diagram of Hartley oscillator and explain its working. **7**

OR

b) Explain the following :

i) Fixed bias

ii) Collector to base bias

iii) Voltage divider bias.

Mention their advantages and disadvantages. **15**

IV. a) i) A series fed class A amplifier shown in fig. below operates from DC source and applied sinusoidal i/p signal generates peak base current of 9mA. Calculate :

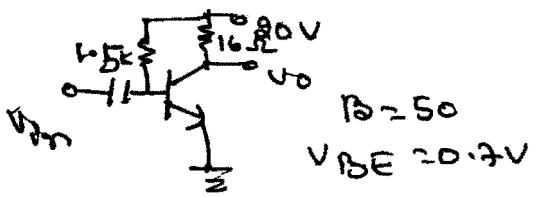
a) Quiescent current

b) Quiescent voltage V_{CEQ}

c) DC input power P_{DC}

d) AC O/P power P_{ac}

e) Efficiency. **8**



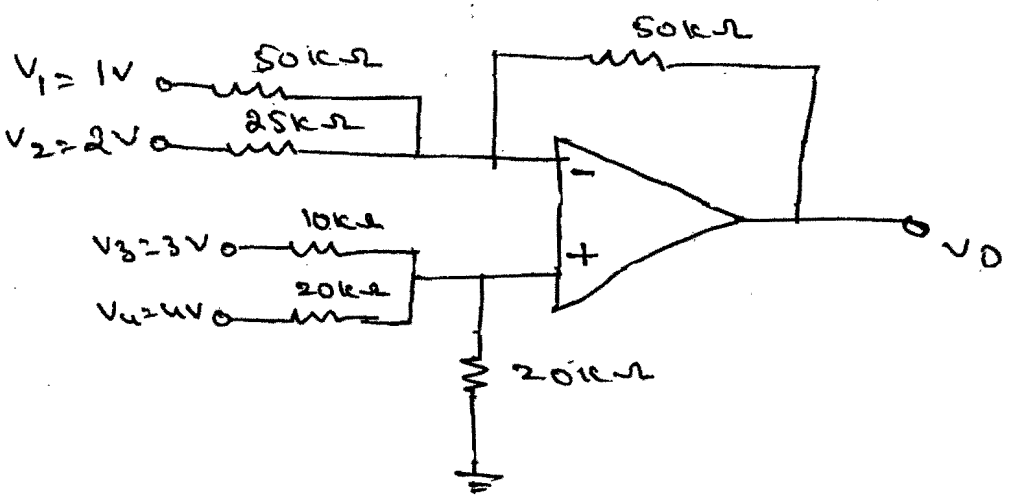
ii) A Hartleys oscillator is designed with $L_1 = 20\,\mu H$ and $L_2 = 2$ mH and a variable capacitance. Determine the range of capacitance values if freq. of oscillations is varied between 1 mHz to 2.5 mHz neglect mutual inductance. **7**

OR

b) i) With neat ckt diagram and wave forms explain the working of class B push pull amplifier. **10**

ii) Explain the classification of power amplifiers based on class of operation. **5**

V. a) i) For the op-amp circuit shown in fig. below find the o/p voltage. **10**



ii) Explain the operation of first order low pass butterworth filter. **5**

OR

b) Explain the following : **15**

i) Logarithmic amplifier

ii) Differentiator

iii) Precision half wave rectifier.

M 25966

Reg. No. : .....

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Third Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part-Time) Examination, November 2014
CS/IT2K 306 : ELECTRIC CIRCUITS AND SYSTEMS
(2006 and Earlier Admn.)

Time: 3 Hours Max. Marks : 100

Instructions : *Answer **all** questions.*
Missing data may be suitably assumed.

1. a) Define :
   i) Passive and active networks.
   ii) Ideal and practical voltage sources. **5**
   b) Explain initial value theorem. **5**
   c) State and explain reciprocity theorem. **5**
   d) Derive an expression to obtain equivalent star connected impedances from given delta connection. **5**
   e) What is two-port network ? Explain. **5**
   f) Explain how bridge balance is obtained in Maxwell's bridge circuit. **5**
   g) Explain block diagram reduction technique. **5**
   h) What is signal flow graph ? Explain with suitable example. **5**

2. a) Determine the current in 12 Ω resistor shown in Fig. (i) Q. 2(a) using source transformation method. **7**

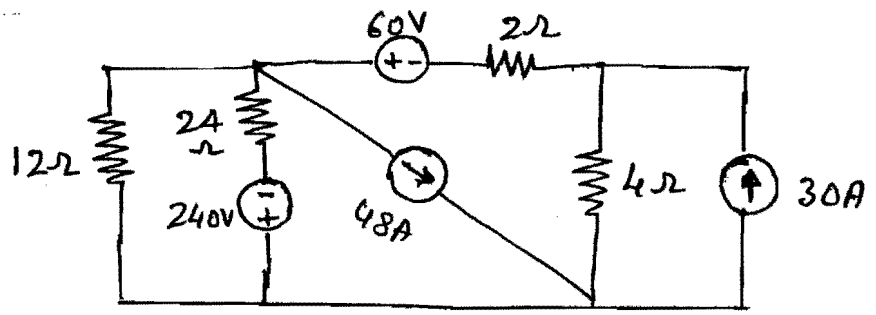

Fig. (i) Q. 2 (a)

P.T.O.

b) Find the current through each resistor of the circuit shown in Fig. (ii) Q. 2 (b) using Nodal analysis. **8**

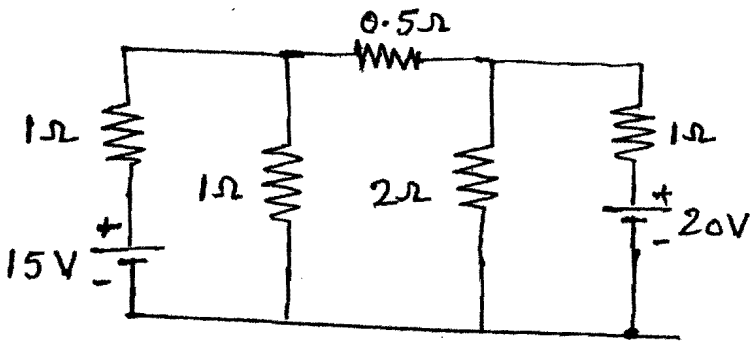

Fig. (ii) Q. 2 (b)

OR

c) Explain how the complete incidence matrix and reduced incidence matrix is obtained for a suitable network. **9**

d) Find the Laplace transform of

i) $\cos \omega t$

ii) te^{-at}. **6**

3. a) State and explain superposition theorem. **6**

b) Find the current through branch be in Fig. (iii) Q. 3 (b) using Norton's theorem. **9**

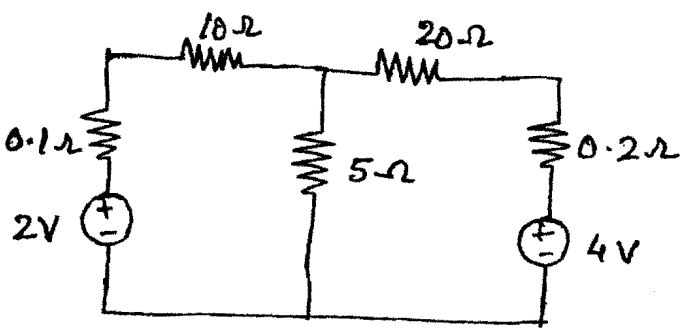

Fig. (iii) Q. 3 (b)

OR

3. c) Explain the effect of switching actions in resistor, inductor and capacitor elements. **6**

d) Show that two wattmeter method sufficient to measure total three phase power in balanced star connected load. Draw the phasor diagram. **9**

4. a) With a neat circuit and phasor diagram explain how balancing is observed in schering bridge. What are the advantages and disadvantages ? **15**

OR

b) The z-parameters of a two-port network are $Z_{11} = 20\Omega$, $Z_{22} = 30\Omega$, $Z_{12} = Z_{21} = 10\ \Omega$. Find admittance and ABCD parameters of the network. **8**

c) Derive the interrelationship to show h-parameters in terms Z-parameters. **7**

5. a) Explain the difference between open loop and closed loop systems, with suitable examples. **6**

b) A feedback control system is represented by the block diagram in Fig. (iv) Q. 5(b). Determine (i) C(S)/R(s) (ii) Find the condition for which the roots of the denominator of C(S)/R(s), called the characteristic equation, are equal. (iii) Determine the values of K_1 and K_2 for the equal roots to be – 8. **9**

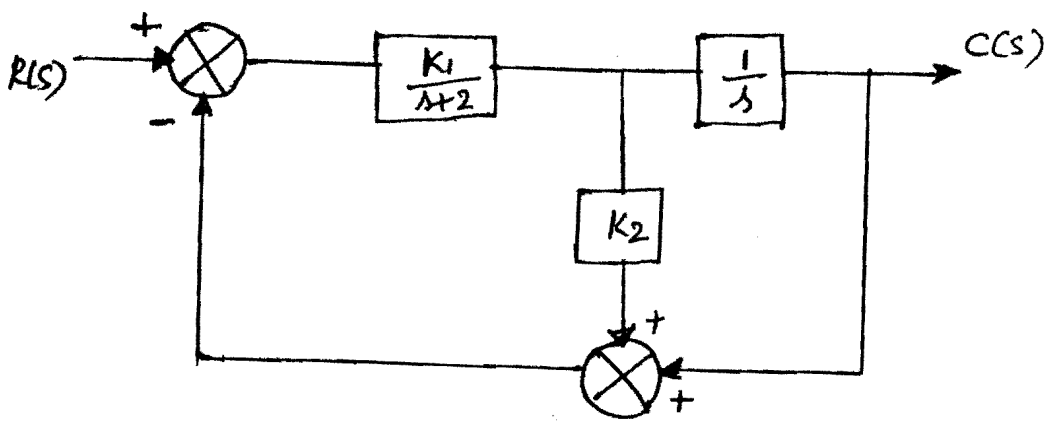

Fig. (iv) Q. 5 (b)

OR

c) A negative feedback control system has a loop transfer function

$GH(s) = \dfrac{k}{(s+1)(s+4)(s+6)}$. Determine the value of gain k for two roots of the characteristic to lie on the imaginary axis. For this value of k find all the roots. **9**

d) What is the meaning of marginally or limitedly stable system ? **6**