

## BSNL (JTO) Examination 2006

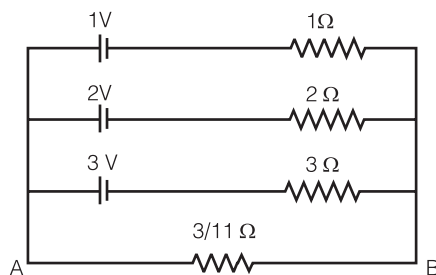
### SECTION-A

- Q.1** A house served by a 220V supply light, is protected by a 9-Ampere fuse. The maximum number of 60 W bulbs in parallel that can be turned on is  
(a) 11 (b) 33  
(c) 22 (d) 44
- Q.2** An n-channel JFET has  $I_{DSS} = 1 \mu A$  &  $V_P = -5V$ . The maximum transconductance is  
(a)  $g_m = 0.4$  milli mho (b)  $g_m = 0.04$  milli mho  
(c)  $g_m = 0.04$  mho (d)  $g_m = 0.4$  millimilli mho
- Q.3** The base to base resistance of a UJT is 6 K Ohm when the emitter current is zero. If  $R_{B_1} = 3.6$  K Ohm, the intrinsic stand off ratio is  
(a)  $n = 0.66$  (b)  $n = 0.6$   
(c)  $n = 6.0$  (d)  $n = 3.6$
- Q.4** A capacitor of  $1\mu F$  initially charged to 10 V is connected across an ideal inductor of 0.1 mH. The maximum current in the circuit is  
(a) 0.5 A (b) 1 A  
(c) 1.5 A (d) 2 A
- Q.5** Silicon has a preference in IC technology because  
(a) it is an indirect semiconductor  
(b) it is a covalent semiconductor  
(c) it is an elemental semiconductor  
(d) of the availability of nature oxide SiO
- Q.6** Three equal resistance of magnitude 5 Ohm each are connected in delta. The resistance between any two pair of terminals of the delta will be  
(a) 5 Ohm (b)  $5/3$  Ohm  
(c)  $10/3$  Ohm (d)  $3/5$  Ohm
- Q.7** The R.M.S. value of a half wave rectified sinusoidal alternating current with peak value  $I_m$  is  
(a)  $I_m/1$  (b)  $I_m/\sqrt{2}$   
(c)  $I_m/2$  (d)  $I_m\sqrt{3}$





- Q.8** For a series resonant circuit, at the half power points, which of the following is true?
- Current is half of the current at resonance.
  - Resistance is equal to the reactance.
  - The impedance is half the impedance at the resonance.
  - None of the above
- Q.9** The lossless line of characteristics impedance 300 Ohm is terminated in a pure resistance of 200 Ohm. The value of the standing wave ratio is
- 1.5
  - 0.67
  - 1.0
  - 1.25
- Q.10** The transient current in lossless L-C circuit when excited from an AC source is, \_\_\_\_\_ sine wave
- Critically damped
  - Underdamped
  - Overdamped
  - Undamped
- Q.11** The values of L and C for a low pass filter with cut off frequency of 2.5 KHz and operating with a terminated load resistance of 450 Ohm are given by
- 57.3 mH; 0.283  $\mu$ F
  - 28.66  $\mu$ H; 0.14  $\mu$ F
  - 114.64 mH; 0.566 mF
  - 50.23 mH; 0.632 mF
- Q.12** The driving point impedance with poles at  $\omega = 0$  (zero) and  $\omega = \infty$  (infinity) must have the
- s term in the denominator and an excess term in the numerator
  - s term in the numerator and an excess term in the denominator
  - s term in the numerator and equal number of terms in the numerator and denominator
  - s term in the denominator and equal number of terms in the numerator and denominator
- Q.13** A transmission line is terminated at its characteristic impedance. The reflection coefficient is
- 1
  - 1
  - 0
  - $\infty$
- Q.14** In the circuit shown below, the current through the  $3/11 \Omega$  resistance between terminals A & B is



- 4 Amps
- 1 Amp
- 2 Amps
- 5 Amps



- Q.15** In a series RLC circuit operating below the resonant frequency the current
- (a)  $I$  leads  $V_s$  (b)  $I$  lags  $V_s$   
 (c)  $I$  is in Phase with  $V_s$  (d) None of these
- Q.16** An antenna has maximum radiation intensity  $U_{\max} = 10$  Watt/Sr and average radiation intensity  $U_{\text{avg}} = 4.5$  Watt/Sr. If the efficiency of the antenna is given as  $\eta_r = 95\%$ , the input power of the antenna is
- (a) 2.222 Watt (b) 12.11 Watt  
 (c) 55.55 Watt (d) 59.52 Watt
- Q.17** In an airport, a receiving, antenna has a maximum dimension of 3 metres and operates at 100 MHz. An aircraft approaching the airport is  $1/2$  Km away from the antenna. The aircraft is in the \_\_\_\_\_ region of the antenna.
- (a) far-field (b) near-field  
 (c) close-field (d) Out of reach
- Q.18** A lossless transmission line with characteristic impedance 500 Ohms is excited by a signal of voltage  $10\angle 0^\circ$  volts at 1.2 MHz. If the line is terminated by  $Z_L$  at a distance 1 Km, the input impedance  $Z_{in}$  of the line for  $Z_L = \infty$  (infinity) and  $Z_L = 0$  (zero) in Ohm, respectively are
- (a)  $+j\infty, 0$  (b)  $-j\infty, 0$   
 (c)  $0, -j\infty$  (d)  $0, +j\infty$
- Q.19** If the electric field of a plane wave is represented by  $E = 10\hat{y} \cos(10^9 t + 30z)$  volt/m, assuming  $\epsilon$  is the dielectric constant, the corresponding magnetic field  $H$  is
- (a)  $-\hat{y} \epsilon 10^9/3 \cos(10^9 t + 30z)$  Amp/m  
 (b)  $-\hat{x} \epsilon 10^9/3 \cos(10^9 t + 30z)$  Amp/m  
 (c)  $-\hat{z} \epsilon 10^9/3 \cos(10^9 t + 30z)$  Amp/m  
 (d)  $+\hat{x} \epsilon 10^9/3 \cos(10^9 t + 30z)$  Amp/m
- Q.20** A 50 Ohm lossless line connects a signal of 200 KHz to a load of 200 Ohm. If the load power is 100 mW, the value for voltage minimum  $V_{\min}$  is
- (a)  $(\sqrt{20})/4$  (b)  $(\sqrt{10})/4$   
 (c)  $(\sqrt{20})/2$  (d)  $(\sqrt{10})/2$
- Q.21** Choose the correct statement
- (a) Digital multimeters are built using current measuring elements, while analog multimeters are built using voltage measuring units  
 (b) Digital multimeters are built using voltage measuring units, while analog multimeters are built using current measuring units  
 (c) Both digital and analog multimeters are built using voltage measuring units  
 (d) Both digital and analog multimeters are built using current measuring units

- Q.22** An analog voltmeter has a sensitivity of  $10\text{k}\Omega/\text{volt}$ . The galvanometer used in constructing the instrument will produce a full scale deflection when the current passed through it is
- (a) 10 mA                                  (b) 20 mA  
(c) 50 mA                                  (d)  $100\ \mu\text{A}$

- Q.23** The input versus output characteristics of a digital-to-analog converter is given in the table below:

Input (bit string)	Output (in Volts)
000	0.0
010	2.1
100	4.0
110	5.9

The converter is exhibiting

- (a) offset error                                  (b) statistical error  
(c) linearity error                              (d) hysteresis error
- Q.24** An optical fiber cable laid underground has developed a discontinuity at a distance  $d$  from the source end. The fault can be located using the instrument
- (a) Optical spectrum Analyzer (OSA)  
(b) Optical Time Domain Reflectometer (OTDR)  
(c) Optical Power Meter (OPM)  
(d) Laser Diffractometer (LD)
- Q.25** Two sinusoidal signals of the same frequency are displayed on a dual-trace oscilloscope. One complete cycle of each signal covers 6 cm of the horizontal scale and the starting point of the horizontal scale and the starting point of the two signals are separated by 0.5 cm. The phase difference between the two signals in degrees is
- (a) 30    (b) 45  
(c) 60    (d) 90
- Q.26** Transient signals can be observed using
- (a) storage oscilloscope                      (b) sampling oscilloscope  
(c) wave analyzer                              (d) spectrum analyzer
- Q.27** The trace on an oscilloscope continually moves to the right of the screen when
- (a) the sweep is triggered.  
(b) the sweep period is larger than the signal period.  
(c) the sweep period is smaller than the signal period.  
(d) there is no sweep.
- Q.28** In a dual trace oscilloscope, the display appears segmented when
- (a) low frequency signals are observed in Alternate mode  
(b) low frequency signals are observed in Chop mode  
(c) high frequency signals are observed in Alternate mode  
(d) high frequency signals are observed in Chop mode





- Q.29** To distinguish between signals having very close values, we need an instrument with
- (a) high accuracy (b) high resolution  
(c) high sensitivity (d) high linearity

- Q.30** Match **List-I** (Instruments) with **List-II** (Measurement in which the instrument is used) and select the correct answer using the codes given below the lists:

<b>List-I</b>	<b>List-II</b>
A. Lock-in amplifier	1. Patient monitoring
B. Sampling oscilloscope	2. Overcoming ground loop problem
C. Isolation amplifier	3. Phase difference between two signals
D. Strip-chart recorder	4. Signal recovery from noise
	5. Observing very high frequency signals

**Codes:**

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
(a)	1	3	5	4
(b)	2	1	3	4
(c)	4	5	2	1
(d)	3	4	1	2

- Q.31** A power diode has lightly doped n type substrate sandwiched between heavily doped p and n regions
- (a) to increase reverse breakdown voltage  
(b) to reduce ohmic loss under forward bias  
(c) to decrease switching time of the power diode  
(d) to improve transient behaviour of the diode
- Q.32** An ideal thyristor is driving an R-L load of impedance Z. Input AC voltage is  $V_s = V_m \sin \omega_m t$ . If thyristor is fired at an input phase angle of  $90^\circ$ . What will be the output voltage and output current across R-L load at the instant of firing?
- (a) Output voltage is  $V_m$  and output current is  $V_m/Z$   
(b) Output voltage and output current are both zero  
(c) Output voltage is zero and output current is delayed by an angle  $90^\circ$   
(d) Output voltage is  $V_m$  and output current is zero
- Q.33** In a regenerative braking, which of the following is generally true?
- (a) Back e.m.f. in the motor exceeds the applied voltage  
(b) Back e.m.f. is less than the applied voltage  
(c) Kinetic energy of the motor is dissipated in a resistance  
(d) Kinetic energy of the motor is dissipated through free wheeling diode across the motor
- Q.34** A step-down chopper, fed from a 120 volt DC source, operates a DC motor whose armature e.m.f. and armature resistance are 100 volt and  $0.5\Omega$  respectively. With the magnitude control ratio 0.6, the quadrant of operation DC motor is
- (a) First (b) Second  
(c) Third (d) Fourth



- Q.35** For IGBT, which of the following statement is true?  
 (a) Switching speed of IGBT is more than bipolar transistor  
 (b) IGBT is a current-controlled device  
 (c) On-state collector-emitter voltage is less than that of bipolar junction transistor  
 (d) It combines voltage control features of MOSFET gate and high power capability of bipolar transistor
- Q.36** The semiconductor used for LEDs emitting in the visible range is  
 (a) GaAs (b) GaAlAs  
 (c) GaInAs (d) GaAsP
- Q.37** The polar bonds existing in III-V compound semiconductor, may be considered as equivalent to  
 (a) 1 ionic bond and 3 covalent bonds  
 (b) 1 ionic bond and 4 covalent bonds  
 (c) 2 ionic bonds and 2 covalent bonds  
 (d) 2 ionic bonds and 4 covalent bonds
- Q.38** Which of the following pairs of crystal structure possesses the same atomic packing density?  
 (a) simple cubic & body centred cubic  
 (b) body centred cubic & face centred cubic  
 (c) face centered cubic & hexagonal close packed  
 (d) body centred cubic & hexagonal close packed
- Q.39** The colour bands on a carbon composition resistor occur in the sequence: yellow, violet, yellow and silver. Its resistance is  
 (a)  $470\text{ K}\Omega \pm 47\text{ K}\Omega$  (b)  $470\text{ K}\Omega \pm 23.5\%$   
 (c)  $47\text{ K}\Omega \pm 10\%$  (d)  $47\text{ K}\Omega \pm 5\%$
- Q.40** The real & imaginary dielectric constants  $\epsilon_r'$  and  $\epsilon_r''$  of 3 insulators at 1 KHz and  $50^\circ\text{C}$  are listed below:

Material	$\epsilon_r'$	$\epsilon_r''$
Polycarbonate	2.47	0.003
PET	2.58	0.003
PEEK	2.24	0.003

At a given voltage, the lower power dissipation per unit capacitance at 1 KHz can be obtained from

- (a) Polycarbonate  
 (b) PET  
 (c) PEEK  
 (d) Insufficient information to answer
- Q.41** A battery of 40 V and three capacitors of  $1000\text{ }\mu\text{F}$ ,  $500\text{ }\mu\text{F}$  and  $100\text{ }\mu\text{F}$  are all connected in (I) parallel and (II) series. The ratio of total charge stored in case I to that in case II is approximately  
 (a) 3 : 64 (b) 64 : 3  
 (c) 160 : 3 (d) 104 : 5



- Q.42** The magnetic flux  $\phi$  ( in Weber) linked with a coil at an instant of time  $t$ (in second) is given by  $\phi(t) = 2t^2 - 20t + 40$ . The induced e.m.f. in the coil at the instant  $t = 2$  second is  
 (a) 22 V (b) 20 V  
 (c) 12 V (d) 10 V
- Q.43** The speed of an audio cassette tape in a cassette player is 5cm/sec. If the maximum frequency that needs to be recorded is 20 KHz, the minimum spatial wavelength on the tape is  
 (a) 40  $\mu\text{m}$  (b) 25  $\mu\text{m}$   
 (c) 4  $\mu\text{m}$  (d) 2.5  $\mu\text{m}$
- Q.44** In a power transformer, the fundamental frequency of the hum arising due to magnetostriction is  
 (a) equal to the line frequency  
 (b) double the line frequency  
 (c) 4 times the line frequency  
 (d) not related to the line frequency
- Q.45** At a particular temperature and current density, the critical magnetic field for a Type I superconductor is  $B_c$  and that for a type II superconductor ranges from  $B_{c1}$  to  $B_{c2}$  keeping other parameters unloaded. both superconductors are now subjected to a magnetic field  $B$  that satisfies the conditions  $B > B_c$  and  $B_{c1} < B < B_{c2}$ . Which of the following statements is then true?  
 (a) Both type I and Type II superconductors will switch to their normal conducting states  
 (b) Both Type I and Type II superconductors will maintain their superconducting states  
 (c) Type I superconductor will remain in superconducting state, while type II super conductor will maintain a vortex state  
 (d) Type I superconductor will switch to the normal conducting state, while Type II superconductor will maintain a vortex state
- Q.46** Two free charges  $q$  and  $4q$  are placed at a distance  $d$  apart A third charge  $Q$  is placed between them at a distance  $X$  from charge  $q$  such that the system is in equilibrium. Then  
 (a)  $Q = \frac{4q}{9}$ ,  $X = \frac{d}{3}$  (b)  $Q = \frac{-4q}{9}$ ,  $X = Q = \frac{d}{4}$   
 (c)  $Q = \frac{-4q}{9}$ ,  $X = \frac{d}{3}$  (d)  $Q = \frac{-4q}{9}$ ,  $X = \frac{d}{4}$
- Q.47** In order to generate electron-hole pairs, the maximum wavelength of radiation for Silicon (Band gap = 1.1 eV) is  
 (a) 1.88  $\mu\text{m}$  (b) 1.68  $\mu\text{m}$   
 (c) 1.13  $\mu\text{m}$  (d) 1.54  $\mu\text{m}$
- Q.48** Resistivity of a p-type specimen is 0.12  $\Omega\text{-m}$ , hole mobility is 0.048  $\text{m}^2 \text{V}^{-1} \text{s}^{-1}$ (electron charge =  $1.6 \times 10^{-19}$  Coulomb) and intrinsic concentration is  $5.9 \times 10^{10} \text{cm}^{-3}$ . Then the electron concentration in the specimen is  
 (a)  $1.085 \times 10^{15} \text{cm}^{-3}$  (b)  $3.206 \times 10^6 \text{cm}^{-3}$   
 (c)  $5.9 \times 10^{10} \text{cm}^{-3}$  (d)  $1.085 \times 10^6 \text{cm}^{-3}$



**Q.49** What is the change of barrier height of a p-n junction at 300° K when doping in n-side is increased by a factor of 1000 and doping in p-side remains unchanged?

Hint : at 300° K  $\frac{kT}{q} = 0.026V$

- (a) 0.18 V
- (b) 1.8 V
- (c) 0.018 V
- (d) 0.14 V

**Q.50** A BJT has  $\alpha = 0.99$ ,  $i_B = I_B = 25 \mu A$  and  $I_{CBO} = 200 \text{ nA}$ . The collector current is

- (a)  $I_c = 2.5 \text{ mA}$
- (b)  $I_c = 1.5 \text{ mA}$
- (c)  $I_c = 3.5 \text{ mA}$
- (d)  $I_c = 4.5 \text{ mA}$

**SECTION-B**

**Q.51.** Excitation table of a flip-flop is given below:

$Q_n$	$Q_{n+1}$	A	B
0	0	0	x
0	1	1	x
1	0	x	1
1	1	x	0

Characteristic equation of the flip-flop will be:

- (a)  $Q_{n+1} = A\bar{Q}_n + BQ_n$
- (b)  $Q_{n+1} = \bar{A}Q_n + BQ_n$
- (c)  $Q_{n+1} = A\bar{Q}_n + BQ_n$
- (d)  $Q_{n+1} = A\bar{Q}_n + BQ_n$

**Q.52** In a weighted-resistor digital-to-analog converter with 8-bit input, if the resistance corresponding to the MSB is 2K, what will be the resistance corresponding to the LSB?

- (a) 250  $\Omega$
- (b) 512 K $\Omega$
- (c) 256 K $\Omega$
- (d) 25.5  $\Omega$

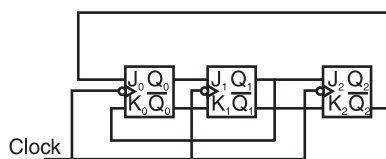
**Q.53** The angle ( $\theta_k$ ) of the asymptotes of the root loci, where  $k = 0, 1, 2 \dots n$ ;  $n = (\text{no. of poles } N) - (\text{no. of zeroes } Z)$  is given by

- (a)  $\pi k/n$
- (b)  $(k + 1) 2 \pi/n$
- (c)  $2\pi k/n$
- (d)  $(2k + 1) \pi/n$

**Q.54** For a 2<sup>nd</sup> order feedback control system, the peak resonance magnitude should be  $M_p \leq 1.15$ . Hence the damping ratio ( $\delta$ ) is

- (a) 0.1
- (b) 0.5
- (c) 0.707
- (d) 1

**Q.55** Modulus of the following counter is



- (a) 3
- (b) 5
- (c) 6
- (d) 8

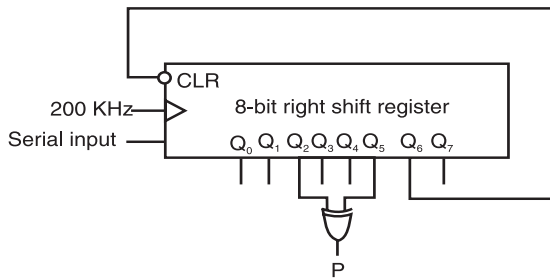




**Q.56** A ripple counter is to operate at a frequency of 10 MHz. If the propagation delay time of each flip-flop in the counter is 10ns and the storing time is 50 ns, how many maximum stages can the counter have?

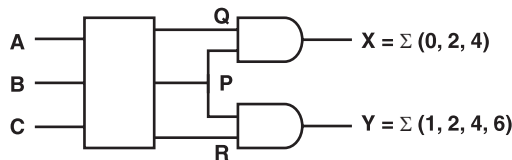
- (a) 10
- (b) 5
- (c)  $2^{10}$
- (d)  $10^2$

**Q.57** For the adjoining circuit, the waveform at P will be high during



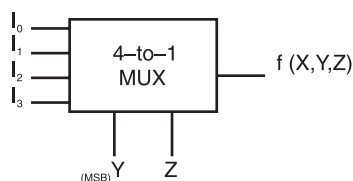
- (a) (0-15) $\mu$ s
- (b) (5-20) $\mu$ s
- (c) (10-25) $\mu$ s
- (d) (15-30) $\mu$ s

**Q.58** Given a combinational network with three inputs A, B and C, three intermediate outputs P, Q and R, and two outputs  $X = P.Q = \Sigma(0, 2, 4)$  and  $Y = P.R = \Sigma(1, 2, 4, 6)$  as shown below, find the smallest function P (containing minimum number of minterms that can produce the output X and Y.



- (a)  $\Sigma(2, 4)$
- (b)  $\Sigma(0, 1, 2, 4, 6)$
- (c)  $\Sigma(3, 5, 7)$
- (d)  $\Sigma(1, 2, 6)$

**Q.59** If a 4-to-1 MUX (shown below) realizes a three-variable function  $f(X,Y,Z) = XY + X\bar{Z}$ . then which of the following is correct?



- (a)  $I_0 = X, I_1 = 0, I_2 = X, I_3 = X$
- (b)  $I_0 = 0, I_1 = 1, I_2 = Y, I_3 = X$
- (c)  $I_0 = X, I_1 = 1, I_2 = 0, I_3 = X$
- (d)  $I_0 = X, I_1 = 0, I_2 = X, I_3 = Z$

**Q.60** The characteristic equation for a closed loop system with forward gain K is  $s^4 + 4s^3 + 8s^2 + 6s + K = 0$ . The critical gain value  $K_c$  for stability should not exceed

- (a) 3.25
- (b) 9.75
- (c) 13.0
- (d) 23.3



**Q.61** Two systems are defined by their state variable equations in item domain  $dx(t)/dt = Ax(t) + Bu(t)$  as follows. If the gain equations in this are as given below, which of the following choices is correct?

$$A = \begin{bmatrix} -2 & 1 \\ 0 & -1 \end{bmatrix} \quad B = \begin{bmatrix} 1 \\ 0 \end{bmatrix} \dots\dots \text{Equation 1}$$

$$A = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix} \quad B = \begin{bmatrix} 0 \\ 1 \end{bmatrix} \dots\dots \text{Equation 2}$$

- (a) Both equations are uncontrollable  
 (b) Both equations are controllable  
 (c) Only Equation 1 is controllable  
 (d) Only Equation 2 is controllable
- Q.62** The loop transfer of a system is  $G(s)H(s) = 5/(s+1)(2s+1)(3s+1)$  which has the phase crossover frequency  $f_c = 0.16$  Hz. The gain margin (dB) of the system is
- (a) 6 (b) 4  
 (c) 2 (d) 0
- Q.63** For a 2<sup>nd</sup> order servo system, the damping ratio  $\delta = 0.5456$  and undamped natural frequency is  $\omega_n = 31.6$  rad/sec. The percent overshoot is
- (a) 7.07 (b) 10.2  
 (c) 14.10 (d) 21.21
- Q.64** For a system with derivative feedback, forward path transfer is  $G(s) = 1/(s^2 + s + 1)$  and feedback path transfer is  $H(s) = Ks$ . What is the value of K to obtain a critically-damped closed loop transient response.
- (a) 0.5 (b) 0.707  
 (c) 1 (d) 1.414
- Q.65** A P-controller is used to adjust the outer level of a tank in range of (0-10)m. The desired level is 5 m. The controller should fully close the valve, if level rises to 5.5 m and it should fully open the valve, if level falls to 4.5 m. What should be the % P-band?
- (a) 1 (b) 5  
 (c) 7 (d) 10
- Q.66** In a radio transmitter, the frequency of the crystal oscillator will be stable for a long time if the quality factor of the crystal resonator is
- (a) > 100 (b) > 500  
 (c) > 1000 (d) > 20000
- Q.67** In an IF amplifier, the IF transformer is provided with tapping to
- (a) increase the voltage gain  
 (b) increase the bandwidth of the resonance circuit  
 (c) increase the impedance offered by the resonance circuit to the following cascaded amplifier  
 (d) increase the quality factor of the resonance circuit



- Q.68** Consider the wave form  $V(t) = (1+m \cos \omega_m t) \cos \omega_c t$ . Show that, if the demodulated wave is to follow the envelope of  $V(t)$ , it is required that at any time  $t_0$
- $RC \leq \omega_m (m \sin \omega_m t_0) /$
  - $(1/RC) \geq$
  - $1/RC \leq$
  - RC is very large
- Q.69** QPSK system is superior to BPSK system because
- its bandwidth is higher than that of BPSK System
  - interchannel interference in QPSK system is less than that in BPSK system
  - bandwidth of QPSK system is half of the bandwidth of BPSK system
  - in QPSK system inter-symbol interference is improved
- Q.70** A radio receiver is placed at one corner of a table and again placed at some other corner of the same table. Loudspeaker output is changed because
- image interference is reduced
  - adjacent channel interference is increased
  - of fading
  - line of sight propagation is not utilized
- Q.71** In time-division multiple access system, a traffic system on the receiver side must receive the traffic burst addressed to it. For this
- transmitting frame acquisition is required
  - proper synchronization of the timing of transmit frame is required
  - frame efficiency should be higher
  - synchronization is necessary to overcome the perturbations of the satellite
- Q.72** Earth coverage dish antenna is used in satellite system. It is characterized by the fact that
- It is a narrow beam antenna
  - It is Parabolic antenna
  - it is sharply focused within a small area of the surface of the earth
  - it is a wide angle antenna which covers a large area of the surface of the earth
- Q.73** In a Klystron amplifier, the RF voltage produces
- amplitude modulation
  - frequency modulation
  - phase modulation
  - velocity modulation
- Q.74** For the proper operation of MASER at a frequency of 10 GHz, the material used is
- $Al_2O_3$  with slight doping of chromium
  - $TiO_2$  with slight doping of iron
  - $TiO_2$  with slight doping of chromium
  - $Al_2O_3$  with slight doping of iron



- Q.75** A rectangular waveguide is 4.2 cm by 1.85 cm. The cut-off frequency of the dominant mode through this waveguide is  
 (a) 3.57 GHz (b) 3.75 GHz  
 (c) 3.70 MHz (d) 3.57 MHz
- Q.76** For an antenna to be frequency-independent, it should expand or contract in proportion to the  
 (a) gain (b) directivity  
 (c) wavelength (d) impedance
- Q.77** Suppose that data items, numbered 1, 2, 3, 4, 5 and 6 come in the input stream in this order. By using a queue, which of the following rearrangement can be obtained in the output order ?  
 (a) 1 2 6 4 5 3 (b) 2 4 3 6 5 1  
 (c) 4 2 1 3 5 6 (d) 1 2 3 4 5 6
- Q.78** We are told that the integers between 1 and 1000 are arranged in a binary search tree with '<' as the ordering relation. Below are four lists of vertices encountered as we search for the number 363. Which list cannot be produced by this search through a binary search tree?  
 (a) 924, 220, 911, 244, 898, 248, 363  
 (b) 2, 252, 401, 398, 330, 344, 397, 363  
 (c) 925, 202, 911, 240, 912, 245, 363  
 (d) 2, 399, 387, 219, 266, 382, 381, 278, 363
- Q.79** The number of 1's in the binary representation of  $13 \cdot 16^3 + 11 \cdot 16 + 2$  is  
 (a) 8 (b) 7  
 (c) 9 (d) 12
- Q.80** A disk has 500 bytes/sector, 100 sectors / track, 20 heads and 1000 cylinders. Total capacity of disk is  
 (a) 1 GB (b) 100 MB  
 (c) 10 MB (d) 10 GB
- Q.81** Suppose that the same clock signal is used to increment the microprogram counter and to load the control register. Which of the following assertion(s) is/are true?  
 1. Microinstruction execution time is at least two clock periods.  
 2. Microinstruction execution time can be overlapped with fetching the next microinstruction.  
 3. Unconditional branch microinstructions must necessarily take longer than other types.  
 (a) 1 only (b) 2 only  
 (c) 1 and 3 (d) 2 and 3
- Q.82** Some system architects do not find RISC instruction repertoire to be cost-effective because it  
 (a) result in large increase in programme size  
 (b) result in complex structure of microcode  
 (c) has been observed that an average compiler does not employ more than a limited subset of available instructions  
 (d) results in complex decoding of opcode field resulting in longer execution time



- Q.83** A stack machine pushes operands on a stack and evaluates binary operators by a pcs (i.e pop/compute/store) where the top two operands are popped computation is performed and the result is pushed onto stack. Evaluation of an expression  $(x * y) + (u * v)$  by Reverse Polish notation in a stack machine needs
- 4 push and 3 pcs instructions
  - 6 push and 1 pcs instructions
  - 4 push and 1 pcs instructions
  - 5 push and 2 pcs instructions
- Q.84** A dot matrix printer takes 3 msec to print a character, and 1 msec for a space between two consecutive characters. If it prints 100 characters per line, its printing speed specifications in characters per second (cps) and time to print a line of characters are respectively
- 100 cps and 400 msec
  - 2500 cps and 0.04 sec
  - 250 cps and 40 msec
  - 250 cps and 0.4 sec
- Q.85** Consider the following program segment with 8085 microprocessor  
 LXI H 3600H  
 MOV A, M  
 HLT  
 The MOV instruction involves
- indirect addressing
  - immediate addressing
  - implicit addressing
  - direct addressing
- Q.86** To establish a communication between 8085 microprocessor and 8255 Programmable Peripheral Interface chip. the status of the chip select input would be
- TRISTATE
  - HIGH
  - LOW
  - DON'T CARE
- Q.87** Which flag does not change by the execution of the instruction DCR B in 8085 microprocessor ?
- Parity
  - Carry
  - Zero
  - Sign
- Q.88** Let the content of the memory location 3501H be 72H. Now consider the following program with 8085 microprocessor  
 LDA 3501H  
 CMA  
 STA 3502H  
 HLT  
 The content of the memory location 3502H after execution of programme will be
- 27H
  - D8H
  - 8DH
  - 72H



**Q.89** Given the program segment below, how many times will the instruction LP: JNZ REP be executed?

```

MVI H, 02H
MVI L, 05H
REP : DCR L
LP   : JNZ REP
      : DCR H
      : JNZ REP
.....
    
```

- (a) 10
- (b) 260
- (c) 510
- (d) 7

**Q.90** What addressing mode is used in the instruction RET?

- (a) Direct
- (b) Immediate
- (c) Implicit
- (d) Register-indirect

**Q.91** A one-byte instruction is executed in the 8085 microprocessor by the following steps:

```

((SP) - 1) ← (PCH)
((SP) - 2) ← (PCL)
((SP) ← ((SP) - 2)
(PC) ← 0008H
    
```

The corresponding instruction is

- (a) JMP 0008H
- (b) PUSH PSW
- (c) CALL 0008 H
- (d) RST 1

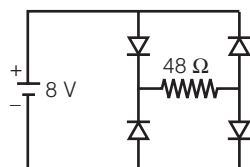
**Q.92** The zero flag of 8085 microprocessor is to be set keeping the content of the accumulator unchanged. Which instruction is to be used?

- (a) MOV A,A
- (b) ANI 00H
- (c) XRA A
- (d) CMP A

**Q.93** In class - A power amplifier, the collector dissipation is maximum when

- (a) no signal is present
- (b) signal swing is maximum
- (c) signal swing is (1/1.414) of its maximum
- (d) none of the above

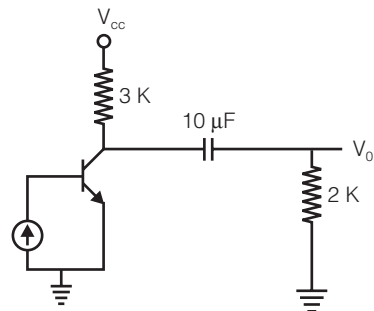
**Q.94** If cut-in voltage and forward resistance of each diode (in the adjoining figure) are 0.7 V and 1 ohm respectively, the current through the 48 ohm resistor is



- (a) 132 mA
- (b) 160 mA
- (c) 0 mA
- (a) (1/6) A

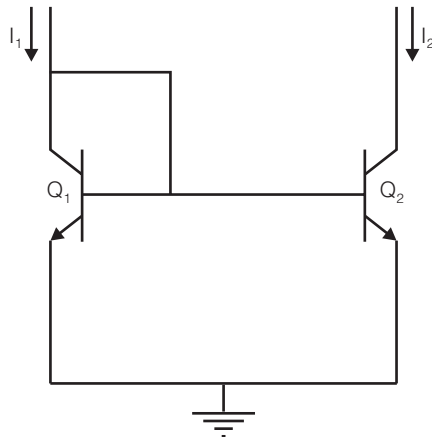


**Q.95** The lower cut-off frequency of the transistor stage in the adjoining figure is



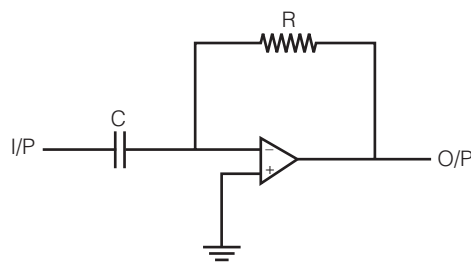
- (a) 7.95 Hz
- (b) 13.25 Hz
- (c) 5.30 Hz
- (d) 3.18 Hz

**Q.96** In the adjoining current mirror circuit if  $Q_1$  and  $Q_2$  are identical and base currents are not neglected, then which of the following is true ?



- (a)  $I_2 = I_1$
- (b)  $I_2 = \beta I_1$
- (c)  $I_2 = [(\beta/(\beta + 2))]I_1$
- (d)  $I_2 = [(\beta + 2)/\beta]I_1$

**Q.97** If rectangular input is applied to the adjoining circuit, it produces

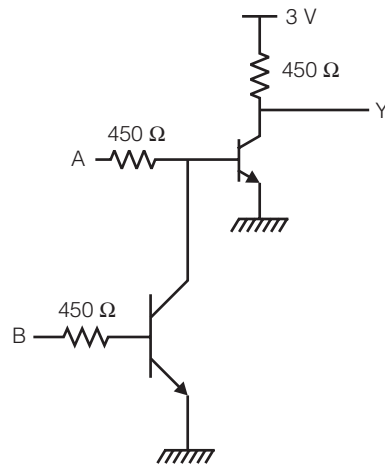


- (a) square output
- (b) spike output
- (c) sinusoidal output
- (d) none of the above

**Q.98** In an oscillator, if amplifier gain (A) without feedback is  $(1 + R_f/R_1)$  and gain ( $\beta$ ) of the feedback network is  $1/\{3 + j(\omega R_c - 1/\omega R_c)\}$ , then which of the following is true ?

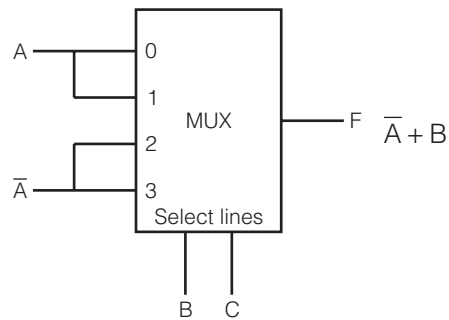
- (a)  $R_f \leq 2R_1$
- (b)  $R_f \geq R_1$
- (a)  $|\beta| = 3$
- (b)  $|\beta| = 1/3$

**Q.99** Logic expression for Y in terms of logical variables A and B in the adjoining figure is



- (a)  $A + B$
- (b)  $A + \bar{B}$
- (c)  $A + B$
- (d)  $\bar{A} + \bar{B}$

**Q.100** The logic realized by the adjoining circuit is



- (a)  $F(A, B, C) = A \oplus B$
- (b)  $F(A, B, C) = A \oplus C$
- (c)  $F(A, B, C) = A \odot B$
- (d)  $F(A, B, C) = A \odot C$





## BSNL (JTO ) EXAM-2006

### ANSWERS

11. (b)	26. (a)	51. (c)	76. (d)
2. (d)	27. (c)	52. (c)	77. (d)
3. (b)	28. (d)	53. (d)	78. (c)
4. (b)	29. (b)	54. (b)	79. (b)
5. (d)	30. (c)	55. (c)	80. (a)
6. (c)	31. (d)	56. (b)	81. (d)
7. (c)	32. (d)	57. (c)	82. (a)
8. (b)	33. (a)	58. (b)	83. (a)
9. (a)	34. (a)	59. (a)	84. (d)
10. (d)	35. (d)	60. (b)	85. (d)
11. (a)	36. (d)	61. (a)	86. (c)
12. (a)	37. (a)	62. (a)	87. (b)
13. (c)	38. (c)	63. (c)	88. (c)
14. (c)	39. (c)	64. (c)	89. (a)
15. (a)	40. (b)	65. (d)	90. (d)
16. (d)	41. (d)	66. (c)	91. (c)
17. (a)	42. (c)	67. (a)	92. (d)
18. (b)	43. (d)	68. (b)	93. (a)
19. (d)	44. (b)	69. (c)	94. (a)
20. (a)	45. (d)	70. (c)	95. (c)
21. (b)	46. (a)	71. (b)	96. (c)
22. (d)	47. (c)	72. (c)	97. (b)
23. (a)	48. (b)	73. (d)	98. (d)
24. (b)	49. (a)	74. (b)	99. (d)
25. (a)	50. (a)	75. (a)	100 (a)