TEST SERIES CSIR-NET/JRF June 2017

BOOKLET SERIES B

Paper Code 05

Test Type: TEST SERIES

PHYSICAL SCIENCES

Duration: 02:00 Hours

Date: 26-05-2017

Maximum Marks: 120

Read the following instructions carefully:

* Single Paper Test is divided into **TWO** Parts.

Part - A: This part shall carry **10** questions. Each question shall be of **2 marks.**

Part - B: This part shall contain **50** questions. Each question shall be of **2 marks**.

* Darken the appropriate bubbles with HB pencil/Ball Pen to write your answer.

* There will be negative marking @25% for each wrong answer.

* The candidates shall be allowed to carry the Question Paper Booklet after completion of the exam.

* For rough work, blank sheet is attached at the end of test booklet.

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PART-A : GENERAL APTITUDE

1. Six bells commence tolling together and toll at intervals of 2, 4, 6, 8, 10 and 12 seconds respectively. In 30 minutes, how many times do they toll together?
(a) 4 (b) 10 (c) 15 (d) 16

2. A library has an average of 510 visitors on Sundays and 240 on other days. The average number of visitors per day in a month of 30 days beginning with a Sunday is
(a) 250 (b) 276 (c) 280 (d) 285

3. My brother is 3 years elder to me. My father was 28 years of age when my sister was born while my mother was 26 years of age when I was born. If my sister was 4 years of age when my brother was born, then, what was the age of my father and mother respectively when my brother was born?
(a) 32 yrs, 23 yrs (b) 32 yrs, 29 yrs (c) 35 yrs, 29 yrs (d) 35 yrs, 33 yrs

4. In an examination, 35% candidates failed in one subject and 42% failed in another subject while 15% failed in both the subjects. If 2500 candidates appeared at the examination, how many passed in either subject but not in both?
(a) 325 (b) 1175 (c) 2125 (d) None of these

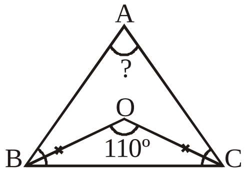
5. On selling 17 balls at Rs. 720, there is a loss equal to the cost price of 5 balls. The cost price of a ball is
(a) Rs. 45 (b) Rs. 50 (c) Rs. 55 (d) Rs. 60

6. A wheel that has 6 cogs is meshed with a larger of 14 cogs. When the smaller wheel has made 21 revolutions, then the number of revolutions made by the larger wheel is
(a) 4 (b) 9 (c) 12 (d) 49

7. A machine P can print one lakh books in 8 hours, machine Q can print the same number of books in 10 hours while machine R can print them in 12 hours. All the machines are started at 9 a.m. while machine P is closed at 11 a.m. and the remaining two machines complete the work. Approximately at what time will the work be finished?
(a) 11:30 a.m. (b) 12 noon (c) 12:30 p.m. (d) 1 p.m.

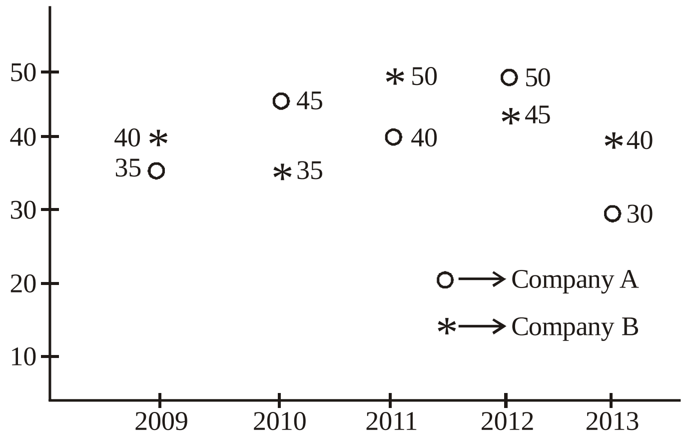
8. A and B walk around a circular track. They start at 8 a.m. from the same point in the opposite directions. A and B walk at a speed of 2 rounds per hour and 3 rounds per hour respectively. How many times shall they cross each other before 9.30 a.m.?
(a) 5 (b) 6 (c) 7 (d) 8

9. The internal bisectors of $\angle ABC$ & $\angle ACB$ of ΔABC meet each other at 0. If $\angle BOC = 110^\circ$ then $\angle BAC$ is equal to



(a) 40º (b) 55º (c) 90º (d) 110º

10. This graph shows the percentage profit earned by two companies A and B over the years.



Ratio of income of company B in the year 2011 and 2013 is 2:3, then what was the ratio of expenditure of the company in these two years?

(a) 28:45 (b) 15:21 (c) 5:6 (d) 8:15

PART-B : Thermo & Statistical Physics, Solid State & Electronics

11. Consider a system of two atoms ,each having only 3 quantum states of energies $0, \in$ and $2\in$. The system is in contact with a heat reservoir at temperature T. The partition function of the system if the particles obey Fermi-Dirac statistics, is:

(a) $1+\exp(-\beta\in)+\exp(-2\beta\in)$

(b) $\left(1+\exp(-\beta\in)+\exp(-2\beta\in)\right)^2$

(c) $\exp(-\beta\in)+\exp(-2\beta\in)+\exp(-3\beta\in)$

(d) $1+\exp(-\beta\in)+2\exp(-2\beta\in)+2\exp(-3\beta\in)+\exp(-4\beta\in)$

12. Let us consider a statistical system with N states, with energies $E_n = n\varepsilon,\ n = 0,1,2,....N-1$. The system is in thermal contact with a reservoir at temperature T.The probability that the system is in the state with energy E_n is

(a) $\dfrac{e^{\frac{n\varepsilon}{kT}} - e^{-\frac{(n+1)\varepsilon}{kT}}}{1-e^{\frac{N\varepsilon}{kT}}}$ (b) $\dfrac{e^{-\frac{n\varepsilon}{kT}} - e^{-\frac{(n+1)\varepsilon}{kT}}}{1-e^{\frac{N\varepsilon}{kT}}}$ (c) $\dfrac{e^{-\frac{N\varepsilon}{kT}} - e^{-\frac{(n+1)\varepsilon}{kT}}}{1-e^{\frac{N\varepsilon}{kT}}}$ (d) $\dfrac{e^{-\frac{n\varepsilon}{kT}} - e^{-\frac{\varepsilon}{kT}}}{1-e^{\frac{N\varepsilon}{kT}}}$

13. Consider an ideal Fermi gas is confined in one dimensional region of length L at $T = 0$. If the density of gas increases to two times of its initial value, then its pressure

(a) increases to eight times of its initial value (b) increases to $2\sqrt{2}$ times of its initial value

(c) increases to $4\sqrt{2}$ times of its initial value (d) remains unchanged

14. For a thermodynamics system, the relation among the entropy S, volume V, internal energy U and number of particles N is given by $S = A(NVU)^{1/3}$, where A is constant. The pressure (P) and specific heat (C_V) at constant volume respectively are

(a) $\sqrt{\dfrac{A^3NT}{27V}}, \sqrt{\dfrac{A^3N}{12TV}}$ (b) $\sqrt{\dfrac{A^3NT^3}{27V}}, \sqrt{\dfrac{A^3NVT}{12}}$

(c) $\sqrt{\dfrac{NA^3T^3}{27V}}, \sqrt{\dfrac{NA^3VT}{27}}$ (d) $\sqrt{\dfrac{NA^3T^3}{12V}}, \sqrt{\dfrac{A^3NVT}{12}}$

15. A branch of excitations for a three-dimensional system has a dispersion relation $\in(k) = Ak^{2/3}$, where A is constant and k is magnitude of wave vector. The excitations are bosonic in nature and chemical potential (μ) is zero. The heat capacity at constant volume (C_V) of the system varies on absolute temperature (T) as

(a) $C_V \propto T^{3/2}$ (b) $C_V \propto T^3$ (c) $C_V \propto T^{7/2}$ (d) $C_V \propto T^{9/2}$

16. A system consists of 4 distinguishable coins that can come up either heads or tails. All coins are tossed simultaneously. Then the maximum entropy corresponding to a macrostate of the system is

(a) $k_B[\ln 2 + \ln 3]$ (b) $4k_B \ln 2$ (c) $k_B \ln 3$ (d) $2k_B \ln 2$

17. An ensemble of systems is in thermal equilibrium with a reservoir for which $kT = 0.025$eV. State A has an energy that is 0.1 eV above that of state B. If degeneracies of each state is same, then the ratio of the number of systems in state A to the number of system in state B is

(a) 1 (b) $e^{0.25}$ (c) $2\times0^{-0.25}$ (d) e^{-4}

18. Consider a system of N distinguishable and non interacting particles. The single particle energy spectrum is $\varepsilon_n = n\varepsilon,$ with $n = 0, 1, 2, \ldots, +\infty$ and degeneracy $g_n = n+1$ ($\in > 0$ is a constant). The system is in thermal equilibrium at temperature T, the partition function of the system is given by,

(a) $Q_N(V,T) = \left(\dfrac{n+1}{\left(1-e^{-\varepsilon/kT}\right)}\right)^N$ (b) $Q_N(V,T) = \left(\dfrac{n+1}{\left(1-e^{-\varepsilon/kT}\right)^2}\right)^N$

(c) $Q_N(V,T) = \left(\dfrac{1}{\left(1-e^{-\varepsilon/kT}\right)^2}\right)^N$ (d) $Q_N(V,T) = \left(\dfrac{1}{\left(1-e^{-\varepsilon/kT}\right)}\right)^N$

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19. The mean square fluctuations in energy for a system composed of N distinguishable particles with two energy levels ε_1 and $\varepsilon_2 (= \varepsilon_1 + \Delta)$ with degeneracy g_1 and g_2 respectively in thermal equilibrium at temperature T are given by

(a) $N \dfrac{g_1\varepsilon_1 + g_2\varepsilon_2 e^{-\frac{\Delta}{kT}}}{g_1 + g_2 e^{-\frac{\Delta}{kT}}}$ (b) $\dfrac{N}{kT^2} \dfrac{g_1\varepsilon_1 + g_2\varepsilon_2 e^{-\frac{\Delta}{kT}}}{\left(g_1 + g_2 e^{-\frac{\Delta}{kT}}\right)^2}$

(c) $\dfrac{N}{kT^2} \dfrac{g_1 g_2 \Delta^2 e^{-\frac{\Delta}{kT}}}{\left(g_1 + g_2 e^{-\frac{\Delta}{kT}}\right)^2}$ (d) $N \dfrac{g_1 g_2 \Delta^2 e^{-\frac{\Delta}{kT}}}{\left(g_1 + g_2 e^{-\frac{\Delta}{kT}}\right)^2}$

20. Consider a system of N distinguishable particles (in which particles can move in one dimensional segment $q=0$ and $q=L$) in thermal equilibrium at temperature T. The single particle Hamiltonian is given by

$$H=\frac{p^2}{2m}-\alpha\ell n\left(\frac{q}{L_0}\right),$$

where α is positive constant and L_0 is characteristic length. The equation of state of the system is

(a) $\frac{NKT}{L}$ (b) $\frac{\alpha NKT}{L}\left(1-\frac{\alpha}{kT}\right)$ (c) $\frac{NKT}{L}\left(1+\frac{\alpha}{kT}\right)$ (d) $\frac{NKT}{\alpha L}$

21. Consider a system of distinguishable particles with energy levels $0,\varepsilon,2\varepsilon,3\varepsilon,4\varepsilon,.....$. For a system with 2 particles and energy 2ε, the entropy of the system is

(a) kln3 (b) 2kln2 (c) 2kln3 (d) kln5

22. A system of 6 localized and independent quantum oscillators in contact with a thermal reservoir at temperature T. The energy levels of single oscillator are given by

$$E_n=\hbar\omega_0\left(n+\frac{1}{2}\right),\qquad n=1,3,5,7..........$$

The average internal energy of the system is

(a) $\frac{1}{2}\hbar\omega_0+\frac{\hbar\omega_0}{e^{\frac{\hbar\omega_0}{kT}}-1}$ (b) $3\hbar\omega_0+\frac{6\hbar\omega_0}{e^{\frac{\hbar\omega_0}{kT}}-1}$ (c) $\frac{15}{2}\hbar\omega_0+\frac{10\hbar\omega_0}{e^{\frac{2\hbar\omega_0}{kT}}-1}$ (d) $9\hbar\omega_0+\frac{12\hbar\omega_0}{e^{\frac{2\hbar\omega_0}{kT}}-1}$

23. Consider that the density of states $g(E)$ for super-relativistic gas is defined as

$$g(E)=\begin{cases}1, & 0<E<E_D\\ 0, & E>E_D\end{cases}$$

The specific heat at constant volume C_V for gas of bosons and fermions in very low temperature limit ($T\to 0$) varies as

(a) $C_V\,\alpha\,T^3$ for bosons and $C_V\,\alpha\,T$ for fermions

(b) $C_V\,\alpha\,T$ for bosons and for fermions $C_V\,\alpha\,T^3$

(c) $C_V\,\alpha\,T^2$ for bosons and for fermions $C_V\,\alpha\,T$

(d) $C_V\,\alpha\,T$ for bosons and for fermions $C_V\,\alpha\,T$

24. The equation of state for one mole of a gas is given by $\left(P+\frac{a}{TV^2}\right)(V-b)=RT$, where a, b are positive constants of appropriate dimensions and R is universal gas constant, the value of critical temperature of the gas is

(a) $\sqrt{\left(\frac{8a}{27bR}\right)}$ (b) $\frac{8a}{27bR}$ (c) $\frac{3a}{27bR}$ (d) $\sqrt{\left(\frac{a}{27bR}\right)}$

25. The Hamiltonian marix for a quantum mechanical system can be written as

$$H=-\frac{gB}{\sqrt{2}}\begin{pmatrix}0 & 1 & 0\\ 1 & 0 & 1\\ 0 & 1 & 0\end{pmatrix}$$, where $g, B>0$ constants.

The system is in thermal equilibrium at temperature T, the average energy of the system is given by

(a) 0 (b) $\frac{2gB}{3}$ (c) $\frac{-gB\left(e^{\beta gB}-e^{-\beta gB}\right)}{\left(1+e^{\beta gB}+e^{-\beta gB}\right)}$ (d) $\frac{-gB\left(e^{\beta gB}+e^{-\beta gB}\right)}{\left(1+e^{\beta gB}+e^{-\beta gB}\right)}$

26. The average energy per particle for a Fermi gas at $T=0$, in terms of Fermi energy ε_F, if density of states is proportional $\varepsilon^{-1/2}$ is given by

(a) $\frac{3}{5}\varepsilon_F$ (b) $\frac{1}{2}\varepsilon_F$ (c) $\frac{3}{4}\varepsilon_F$ (d) $\frac{1}{3}\varepsilon_F$

27. In the first –order phase transition which is/are continuous?

(a) Volume (b) Chemical potential (c) Entropy (d) all

28. The lattice parameter of a fcc solid is given as a = 2Å. If energy (E_V) of vacancy formation is 1 eV. The number of vacancies/m^3 at 300K are: (Given : $\exp(-40)=4.2\times10^{-18}$)

(a) 2.1×10^{12} (b) 1.70×10^{12} (c) 4×10^{19} (d) 1.70×10^{20}

29. Critical temperature of a type-I super conductor is 15K and critical magnetic field at 0K is 10^4 A/m. The band gap (E_g) of the super conductor is

(a) 2.3 meV (b) 4.6 meV (c) 1.3 meV (d) 10 meV

30. Interaction between two atoms of copper (Cu) having fcc structure is given by the potential $V(r)=-\frac{a}{r^2}+\frac{b}{r^{10}}$, where $a=\frac{1}{2}\times10^{-40}\ J-m^2$ and $b=\frac{1}{10}\times10^{-120}\ J-m^{10}$, the lattice constant 'a' of Cu is:

(a) 2Å (b) 1 Å (c) 1.40 Å (d) 1.15Å

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31. The resistance of copper rod of resistivity 'ρ' length 'l' and radius 'r' is calculated using the formula $R=\rho\frac{\ell}{\pi r^2}$. If the uncertainties in the measurement of length and radius are 5% and 3% respecetively. The uncertainity in R is:

(a) 9% (b) 8% (c) 5% (d) 11%

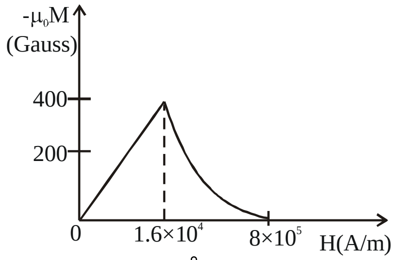
32. A GaAsP photodetector has a cross-sectional area of 2×2 mm^2. A light of wavelength 500 nm and intensity 0.1 mw/cm^2 incident on the photodetector of unity quantum efficiency. Band gap of GaAsP semiconductor is 2.20 eV. Photocurrent (I_{ph}) generated in the detector is?

(a) 3μA (b) 1.60 μA (c) 2.30 μA (d) 1.50 μA

33. The compound NaCl has a cubic lattice with density 2.167 g/cm^3. Na has a molar mass of 23 g/mol and Cl has a molar mass of 35.4 g/mol. The distance between adjacent atoms is:

(a) 5.6Å (b) 2.45Å (c) 4.90Å (d) 2.80Å

34. For a super conductor M vs H graph is shown in the figure. The penetration depth (λ) for the super conductor is?



(a) 4Å (b) 2Å (c) 6Å (d) 8Å

35. In an x-ray diffraction experiment using $\lambda_{Cu} = 1.54\text{Å}$, the (011) plane of a fcc lattice gives a diffraction peak at Bragg's angle $\theta_B = 45^o$, with an uncertainity of $\pm 0.9^o$. The lattice parameter (a) of fcc lattice is:

(a) 1.54Å (b) 6.16Å (c) 3.08Å (d) 2.17Å

36. In two dimensions two metals *A* and *B*, have the number density of free electrons in the ratio $n_A : n_B = 1:2$. The ratio of their Fermi velocities is

(a) 2 : 1 (b) 1 : 2 (c) 1 : 4 (d) $1 : \sqrt{2}$

37. A two-dimensional system consists of a monovalent atom in a rectangular primitive cell with a = 2Å and b = 4Å. By assuming free electron model, the ratio of the electron energy at corner to side centre position (along k_x-direction) is:

(a) $\frac{5}{4}$ (b) $\frac{4}{5}$ (c) 5 (d) $\frac{1}{5}$

38. Consider a square lattice in two dimensions with crystal potential

$$U(x, y) = -4U \cos\left(\frac{k_x a}{2}\right) \cdot \cos\left(\frac{k_y a}{2}\right)$$

The effective mass (m^*) at the Brillouin zone boundary is

(a) $\frac{\hbar^2}{Ua^2}$ (b) $\frac{-\hbar^2}{Ua^2}$ (c) ∞ (d) $\frac{-\hbar^2}{2Ua^2}$

39. In a cyclotron resonance experiment with angular (ω_c) 1.5×10^{11} rad/sec and magnetic field (*B*) 860 Gauss, the effective mass (m^*) of electron is [m_0 is free electron mass]:

(a) 0.1 m_0 (b) 0.01 m_0 (c) m_0 (d) 10 m_0

40. The radius of Fermi sphere in copper having mono-valent fcc structure is (*a* is lattice parameter):

(a) $\frac{9.80}{a}$ (b) $\frac{3.90}{a}$ (c) $\frac{4.90}{a}$ (d) $\frac{3.09}{a}$

41. Fermi energy of a certain metal M_1 is 5eV. A second metal M_2 has an electron density which is 6% higher than that of M_1. Assuming that the free electron theory is valid for both the metals, the Fermi energy of M_2 is closest to

(a) 5.6 eV (b) 5.2 eV (c) 4.8 eV (d) 4.4eV

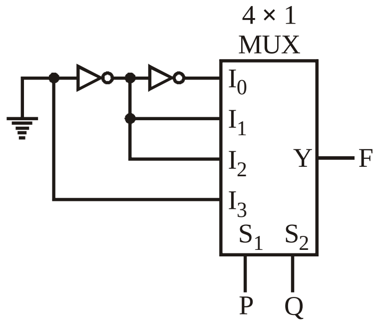
42. An X-ray diffraction (XRD) experiment is carried out on a crystalline solid having *FCC* structure at room temperature. The solid undergoes a phase transformation on cooling to –20ºC and shows orthorhombic structure with small decrease in its unit cell lengths as compared to the *FCC* unit cell lengths. As a result, the (311) line of the XRD pattern corresponding to the *FCC* system

(a) will split into a doublet. (b) will split into a triplet.
(c) will remain unchanged. (d) will split into two separate doublets.

43. The α phase of iron above the Curie temperature has a paramagnetic susceptibility satisfying $\chi = \frac{C}{(T - T_C)}$, where C = 2.18 K, and T_C = 1093 K. The spontaneous magnetisation at 0K is 2×10^4 G. The Weiss molecular field in iron at 0K is

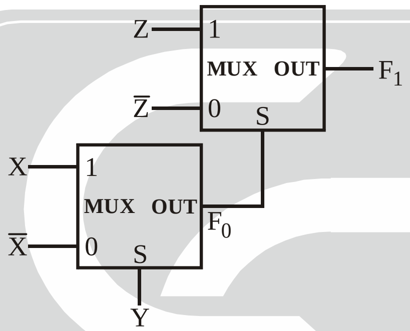
(a) 10^5 G (b) 10^6 G (c) 10^7 G (d) 10^8 G

44. The logic function implemented by the circuit below is (gound implies logic 0)



(a) F = AND (P, Q) (b) F = OR (P, Q) (c) F = XNOR (P, Q) (d) F = XOR (P, Q)

45. A MUX circuit shown in the figure below:



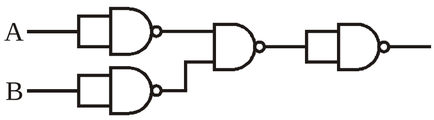
implements a logic function F_1. The correct expression for F_1 is

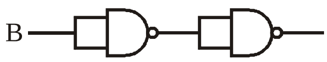
(a) $\left(\overline{X \oplus Y}\right) \oplus Z$ (b) $\overline{\left(\overline{X \oplus Y}\right) \oplus Z}$ (c) $(X \oplus Y) \oplus \bar{Z}$ (d) $(X \oplus Y) \oplus Z$

46. Which of the following operation is commutative but not associative ?

(a) AND (b) OR (c) XNOR (d) NAND

47. Which one of the following is correct logic diagram for Boolean function $F = A\bar{B} + AB\bar{C} + ABCD + ABC\bar{D}$

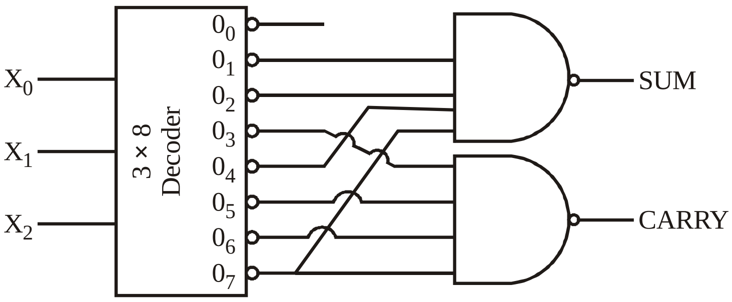
(a) 

(b) 

(c) 

(d) None of these

48. A full adder with 3 inputs as $X_0X_1X_2$ is designed using a 3 × 8 decoder as shown in figure. Then,



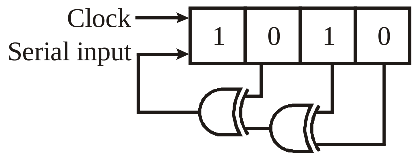
(a) SUM $= \Sigma(1, 2, 4, 7)$, CARRY $= \Sigma(3, 5, 6, 7)$

(b) SUM $= \Sigma(3, 5, 6, 7)$, CARRY $= \Sigma(1, 2, 4, 7)$

(c) SUM $= \Sigma(0, 3, 5, 6)$, CARRY $= \Sigma(1, 2, 4, 7)$

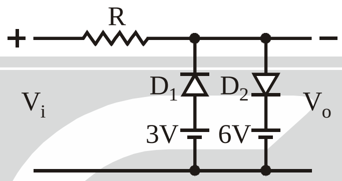
(d) None of the above

49. The shift register shown in figure is initially loaded with the bit pattern 1010. Subsequently the shift register is clocked, and with each clock pulse the pattern gets shifted by one bit position to the right. With each shift, the bit at the serial input is pushed to the left most position (MSB). After how many clock pulses will the content of the shift register become 1010 again ?



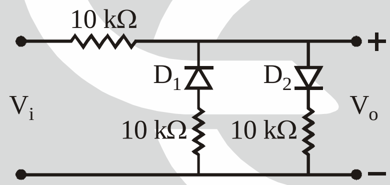
(a) 3 (b) 7 (c) 11 (d) 15

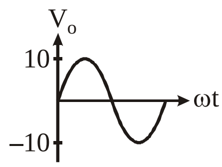
50. In the circuit shown in figure, V_i is 4V. Assuming the diodes to be ideal, V_0 is

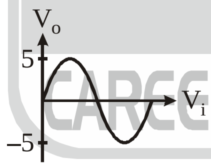


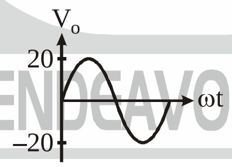
(a) 3 V (b) 4 V (c) 4.5 V (d) 6 V

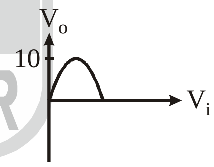
51. Draw the output waveform for a sinusoidal of amplitude 20V. (Assume Ideal diodes)



(a)


(b)


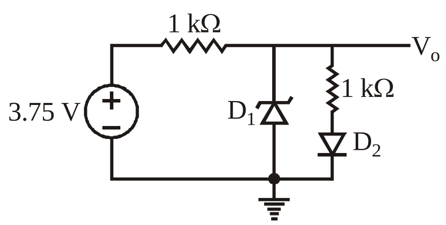
(c)


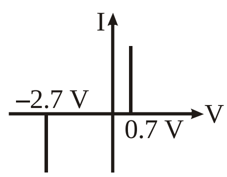
(d)


52. Ripple factor of a half-wave rectifier is

(a) 1.21 (b) 0.58 (c) 0.48 (d) 0.812

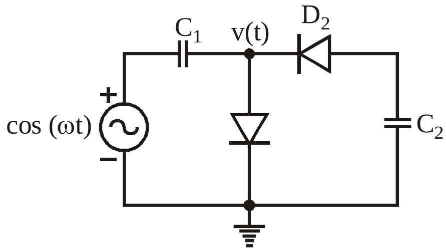
53. Assuming Zener diode D_1 has current-voltage characteristics as shown below on the right and forward voltage drop of diode D_2 is 0.7 V, the voltage V_o in the circuit shown below is





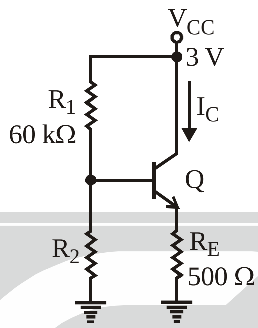
(a) 3.7 V (b) 2.7 V (c) 2.2 V (d) 0 V

54. The diodes and capacitors in the circuit shown are ideal. The voltage v(t) across the diode D_1 is



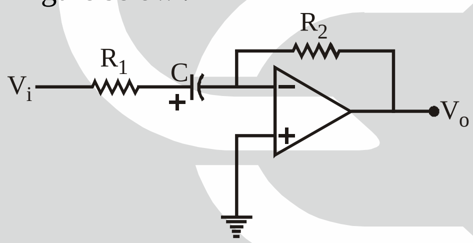
(a) $\cos(\omega t)-1$ (b) $\sin(\omega t)$ (c) $1-\cos(\omega t)$ (d) $1-\sin(\omega t)$

55. In the circuit shown below, the silicon npn transistor Q has a very high value of β. The required value of R_2 in kΩ to produce $I_C = 1\,\text{mA}$ is



(a) 20 (b) 30 (c) 40 (d) 50

56. A simple active filter is shown in figure below :



The transfer function $\frac{V_{out}}{V_{in}}$ is

(a) $\frac{SCR_2}{1+SR_1C}$ (b) $\frac{SCR_1}{1+SR_2C}$ (c) $\frac{-SCR_2}{1+SCR_1}$ (d) $\frac{-SCR_1}{1+SCR_2}$

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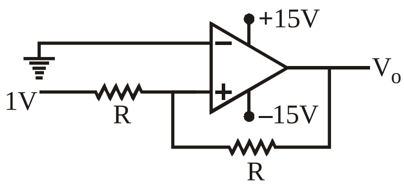
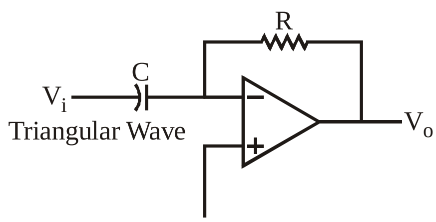
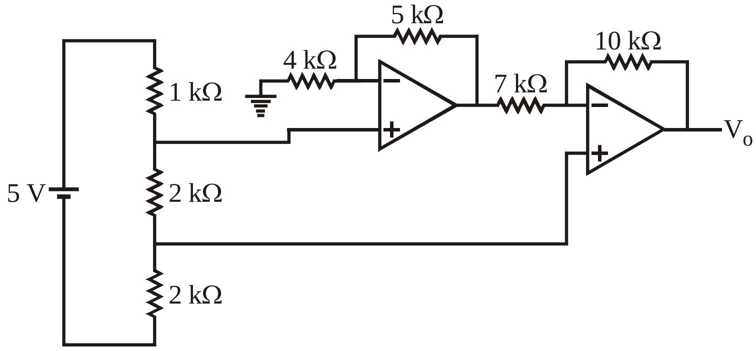
57. What is V_o for both figures ?





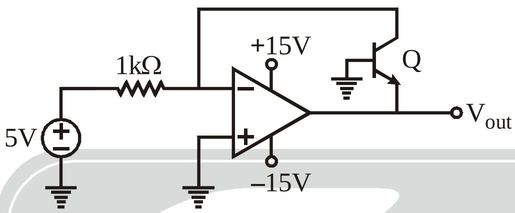
(a) Saw tooth wave (b) Triangular wave (c) Square wave (d) None of these

58. What will be the value of V_o ?



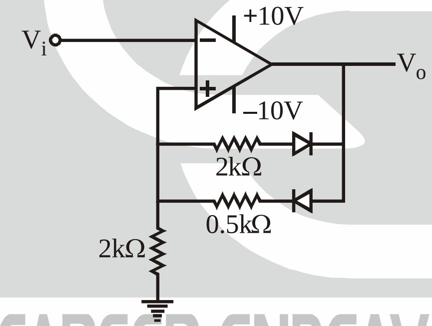
(a) 8 V (b) –8 V (c) 9 V (d) –9 V

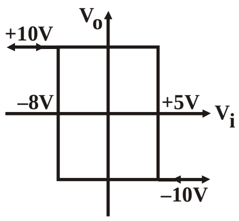
59. In the circuit shown below what is the output voltage (V_{out}) if a silicon transistor Q and an ideal op-amp are used ?

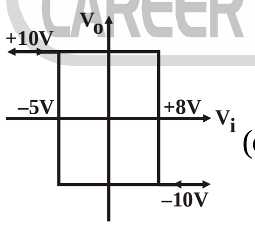


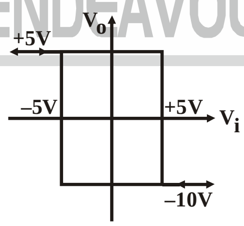
(a) –15 V (b) –0.7 V (c) +0.7 V (d) +15 V

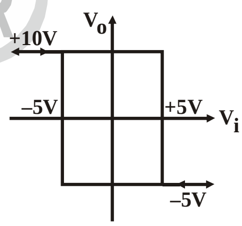
60. Given the ideal operational amplifier circuit shown in below figure indicate the correct transfer characteristics assuming ideal diodes with zero cut-in voltage.



(a)


(b)


(c)


(d)


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Date : 26-05-2017

ANSWER KEY

PART-A

1. (d)	2. (d)	3. (a)	4. (b)	5. (d)	6. (b)	7. (d)
8. (c)	9. (a)	10. (a)				

PART-B

11. (c)	12. (b)	13. (a)	14. (b)	15. (d)	16. (a)	17. (d)
18. (c)	19. (d)	20. (c)	21. (a)	22. (d)	23. (d)	24. (a)
25. (c)	26. (d)	27. (b)	28. (a)	29. (b)	30. (c)	31. (b)
32. (b)	33. (d)	34. (b)	35. (c)	36. (d)	37. (a)	38. (b)
39. (a)	40. (c)	41. (b)	42. (b)	43. (c)	44. (d)	45. (d)
46. (d)	47 . (c)	48. (a)	49. (b)	50. (b)	51. (a)	52. (a)
53. (c)	54. (a)	55. (c)	56. (c)	57. (c)	58. (b)	59. (b)
60. (b)						

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