



# PHYSICS

## BOOKS - KCET PREVIOUS YEAR PAPERS

### KARNATAKA 2016

#### Physics

1. A body falls freely for 10 sec Its average velocity during this journey ( take =  $10m s^{-2}$ )

A.  $100ms^{-1}$

B.  $10ms^{-2}$

C.  $50ms^{-1}$

D.  $5ms^{-1}$

**Answer: c**



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**2.** Three projectiles A , B and C are projected at an angle of  $30^\circ$  ,  $60^\circ$  respectively , If  $R_A$ ,  $R_B$  and  $R_C$  are ranges of A, B and C respectively

then (velocity of projection is same for A, B and C

A.  $R_A = R_B = R_C$

B.  $R_A = R_C > R_B$

C.  $R_A < R_B < R_C$

D.  $R_A = R_C < R_B$

**Answer: d**



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3. The component of a vector  $\vec{r}$  along x- axis will have a maximum value if

A.  $\vec{r}$  is along +ve x- axis

B.  $\vec{r}$  is along +ve y-axis

C.  $\vec{r}$  is along -Ve y- axis

D.  $\vec{r}$  makes an angle of  $45^\circ$  with the x- axis

**Answer: a**



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4. maximum acceleration of the train in which a 50 Kg box lying on its floor will remain stationary (Given : Co-efficient of static friction between the box and the train's floor is 0.3 and  $g = 10\text{ms}^{-2}$ )

A.  $5.0\text{ms}^{-2}$

B.  $3.0\text{ms}^{-2}$

C.  $1.5\text{ms}^{-2}$

D.  $15\text{ms}^{-2}$

**Answer: b**





5. A 12 kg bomb at rest explodes into two pieces of 4 kg and 8 kg. If the momentum of the 4 kg piece is 20 Ns, the kinetic energy of the 8 kg piece is

A. 25 J

B. 20 J

C. 50 J

D. 40 J

**Answer: a**



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6. Which of the points is likely position of the centre of mass of the system shown in the figure ?



A. A

B. D

C. B

D. C

**Answer: b**



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7. Three bodies a ring ( R ) , a solid cylinder ( C ) and a solid sphere ( S ) having same mass and same radius roll down the inclined plane without slipping . They start from rest , if  $V_R, V_C$  and  $V_S$  are velocities of respective



bodies on reaching the bottom of the plane

then

A.  $V_R = V_C = V_s$

B.  $V_R > V_C > V_S$

C.  $V_R < V_C < V_S$

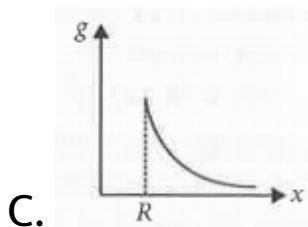
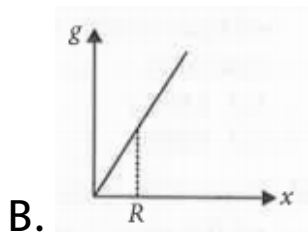
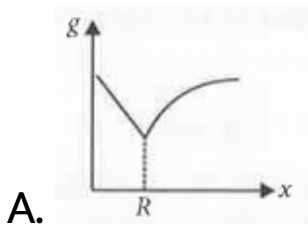
D.  $V_R = V_C > V_s$

**Answer: c**

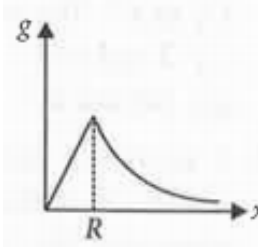


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8. Variation of acceleration due to gravity ( $g$ ) with distance  $x$  from the centre of the earth is best represented by ( $R \rightarrow$  Radius of the earth)



D.



**Answer: s**



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9. A spring is stretched by applying a load to its free end . The strain produced in the spring is

A. Volumetric

B. Shear

C. Longitudinal and shear

D. Longitudinal

**Answer: c**



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**10.** An ideal fluid flows through a pipe of circular cross section with diameters 5 cm and 10 mc as shown . The ratio of velocities of fluid

at A and B is



A. 4:1

B. 1:4

C. 2:1

D. 1:2

**Answer: b**



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11. A pan filled with hot food cools from  $94^{\circ}C$  to  $86^{\circ}C$  in 2 minutes. When the room temperature is  $20^{\circ}C$ . How long will it cool from  $74^{\circ}C$  to  $66^{\circ}C$ ?

- A. 2 minutes
- B. 2.8 minutes
- C. 2.5 minutes
- D. 1.8 minutes

**Answer: d**



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12. Four rods with different radii  $r$  and length  $l$  are used to connect two heat reservoirs at different temperatures. Which one will conduct most heat?

A.  $r=1\text{cm}, l=1\text{m}$

B.  $r=1\text{cm}, l = \frac{1}{2}m$

C.  $r=2\text{cm}, l=2\text{m}$

D.  $r= 2 \text{ cm}, l = \frac{1}{2}m$

**Answer: d**



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**13.** A carnot engine working between 300K and 400K has 800 j of useful work . The amount of heat enegy supplied to the engine from the source is

A. 2400j

B. 3200j

C. 1200j



D. 3600j

**Answer: b**



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**14.** A particle executes SHM has maximum speed of  $0.5ms^{-1}$  and maximum acceleration of  $1.0ms^{-2}$ . The angular frequency of Oscillation is

A.  $2rads^{-1}$

B.  $0.5\text{rads}^{-1}$

C.  $2\pi\text{rads}^{-1}$

D.  $0.5\pi\text{rads}^{-1}$

**Answer: a**



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**15.** A source of sound is moving with a velocity of  $50\text{ms}^{-1}$  towards a stationary observer . The Observer measure the frequency of sound as 500Hz. The appartment frequency of sound

as heard by the observer when source is moving away from him with the same speed is  
(Speed of sound at room temperature  $350\text{m.s}^{-1}$ )

- A. 400Hz
- B. 666Hz
- C. 375Hz
- D. 177.5Hz

**Answer: c**



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16. If there is only one type of charge in the universe, then  $\vec{E} \rightarrow$  Electric field ,  $\vec{ds} \rightarrow$

Area vector

A.  $\int \vec{E} \cdot \vec{ds} \neq 0$  on any surface

B.  $\int \vec{E} \cdot \vec{ds}$  could not be defined

C.  $\int \vec{E} \cdot \vec{ds} = \infty$  if charge is inside

D.  $\int \vec{E} \cdot \vec{ds} = 0$  if charge is outside ,  $= \frac{q}{\epsilon_0}$

if charge is inside

**Answer: s**



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17. An electron of mass  $m$  , Charge  $e$  falls through a distance  $h$  meter in a uniform electric field  $E$ . Then time of fall

A.  $t = \frac{\sqrt{2hm}}{eE}$

B.  $t = \frac{2HM}{eE}$

C.  $t = \frac{\sqrt{2eE}}{hm}$

D.  $t = \frac{2eE}{hm}$

**Answer: a**



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18.  $\vec{E}_{ax}$  and  $\vec{E}_{eq}$  represent electric field at a point on the axial and equatorial line of a dipole. If points are at a distance  $r$  from the centre of the dipole, for  $r \gg a$

A.  $\vec{E}_{ax} = \vec{E}_{eq}$

B.  $\vec{E}_{ax} = -\vec{E}_{eq}$

C.  $\vec{E}_{ax} = -2\vec{E}_{eq}$

D.  $\vec{E}_{ax} = 2\vec{E}_{eq}$

**Answer: c**



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**19.** Nature of equipotential surface for a point charge is

A. Ellipsoid with charge at foci .

B. Sphere with charge at the centre of the sphere

C. Sphere with charge on the surface of the sphere .

D. Plane with charge on the surface

**Answer: b**



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**20.** A particle of mass 1 gm and charge  $1\mu C$  is held at rest on a frictionless horizontal surface at distance 1 m from the fixed charge  $2mc$ . If the particle is released, it will be



repelled . The speed of the particle when it is at a distance of 10m from the fixed charge is

A.  $60\text{ms}^{-1}$

B.  $100\text{ms}^{-1}$

C.  $90\text{ms}^{-1}$

D.  $180\text{ms}^{-1}$

**Answer: d**



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21. A capacitor of  $8\text{f}$  is connected as shown .

Charge on the plates of the capacitor



A.  $32\text{C}$

B.  $40\text{C}$

C.  $0\text{C}$

D.  $80\text{C}$

**Answer: a**



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22. Four metal plates are arranged as shown  
Capacitance between X and Y (A  $\rightarrow$  Area of  
each plate ,  $d \rightarrow$  between the plates )



A.  $\frac{3}{2} \frac{\epsilon_0 A}{d}$

B.  $\frac{2\epsilon_0 A}{d}$

C.  $\frac{2}{3} \frac{\epsilon_0 A}{d}$

D.  $3 \frac{\epsilon_0 A}{d}$

**Answer: c**



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23. Mobility of free electrons in a conductor is

A. directly proportional to electron density

B. directly proportional to relaxation time

C. inversely proportional to electron density

D. inversely proportional to relaxation time

.

**Answer: b**



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24. Variation of resistance of the conductor with temperature is as shown . The temperature co-efficient ( $\alpha$ ) of the conductor is



A.  $\frac{R_o}{m}$

B.  $mR_o$

C.  $m^2 R_o$

D.  $\frac{m}{R_o}$

**Answer: d**



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**25.** Potential difference between A and B in the following circuit



A. 4V

B. 5.6V

C. 2.8V

D. 6V

**Answer: b**



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**26.** In the following network potential at O



A. 4V

B. 3V

C. 6V

D. 4.8V

**Answer: d**



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**27. Effective resistance between A and B in the following circuit**



A.  $10\Omega$



B.  $20\Omega$

C.  $5\Omega$

D.  $\frac{20}{3}\Omega$

**Answer: a**



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**28.** Two heating coils of resistance  $10\Omega$  and  $20\Omega$  are connected in parallel and connected to a battery of emf  $12V$  and internal resistance

$1\Omega$ . The power consumed by them are in the ratio

A. 1 : 4

B. 1 : 3

C. 2 : 1

D. 4 : 1

**Answer: c**



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**29.** A Proton is projected with a uniform velocity  $v$  long the axis of a current carrying solenoid, then

A. the proton will be accelerated along the axis

B. the proton path will be circular about the axis .

C. the proton moves along helical path .

D. the proton will continue to move with velocity  $v$  long the axis .

**Answer: d**



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**30.** In the cyclotron, as radius of the circular path of the charged particle increases ( $\omega$  = angular velocity,  $v$  = linear velocity )

- A. both  $\omega$  and  $V$  increases
- B. only  $\omega$  increases ,  $V$  remains constant
- C.  $v$  increases ,  $\omega$  remains constant
- D.  $v$  increases ,  $\omega$  decreases

**Answer: c**



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**31.** A conduct wire carrying current is arranged as shown . The magnetic field at O 

A.  $\frac{\mu_0 i}{12} \left[ \frac{1}{R_1} - \frac{1}{R_2} \right]$

B.  $\frac{\mu_0 i}{12} \left[ \frac{1}{R_1} + \frac{1}{R_2} \right]$

C.  $\frac{\mu_0 i}{6} \left[ \frac{1}{R_1} - \frac{1}{R_2} \right]$

D.  $\frac{\mu_0 i}{12} \left[ \frac{1}{R_1} + \frac{1}{R_2} \right]$

**Answer: a**



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**32.** The quantity of a charge that will be transferred by a current flow of 20 A over 1 hour 30 minutes period is

A.  $10.8 \times 10^3 C$

B.  $10.8 \times 10^4 C$

C.  $5.4 \times 10^3 C$

D.  $1.8 \times 10^4 C$

**Answer: b**



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**33.** A galvanometer coil has a resistance of  $50\Omega$  and the meter shows full scale deflection for a current of  $5\text{ mA}$  . This galvanometer is converted into voltmeter of range  $0\text{-}20\text{V}$  by connecting

A.  $3950\Omega$  in series with galvanometer

B.  $40\Omega$  in series with galvanometer

C.  $3950\Omega$  in parallel with galvanometer

D.  $4050\Omega$  in parallel with galvanometer

**Answer: a**



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**34.**  $X_1$  and  $X_2$  are susceptibility of a paramagnetic material at temperature  $T_1$  K and  $T_2$  K respectively, then

A.  $X_1 = X_2$



B.  $X_1 T_1 = x_2 T_2$

C.  $X_1 T_2 = X_2 T_1$

D.  $X_1 \sqrt{T_1} = X_2 \sqrt{T_2}$

**Answer: b**



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**35.** At certain place , the horizontal component of earth's magnetic field is 3.0 . The magnetic field of earth at that location

A.  $4.5G$

B.  $5.1G$

C.  $3.5G$

D.  $6.0G$

**Answer: c**



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**36.** The Process of superimposing message signal on high frequency wave is called

A. Amplication

B. Demodulation

C. Transmission

D. Modulation

**Answer: s**



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**37.** A long solenoid with 40 turns per cm carries a current of 1A. The magnetic energy stored per unit volume is \_\_\_\_\_  $J/m^3$

A.  $3.2\pi$

B.  $32\pi$

C.  $1.6\pi$

D.  $6.4\pi$

**Answer: a**



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**38.** A wheel with 10 spokes each of length  $L$  m is rotated with a uniform angular velocity  $\omega$  in a plane normal to the magnetic field  $B$ . The emf

induced between the axle and the rim of the wheel

A.  $\frac{1}{2}N\omega BL^2$

B.  $\frac{1}{2}N\omega BL^2$

C.  $\omega bL^2$

D.  $N\omega BL^2$

**Answer: b**



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39. The rms value of current in a 50 Hz AC circuit is 6A . The average value of AC current over a cycle is

A.  $6\sqrt{2}$

B.  $\frac{3}{\pi\sqrt{2}}$

C. Zero

D.  $\frac{6}{\pi\sqrt{2}}$

**Answer: c**



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40. A capacitor of capacitance  $10\mu F$  is connected to an AC source and an AC ammeter. If the source voltage varies as  $V = 50\sqrt{2} \sin 100t$ , the reading of the ammeter is

A.  $50mA$

B.  $70.7mA$

C.  $5.0MA$

D.  $7.07mA$

**Answer: a**



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**41.** In a series LCR circuit , the potential drop across L, C and R respectively are 40 V , 120V and 60V . Then the source voltage is

A. 220V

B. 160V

C. 180V

D. 100V

**Answer: s**





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**42.** In a series LCR circuit, an alternating emf ( $v$ ) and current ( $i$ ) are given by the equation  $v = v_0 \sin \omega t$ ,  $i = i_0 \sin\left(\omega t + \frac{\pi}{3}\right)$ . The average power dissipated in the circuit over a cycle of AC is

A.  $\frac{v_0 i_0}{2}$

B.  $\frac{V_0 i_0}{4}$

C.  $\frac{\sqrt{3}}{2} v_0 i_0$

D. Zero

**Answer: b**



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**43.** Electromagnetic radiation used to sterilise milk is

A. X- ray

B.  $\gamma$  – ray

C. UV rays

## D. Radiowaves

**Answer: c**



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**44.** A plane glass plate is placed over a various coloured letters ( violet , green , yellow , red ) .

The letter which appears to raised more is

A. Red

B. Yellow

C. Green

D. Violet

**Answer: s**



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**45.** A ray of light passes through four transparent media with refractive indices  $n_1$ ,  $n_2$ ,  $n_3$  and  $n_4$  as shown. The surface of all media are parallel. If the emergent ray DE is parallel to the incident ray AB, then the refractive index  $n_4$  is

incident ray  $Ab$ , then



A.  $n_1 = n_4$

B.  $n_2 = n_4$

C.  $n_3 = n_4$

D.  $n_1 = \frac{n_2 + n_3 + n_4}{3}$

**Answer: a**



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46. Focal length of a convex lens is 20 cm and its RI is 1.5. it produced an erect , enlarged image if the distance of the object from the lens is

A. 40cm

B. 30cm

C. 15cm

D. 20cm

**Answer: c**



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47. A ray of light suffers a minimum deviation when incident on a equilateral prism of refractive index  $\sqrt{2}$ . The angle of incidence is

A.  $30^\circ$

B.  $45^\circ$

C.  $60^\circ$

D.  $50^\circ$

**Answer: b**





**48.** In Young's double slit experiment the source is white light. One slit is covered with red filter and the other with blue filter. There shall be

- A. Alternate red and blue fringes
- B. Alternated dark and pink fringes
- C. Alternate dark and yellow fringes No interference
- D. No interference



**Answer: d**



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**49.** Light of wavelength 600nm is incident normally on a slit of width 0.2 mm. The angular width of central maxima in the diffraction pattern is (measured from minimum to minimum )

A.  $6 \times 10^{-3}$ rad

B.  $4 \times 10^{-3}$ rad

C.  $2.4 \times 10^{-3} \text{rad}$

D.  $4.5 \times 10^{-3} \text{rad}$

**Answer: a**



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50. for what distance is ray optics os good approximation when the aperture is 4 mm and the wavelength of light is 400 nm ?

A. 24m

B. 40m

C. 18cm

D. 30m

**Answer: b**



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**51.** The variation of photo-current with collector potential for different frequencies of incident radiation  $\nu_1$ ,  $\nu_2$  and  $\nu_3$  is shown in

the graph then



A.  $V_1 = V_2 = V_3$

B.  $V_1 > V_2 > V_3$

C.  $V_1 < V_2 < V_3$

D.  $V_3 = \frac{V_1 + V_2}{2}$

**Answer: c**



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52. The de Broglie wavelength of an electron accelerated to a potential of 400 V is approximately

A.  $0.03nm$

B.  $0.04nm$

C.  $0.12nm$

D.  $0.06nm$

**Answer: d**



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53. Total energy of electron in an excited state of hydrogen atom is  $-3.4\text{eV}$ . The kinetic and potential energy of electron on this state

A.  $k=-3.4\text{eV}$   $U= -6.8\text{eV}$

B.  $K=3.4\text{eV}$   $U=-6.8\text{eV}$

C.  $K= -6.8\text{eV}$   $U = +3.4\text{eV}$

D.  $K= + 10.2\text{eV}$   $U= -13.6\text{eV}$

**Answer: b**



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54. When electron jumps from  $n = 4$  level to  $n = 1$  level , the angular momentum of electron changes

A.  $\frac{h}{2\pi}$

B.  $\frac{2h}{2\pi}$

C.  $\frac{3h}{2\pi}$

D.  $\frac{4h}{2\pi}$

**Answer: c**



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55. A radio - active sample of half- life 10 days contains  $1000x$  nuclei . Number of original nuclei present after 5 days is

A.  $707x$

B.  $750x$

C.  $500x$

D.  $250x$

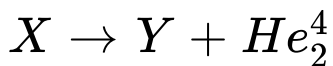
**Answer: a**



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56. An element X decays into element Z by two  
-steps process



- A. X and Z are isobars .
- B. X and Y are isotopes
- C. X and Z are isotones
- D. X and Z are isotopes.

**Answer: d**



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57. A nucleus of mass  $20\text{ u}$  emits a  $\gamma$  photon of energy  $6\text{ MeV}$ . If the emission is assumed to occur when the nucleus is free and at rest then the nucleus will have kinetic energy nearest to  
(take  $1\text{ u} = 1.6 \times 10^{-27}\text{ Kg}$ )

A.  $10\text{ KeV}$

B.  $1\text{ KeV}$

C.  $0.1\text{ KeV}$

D.  $100\text{ KeV}$

**Answer: b**



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**58.** Constant DC voltage is required from a variable AC voltage . Which of the following is correct order of operation ?

- A. Regular , filter rectifier
- B. Rectifier, regulator , filter
- C. Rectifier , Filter , regulator
- D. Filter , regulator , rectifier

**Answer: c**



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**59.** In a transistor , the collector current varies by 0.49mA and emitter current varies by 0.50mA current gain  $\beta$  measured is

A. 49

B. 150

C. 99

D. 100

**Answer: a**



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**60.** Identify the logic operation carried out by the following circuit



A. AND

B. NAND

C. NOR

D. OR

**Answer: d**



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