PHYSICS

BOOKS - TS EAMCET PREVIOUS YEAR PAPERS

TS EAMCET 2019 (3 MAY SHIFT 1)

Physics

1. Match the following fundamental forces of nature with their relative strength.

	List-I		List-II
(A)	Strong nuclear force	(i)	10^{-2}
(B)	Weak nuclear force	(ii)	1
(C)	Elextromagnetic force	(iii)	10^{-39}
(D)	Gravitational force	(iv)	10^{-13}

The correct match is

A. | A | B | C | D |
|---|---|---|---|
| (ii) | (iv) | (i) | (iii) |

B. | A | B | C | D |
|---|---|---|---|
| (iii) | (ii) | (iv) | (i) |

C. | A | B | C | D |
|---|---|---|---|
| (ii) | (iii) | (iv) | (i) |

D. | A | B | C | D |
|---|---|---|---|
| (iv) | (ii) | (i) | (iii) |

Answer: A

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2. Identify the incorrect statement among the following.

A. A true length of 5.678 km has been measured in two experiments as 5.5 km and 5.51 km, respectively. The second measurement has more precision.

B. Length of 1 m and 0.5 m have been both meausred with the same absolute error

of 0.01 m. Both the measurement are equally accurate.

C. The numbers of significant digits in 1.6 and 0.60 are both two.

D. The number 2.445 can be rounded to two decimal place as 2.45.

Answer: B::D

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3. Ball-1 is dropped from the top of a building from rest. At the same moment, ball-2 is throuwn upward toward ball-1 with a speed 14 m/s from a point 21 m below the top of building. How far will the ball-1 have dropped when it passes ball-2. (Assume acceleration due to gravity, $g = 10m/s^2$).

A. $\frac{45}{4}$ m

B. $\frac{52}{6}$ m

C. $\frac{37}{2}$ m

D. $\frac{25}{2}$ m

Answer: A

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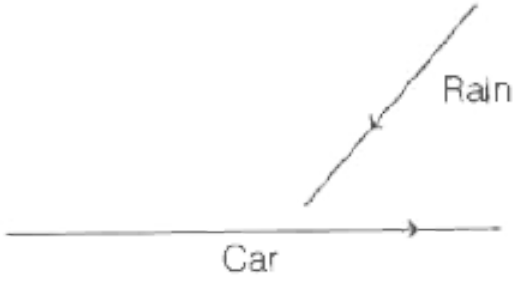
4. Rain is falling at an angle of 30° from the vertical due to the wind with a speed of 40 m/s. A car is travelling horizontally in the direction opposite to the wind, at a speed of 40 m/s. at what angle from the vertical will it

experience the rain falling from?



A. 30°

B. 60°

C. 90°

D. 120°

Answer: B

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5. Two touching blocks 1 and 2 are placed on an inclined plane forming an angle 60° with the horizontal. The masses are m_1 and m_2 and the coefficient of friction between the inclined plane and the two blocks are 1.5μ and 10μ, respectively. The force of reaction between the blocks during the motion is (g = acceleration due to gravity)

A. $(m_2 - m_1)\mu g$

B. $(m_2 + m_1)\mu g$

C. $\frac{1}{2}\frac{m_1 m_2}{m_1 + m_2}\mu g$

D. $\frac{1}{4}\frac{m_1 m_2}{m_1 + m_2}\mu g$

Answer: D

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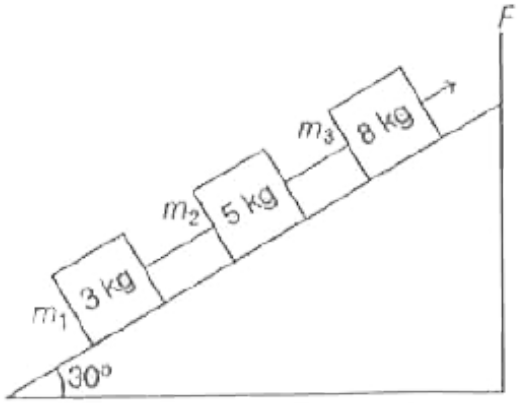
6. Three blocks are connected by massless strings on a frictionless inclined plane of 30° as shown in the figure. A force of 104 N is applied upward along the incline to mass m_3 causing an upward motion of the blocks. What

is the acceleration of the blocks? (Assume, acceleration due to gravity, $g = 10m/s^2$)



A. $6.0m/s^2$

B. $4.5m/s^2$

C. $3.0m/s^2$

D. $1.5m/s^2$

Answer: D

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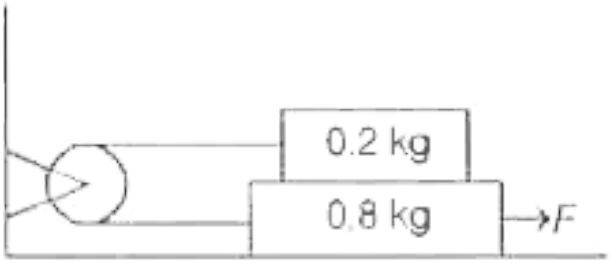
7. Consider a system of two masses and a pulley shown in the figure. The coefficient of friction between the two blocks and also between block and table is 0.1. Find the force F, that must be given to the 0.8 kg block such that it attains acceleration of $5m/s^2$.

(Assume, acceleration due to gravity,

$g = 10m/s^2$)



A. 6.4 N

B. 7.1 N

C. 6.0 N

D. 7.8 N

Answer: A

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8. A box of mass 3 kg moves on a horizontal frictionless table and collides with another box of mass 3 kg initially at rest on the edge of the table at height 1 m. The speed of the moving boxes stick together and fall from the table. The kinetic energy just before the boxes strike the floor is (Assume, acceleration due to gravoty, $g = 10m/s^2$)

A. 40 J

B. 80 J

C. 96 J

D. 72 J

Answer: D

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9. A ball of mass 2 kg is thrown from a tall building with velocity, $v = (20m/s)\hat{i} + (24m/s)\hat{j}$ at time $t = 0$ s. Change in the potential energy of the ball after, $t = 8$ s is (The ball is assumed to be in air buring its motion between 0 s and 8 s, $\hat{i}$ is

along the horizontal and $\hat{j}$ is along the vertical direction. (Take $g = 10m/s^2$)

A. -2.56 kJ

B. 0.52 kJ

C. 1.76 kJ

D. -2.44 kJ

Answer: A

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10. The balls A, B and C of masses 50 g, 100 g and 150 g, respectively are placed at the vertices of an equilateral triangle. The length of each side is 1 m. If A is placed at (0, 0) and B is placed at (1, 0) m, find the coordinates (x, y) for the centre of mass of this system of the balls

A. $\left(\frac{7}{12}, \sqrt{\frac{3}{4}}\right)m$

B. $\left(\frac{5}{18}, \sqrt{\frac{1}{4}}\right)m$

C. $\left(\frac{7}{12}, \sqrt{\frac{3}{2}}\right)m$

D. $\left(\frac{5}{18}, \sqrt{\frac{3}{4}}\right)m$

Answer: C

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11. Three bodies, a ring, a solid disc and a solid sphere roll down the same inclined plane without slipping. The radii of the bodies are identical and they start from rest. If V_S, V_R and V_D are the speeds of the sphere, ring and

disc, respectively when they reach the bottom, then the correct option is

A. $V_S > V_R > V_D$

B. $V_D > V_S > V_R$

C. $V_R > V_D > V_S$

D. $V_S > V_D > V_R$

Answer: D

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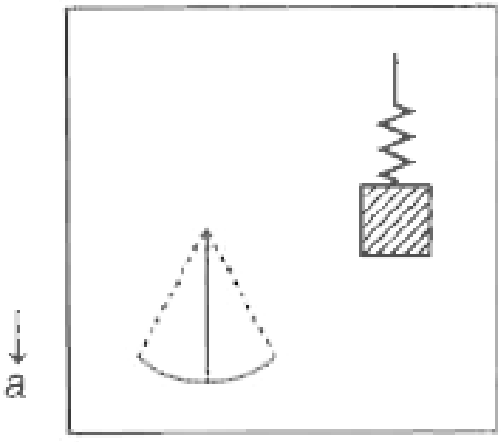
12. A vertical spring mass system has the same time period as simple pendulum undergoing small oscillations. Now, both of them are put in an elevator going downwards with an acceleration $5m/s^2$. The ratio of time period of the spring mass system to the time period of the pendulum is (Assume, acceleration due to gravity, $g = 10m/s^2$)



A. $\sqrt{\frac{3}{2}}$

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

C. $\frac{1}{\sqrt{2}}$

D. $\sqrt{2}$

Answer: C

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13. Consider a spherical planet which is rotating about its axis such that the speed of a point on its equator is v and the effective

acceleration due to gravity on the equator is $\frac{1}{3}$ of its value at the poles. What is the escape velocity for a particle at the pole of this planet.

A. 3 v

B. 2 v

C. $\sqrt{3}$ v

D. $\sqrt{2}$ v

Answer: C

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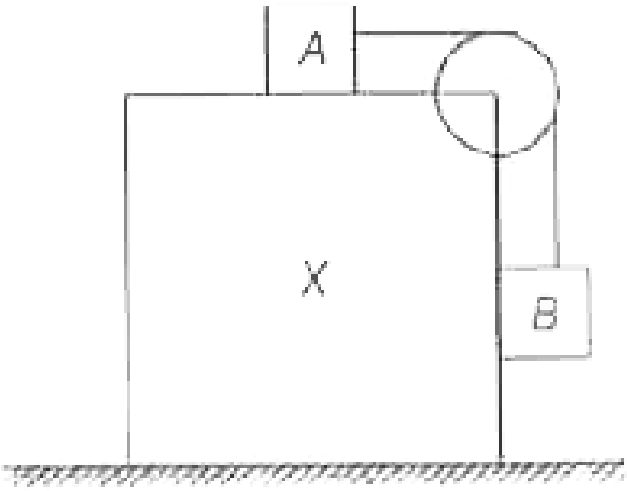
14. Consider a system of blocks X, A and B as shown in the figure. The blocks A and B have equal mass and are connected by a massless string through a massless pully. The coefficient of driction between block A and X or B and X is 0.5. If block X moves on the horizontal frictionless surface what should be its minimum acceleration such that blocks A and B remain stationary. (g = acceleration due to

gravity.)



A. $\frac{g}{3}$

B. $3g$

C. $\frac{g}{4}$

D. $\frac{3g}{4}$

Answer: A

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15. How much pressure (in atm) is is needed to compress a sample of water by 0.4 %?

(Assume, Bulk modulus of water $\approx 2.0 \times 10^9 Pa$)

A. 60 atm

B. 70 atm

C. 80 atm

D. 90 atm

Answer: C

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16. The tension in a massles cable connected to an iron ball of 100 kg when it is submerged in sea water is ($\rho_{\text{iron}} = 8 \times 10^3 \ \text{kg/m}^3$ and $\rho_{\text{sea water}} = 1000 \ \text{kg/m}^3, g = 10 \ \text{m/s}^2$)

A. 950 N

B. 846 N

C. 875 N

D. 933 N

Answer: C

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17. The area of a circular copper coin increases by 0.4 % when its temperature is raised by $100^{\circ}C$. The coefficient of linear expansion of the coin is :

A. $1 \times 10^{-5}/^{\circ}C$

B. $2 \times 10^{-5} / ^{\circ} C$

C. $3 \times 10^{-5} / ^{\circ} C$

D. $4 \times 10^{-5} / ^{\circ} C$

Answer: B

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18. A 210 W heater is used to heat 100 g water. The time required to raise the temperature of this water from $25^{\circ} C$ to $100^{\circ} C$ is (specific heat capacity of water $= 4200 \ \ \mathrm{J/Kg\text{-}}^{\circ} C$)

A. 100 s

B. 125 s

C. 150 s

D. 200 s

Answer: C

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19. One mole of nitrogen gas being initially at a temperature of $T_0 = 300$ K is adiabayically compressed to increase its pressure 10 times.

The final gas temperature after compression is (Assume, nitrogen gas molecules as rigid diatomic and $100^{1/7} = 1.9$)

A. 120 K

B. 750 K

C. 650 K

D. 570 K

Answer: D

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20. Two gaes A and B are contained in two separate, but otherwise identical containers. Gas A consists of monatomic molecules, each with atomic mass of 4u whereas Gas B consists of rigid diatomic molecules, each with atomic mass of 20 u, If gas A is kept at $27^\circ C$, at what temperature should gas B be kept so that both have the same rms speed ?

A. $27^\circ C$

B. $54^\circ C$

C. $270^\circ C$

D. $62^{\circ} C$

Answer: C

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21. Standing waves are produced in a string 16 m long. If there are 9 nodes between the two fixed ends of the string and the speed of the wave is 32 m/s, what is the frequency of the wave ?

A. 5 Hz

B. 10 Hz

C. 30 Hz

D. 20 Hz

Answer: B

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22. A highway truck has two horns A and B. When sounded together, the driver records 50 beats in 10 seconds. With horn B blowing and the truck moving towards a wall at a speed of

10 m/s, the driver noticed a beat frequency of 5 Hz with the echo. When frequency of A is decreased the beat frequency with two horns sounded together increases. Calculate the frequency of horn A. (Speed of sound in air = 330 m/s)

A. 75 Hz

B. 85 Hz

C. 90 Hz

D. 95 Hz

Answer: A

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23. When light of an unknown polarisation is examined with a polaroid, it is found to exhibit maximum intensity I_0 along y-axis and minimum intensity $\frac{2I_0}{3}$ along x-axis. The intensity transmited through a polaroid with pass axis at 45° to y-axis (in x-y plane) is

A. $\frac{5}{8}l_0$

B. $\frac{l_0}{2}$

C. $\frac{5}{6}l_0$

D. $\frac{l_0}{4}$

Answer: C

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24. In a Young's double slit experiment, mth order and nth order of bright fringes are formed at point P on a distant screen, if monochromatic source of wavelength 400 nm and 600 nm are used respectively. The minimum value of m and n are respectively,

A. 4, 6

B. 3, 2

C. 2, 3

D. 4, 2

Answer: B

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25. Two small conductiong ball of identical mass 20 g and identical charge $10^{-10}C$ hang from non-conducting threads of length, L =

300 cm. If the equilibrium separation of balls is x and $x < < L$ then the magnitude of x is (Assume, $4\pi \in_0 = \frac{1}{9 \times 10^9}$ F/m and $g = 10m/s^2$)

A. $\frac{2}{5^{1/3}}$ mm

B. $\frac{3}{10^{1/3}}$ mm

C. $\frac{3^{1/3}}{10}$ mm

D. $\frac{3^{2/3}}{5}$ mm

Answer: B

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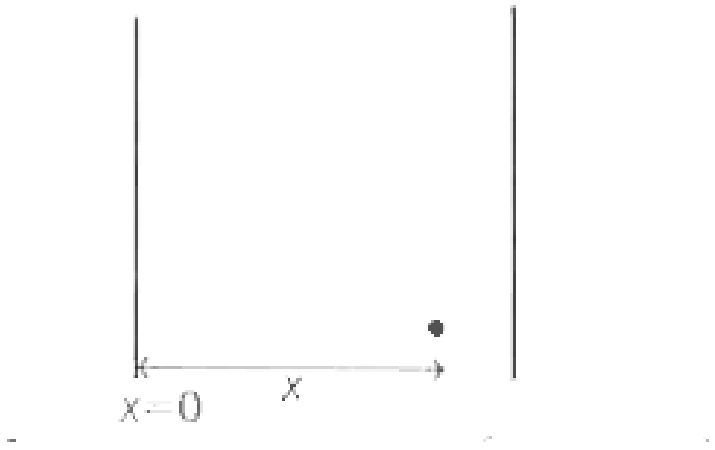
26. The space between the two large parallel plates is filled with a material of uniform charge density ρ. Assume that one of the plate is kept at $x = 0$. The potential at any point x between these plates is given by (A and B are constants).



A. $-\frac{\rho x^3}{2\ \in_0}$

B. $-\left(\frac{\rho x^2}{2\ \in_0}+Ax\right)$

C. $-\left(\frac{\rho x^2}{2\ \in_0}+Ax+B\right)$

D. $-\left(\frac{\rho x^3}{4\ \in_0}+Ax^2+Bx\right)$

Answer: C

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27. Identify the correct statement among the following.

A. Resistivity of metals decreases with temperature because more electrons are available for conduction

B. Resistivity of metals increases with temperature because number of electrons decreases.

C. Resistivity of metals increases with temperature because number of collisions between electrons increases

D. Resistivity of metals decreases with temperature because superconductivity sets in.

Answer: C

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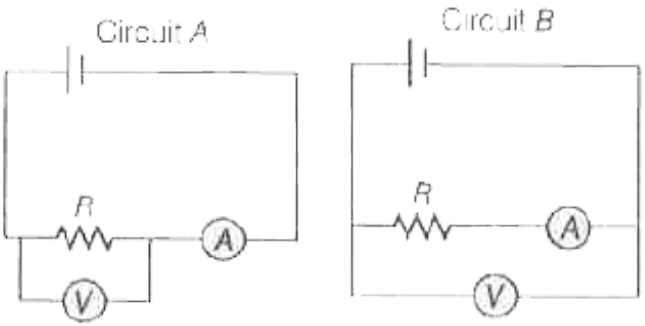
28. For the circuit A and B as shown in the figure, identify the correct option.



A. Circuit A is for accurate measurement of high resistance and B is for low resistance.

B. Circuit A is for accurate measurement of low resistance and B is for high resistance.

C. Both circuit can accurately measured high resistance only.

D. Both circuits can accurately measured low resistance only

Answer: B

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29. Two infinitely long straight wires A and B, each carrying current I are placed on x and y-axis, respectively. The current in wires A and B

flow along $-\hat{i}$ and $\hat{j}$ directions respectively. The force on a charge particle having vharge q, moving from position, $r = d\left(\hat{i} + \hat{j}\right)$ with velocity $v = v\hat{i}$ is

A. $\frac{\mu_0 lqv}{2\pi d}\hat{j}$

B. $\frac{\mu_0 lqv}{\pi d}\hat{j}$

C. $\frac{\mu_0 lqv}{\sqrt{2}\pi d}\hat{k}$

D. 0

Answer: B

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30. A long straight wire carrying current 16 A is bent at 90° such that half of the wire lies along the positive x-axis and other half lies along the positive y-axis. What is the magnitude of the magnetic field at the point, $r = \left(-2\hat{i} + 0\hat{j} \right)$ mm? (Assime, $\frac{\mu_0}{4\pi} = 10^{-7} Hm^{-1}$)

A. 1.2 mT

B. 0.8 mT

C. 3.2 mT

D. 1.6 mT

Answer: B

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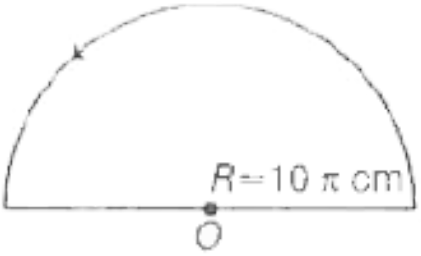
31. The magnitude of the force vector acting on a unit length of a thin wire carrying a current $I = 8A$ at a point O, if the wire is bent as shown in the figure with a radius $R = 10\pi$

cm is



A. 64 μN/m

B. 32 μN/m

C. 20 μN/m

D. 100 μN/m

Answer: A

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32. A 10Ω coil of 180 turns and diameter 4 cm is placed in a uniform magnetic field so that the magnetic flux is maximum through the coil's cross-sectional area. When the field is suddenly removed a charge of 360 μC flows through a 618Ω galvanometer connected to the coil, find the magnetic field.

A. 12 T

B. 6 T

C. 1 T

D. 8 T

Answer: C

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33. An inductor coil is connected to a capacitor and an AC source of rms voltage 8V in series. The rms current in the circuit is 16 A and is in phase with emf. If this inductor coil is connected to 6 V DC battery, the magnitude of steady current is

A. $8A$

B. $10A$

C. $12A$

D. $16A$

Answer: C

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34. An electromagnetic wave of frequency 3.0 MHz passes from vacuum into a non-magnetic medium with permittivity, $\in = 16 \in_0$.

Where $\in_0$ is the free space permittivity. The change in wavelength is

A. -75 m

B. $+75$ m

C. -50 m

D. $+50$ m

Answer: A

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35. A particle of charge q, mass m and energy E has de-Broglie wavelength λ. For a particle of charge 2q, mass 2m and energy 2E, the de-Broglie wavelength is

A. $\frac{\lambda}{4}$

B. 2λ

C. 8λ

D. $\frac{\lambda}{2}$

Answer: D

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36. The collision of an electron with kinetic energy 5.5 eV and a hydrogen atom in its ground state can be described as

A. completely inelastic

B. may be completely inelastic

C. may be partially elastic

D. elastic

Answer: D

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37. An alloy is composed of two radiactive materials A and B having equal weight. The half life of A and B are 10 yrs and 20 yrs respectively. After time t, the alloy was found to consist of $\left(\frac{1}{e}\right)$ kg of A and 1 kg of B. If the atomic weight of A and B are same, then the value of t is (Assume, $\ln 2 = 0.7$)

A. $\left(\frac{200}{7}\right)$ yrs

B. $\left(\frac{10}{7}\right)$ yrs

C. 7 yrs

D. 70 yrs

Answer: A

38. When a zener diode is used as a regulator with zener voltage of 10 V, nearly five times the load current passes through the zener diode. What should be the series resistance for the

zener diode. If load resistance is $2k\Omega$ and the unregulated voltage supplied is 16 V.

A. 500Ω

B. 100Ω

C. 200Ω

D. 800Ω

Answer: C

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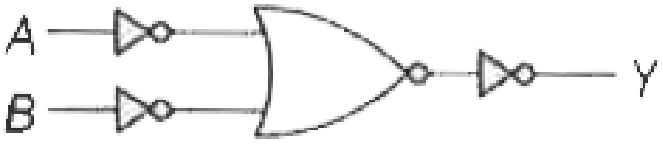
39. The logic circuit below has the truth table, same as that of



A. NOR gate

B. NAND gate

C. AND gate

D. OR gate

Answer: B

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40. A message signal is used to modulate a carrier frequency. If the peak voltages of message signal and carrier signals are increased by 0.1% and 0.3% respectively, then

A. 0.4

B. 0.0

C. -0.4

D. -0.2

Answer: D

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