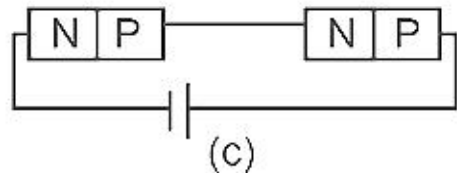
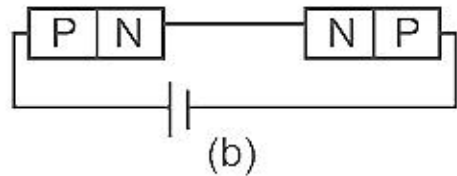
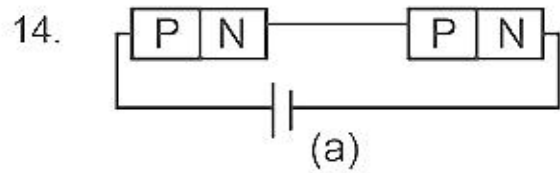


13. Plane angle and solid angle have
- | | |
|--------------------------------|-------------------------------|
| (1) No units and no dimensions | (2) Both units and dimensions |
| (3) Units but no dimensions | (4) Dimensions but no units |

Answer (3)



In the given circuits (a), (b) and (c), the potential drop across the two $p-n$ junctions are equal in

- | | |
|----------------------|-------------------------------|
| (1) Circuit (c) only | (2) Both circuits (a) and (c) |
| (3) Circuit (a) only | (4) Circuit (b) only |
15. The ratio of the radius of gyration of a thin uniform disc about an axis passing through its centre and normal to its plane to the radius of gyration of the disc about its diameter is
- | | |
|-----------|--------------------|
| (1) 4 : 1 | (2) 1 : $\sqrt{2}$ |
| (3) 2 : 1 | (4) $\sqrt{2}$: 1 |

Answer (2)

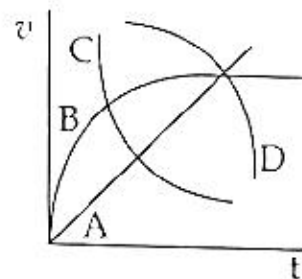
16. The angular speed of a fly wheel moving with uniform angular acceleration changes from 1200 rpm to 3120 rpm in 16 seconds. The angular acceleration in rad/s^2 is
- | | |
|-------------|--------------|
| (1) 12π | (2) 104π |
| (3) 2π | (4) 4π |

Answer (4)

17. A copper wire of length 10 m and radius $\left(\frac{10^{-2}}{\sqrt{\pi}}\right)$ m has electrical resistance of 10Ω . The current density in the wire for an electric field strength of 10 (V/m) is
- | | |
|-----------------------------|--------------------------|
| (1) 10^{-5} A/m^2 | (2) 10^5 A/m^2 |
| (3) 10^4 A/m^2 | (4) 10^6 A/m^2 |

Answer (2)

18. A spherical ball is dropped in a long column of a highly viscous liquid. The curve in the graph shown, which represents the speed of the ball (v) as a function of time (t) is



- | | |
|-------|-------|
| (1) C | (2) D |
| (3) A | (4) B |

Answer (4)

25. Two objects of mass 10 kg and 20 kg respectively are connected to the two ends of a rigid rod of length 10 m with negligible mass. The distance of the center of mass of the system from the 10 kg mass is
- (1) 10 m (2) 5 m
(3) $\frac{10}{3}$ m (4) $\frac{20}{3}$ m

Answer (4)

26. In half wave rectification, if the input frequency is 60 Hz, then the output frequency would be
- (1) 60 Hz (2) 120 Hz
(3) Zero (4) 30 Hz

Answer (1)

27. Given below are two statements

Statement I : Biot-Savart's law gives us the expression for the magnetic field strength of an infinitesimal current element (Idl) of a current carrying conductor only.

Statement II : Biot-Savart's law is analogous to Coulomb's inverse square law of charge q , with the former being related to the field produced by a scalar source, Idl while the latter being produced by a vector source, q .

In light of above statements choose the most appropriate answer from the options given below

- (1) Statement I is correct and Statement II is incorrect
(2) Statement I is incorrect and Statement II is correct
(3) Both Statement I and Statement II are correct
(4) Both Statement I and Statement II are incorrect

Answer (1)

28. The energy that will be ideally radiated by a 100 kW transmitter in 1 hour is
- (1) 36×10^5 J (2) 1×10^5 J
(3) 36×10^7 J (4) 36×10^4 J

Answer (3)

29. A body of mass 60 g experiences a gravitational force of 3.0 N, when placed at a particular point. The magnitude of the gravitational field intensity at that point is
- (1) 20 N/kg (2) 180 N/kg
(3) 0.05 N/kg (4) 50 N/kg

Answer (4)

30. A biconvex lens has radii of curvature, 20 cm each. If the refractive index of the material of the lens is 1.5, the power of the lens is
- (1) +5 D (2) Infinity
(3) +2 D (4) +20 D

Answer (1)

31. A shell of mass m is at rest initially. It explodes into three fragments having mass in the ratio 2 : 2 : 1. If the fragments having equal mass fly off along mutually perpendicular directions with speed v , the speed of the third (lighter) fragment is
- (1) $2\sqrt{2}v$ (2) $3\sqrt{2}v$
(3) v (4) $\sqrt{2}v$

Answer (1)

32. The dimensions $[MLT^{-2}A^{-2}]$ belong to the
- | | |
|---------------------------|---------------------------|
| (1) Magnetic permeability | (2) Electric permittivity |
| (3) Magnetic flux | (4) Self inductance |

Answer (1)

33. The angle between the electric lines of force and the equipotential surface is
- | | |
|----------------|-----------------|
| (1) 90° | (2) 180° |
| (3) 0° | (4) 45° |

Answer (1)

34. A square loop of side 1 m and resistance 1Ω is placed in a magnetic field of 0.5 T. If the plane of loop is perpendicular to the direction of magnetic field, the magnetic flux through the loop is
- | | |
|-------------|----------------|
| (1) 1 weber | (2) Zero weber |
| (3) 2 weber | (4) 0.5 weber |

Answer (4)

35. A light ray falls on a glass surface of refractive index $\sqrt{3}$, at an angle 60° . The angle between the refracted and reflected rays would be
- | | |
|----------------|-----------------|
| (1) 90° | (2) 120° |
| (3) 30° | (4) 60° |

Answer (1)

SECTION-B

36. A ball is projected with a velocity, 10 ms^{-1} , at an angle of 60° with the vertical direction. Its speed at the highest point of its trajectory will be
- | | |
|-------------------------|---------------------------------|
| (1) 5 ms^{-1} | (2) 10 ms^{-1} |
| (3) Zero | (4) $5\sqrt{3} \text{ ms}^{-1}$ |

Answer (4)

37. A series LCR circuit with inductance 10 H, capacitance $10 \mu\text{F}$, resistance 50Ω is connected to an ac source of voltage, $V = 200\sin(100t)$ volt. If the resonant frequency of the LCR circuit is ν_0 and the frequency of the ac source is ν , then

- | | |
|--|--|
| (1) $\nu_0 = \frac{50}{\pi} \text{ Hz}, \nu = 50 \text{ Hz}$ | (2) $\nu = 100 \text{ Hz}; \nu_0 = \frac{100}{\pi} \text{ Hz}$ |
| (3) $\nu_0 = \nu = 50 \text{ Hz}$ | (4) $\nu_0 = \nu = \frac{50}{\pi} \text{ Hz}$ |

Answer (4)

38. The area of a rectangular field (in m^2) of length 55.3 m and breadth 25 m after rounding off the value for correct significant digits is
- | | |
|-----------------------|----------------------|
| (1) 1382.5 | (2) 14×10^2 |
| (3) 138×10^1 | (4) 1382 |

Answer (2)

39. Two pendulums of length 121 cm and 100 cm start vibrating in phase. At some instant, the two are at their mean position in the same phase. The minimum number of vibrations of the shorter pendulum after which the two are again in phase at the mean position is:

- (1) 10 (2) 8
(3) 11 (4) 9

Answer (3)

40. Given below are two statements : One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A): The stretching of a spring is determined by the shear modulus of the material of the spring.

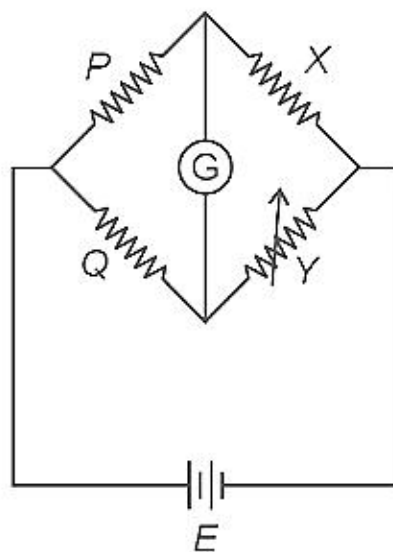
Reason (R): A coil spring of copper has more tensile strength than a steel spring of same dimensions.

In the light of the above statements, choose the **most appropriate** answer from the options given below

- (1) (A) is true but (R) is false
(2) (A) is false but (R) is true
(3) Both (A) and (R) are true and (R) is the correct explanation of (A)
(4) Both (A) and (R) are true and (R) is not the correct explanation of (A)

Answer (1)

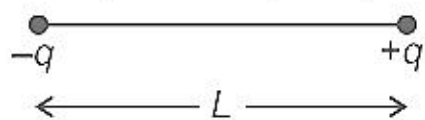
41. A wheatstone bridge is used to determine the value of unknown resistance X by adjusting the variable resistance Y as shown in the figure. For the most precise measurement of X , the resistances P and Q



- (1) Should be very large and unequal (2) Do not play any significant role
(3) Should be approximately equal to $2X$ (4) Should be approximately equal and are small

Answer (4)

42. Two point charges $-q$ and $+q$ are placed at a distance of L , as shown in the figure.



The magnitude of electric field intensity at a distance R ($R \gg L$) varies as:

- (1) $\frac{1}{R^4}$ (2) $\frac{1}{R^6}$
(3) $\frac{1}{R^2}$ (4) $\frac{1}{R^3}$

Answer (4)

