

National Testing Agency

Question Paper Name : B Tech 25072021 Shift S2
Subject Name : B TECH
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Duration : 180
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B TECH

Group Number : 1
Group Id : 864351226
Group Maximum Duration : 0
Group Minimum Duration : 180
Show Attended Group? : No
Edit Attended Group? : No
Break time : 0
Group Marks : 300
Is this Group for Examiner? : No

Physics Section A

Section Id : 864351794
Section Number : 1
Section type : Online

Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	80
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	8643511021
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 86435118370 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The force is given in terms of time t and displacement x by the equation

$$F = A \cos Bx + C \sin Dt$$

The dimensional formula of $\frac{AD}{B}$ is :

Options :

86435161691. $[M^1 L^1 T^{-2}]$

86435161692. $[M^2 L^2 T^{-3}]$

86435161693. $[M^0 L T^{-1}]$

86435161694. $[M L^2 T^{-3}]$

Question Number : 2 Question Id : 86435118371 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

A balloon was moving upwards with a uniform velocity of 10 m/s. An object of finite mass is dropped from the balloon when it was at a height of 75 m from the ground level. The height of the balloon from the ground when object strikes the ground was around : (takes the value of g as 10 m/s^2)

Options :

86435161695. 125 m

86435161696. 300 m

86435161697. 200 m

86435161698. 250 m

Question Number : 3 Question Id : 86435118372 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The instantaneous velocity of a particle moving in a straight line is given as $v = \alpha t + \beta t^2$, where α and β are constants. The distance travelled by the particle between 1 s and 2 s is :

Options :

86435161699. $3\alpha + 7\beta$

86435161700. $\frac{3}{2}\alpha + \frac{7}{3}\beta$

86435161701. $\frac{\alpha}{2} + \frac{\beta}{3}$

Question Number : 4 Question Id : 86435118373 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The relation between time t and distance x for a moving body is given as $t = mx^2 + nx$, where m and n are constants. The retardation of the motion is : (Where v stands for velocity)

Options :

86435161703. $2\ mv^3$

86435161704. $2\ nv^3$

86435161705. $2\ mnv^3$

86435161706. $2\ n^2v^3$

Question Number : 5 Question Id : 86435118374 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Two vectors $\vec{X}$ and $\vec{Y}$ have equal magnitude. The magnitude of $(\vec{X} - \vec{Y})$ is n times the magnitude of $(\vec{X} + \vec{Y})$. The angle between $\vec{X}$ and $\vec{Y}$ is :

Options :

86435161707. $\cos^{-1}\left(\frac{n^2 - 1}{-n^2 - 1}\right)$

$$\cos^{-1} \left(\frac{-n^2 - 1}{n^2 - 1} \right)$$

86435161709.

$$\cos^{-1} \left(\frac{n^2 + 1}{-n^2 - 1} \right)$$

86435161710.

$$\cos^{-1} \left(\frac{n^2 + 1}{n^2 - 1} \right)$$

Question Number : 6 Question Id : 86435118375 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A force $\vec{F} = (40\hat{i} + 10\hat{j})\text{N}$ acts on a body of mass 5 kg. If the body starts from rest, its

position vector $\vec{r}$ at time $t=10$ s, will be :

Options :

86435161711. $(400\hat{i} + 100\hat{j})\text{ m}$

86435161712. $(100\hat{i} + 400\hat{j})\text{ m}$

86435161713. $(100\hat{i} + 100\hat{j})\text{ m}$

$$(100\hat{i} + 100\hat{j})\text{ m}$$

Question Number : 7 Question Id : 86435118376 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Consider a planet in some solar system which has a mass double the mass of earth and density equal to the average density of earth. If the weight of an object on earth is W , the weight of the same object on that planet will be :

Options :

86435161715. W

86435161716. $2 W$

86435161717. $\sqrt{2} W$

86435161718. $\frac{1}{2^3} W$

Question Number : 8 Question Id : 86435118377 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Two spherical soap bubbles of radii r_1 and r_2 in vacuum combine under isothermal conditions. The resulting bubble has a radius equal to :

Options :

86435161719. $\frac{r_1 + r_2}{2}$

86435161720. $\frac{r_1 r_2}{r_1 + r_2}$

86435161721. $\sqrt{r_1 r_2}$

86435161722. $\sqrt{r_1^2 + r_2^2}$

Question Number : 9 Question Id : 86435118378 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A heat engine has an efficiency of $\frac{1}{6}$. When the temperature of sink is reduced by 62°C , its efficiency get doubled. The temperature of the source is :

Options :

86435161723. 37°C

86435161724. 62°C

86435161725. 99°C

86435161726. 124°C

Question Number : 10 Question Id : 86435118379 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In a simple harmonic oscillation, what fraction of total mechanical energy is in the form of kinetic energy, when the particle is midway between mean and extreme position.

Options :

86435161728. $\frac{1}{4}$

86435161729. $\frac{1}{3}$

86435161730. $\frac{1}{2}$

Question Number : 11 Question Id : 86435118380 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If q_f is the free charge on the capacitor plates and q_b is the bound charge on the dielectric slab of dielectric constant k placed between the capacitor plates, then bound charge q_b can be expressed as :

Options :

86435161731. $q_b = q_f \left(1 - \frac{1}{k} \right)$

86435161732. $q_b = q_f \left(1 - \frac{1}{\sqrt{k}} \right)$

86435161733. $q_b = q_f \left(1 + \frac{1}{k} \right)$

$\left(1 - \frac{1}{k} \right)$

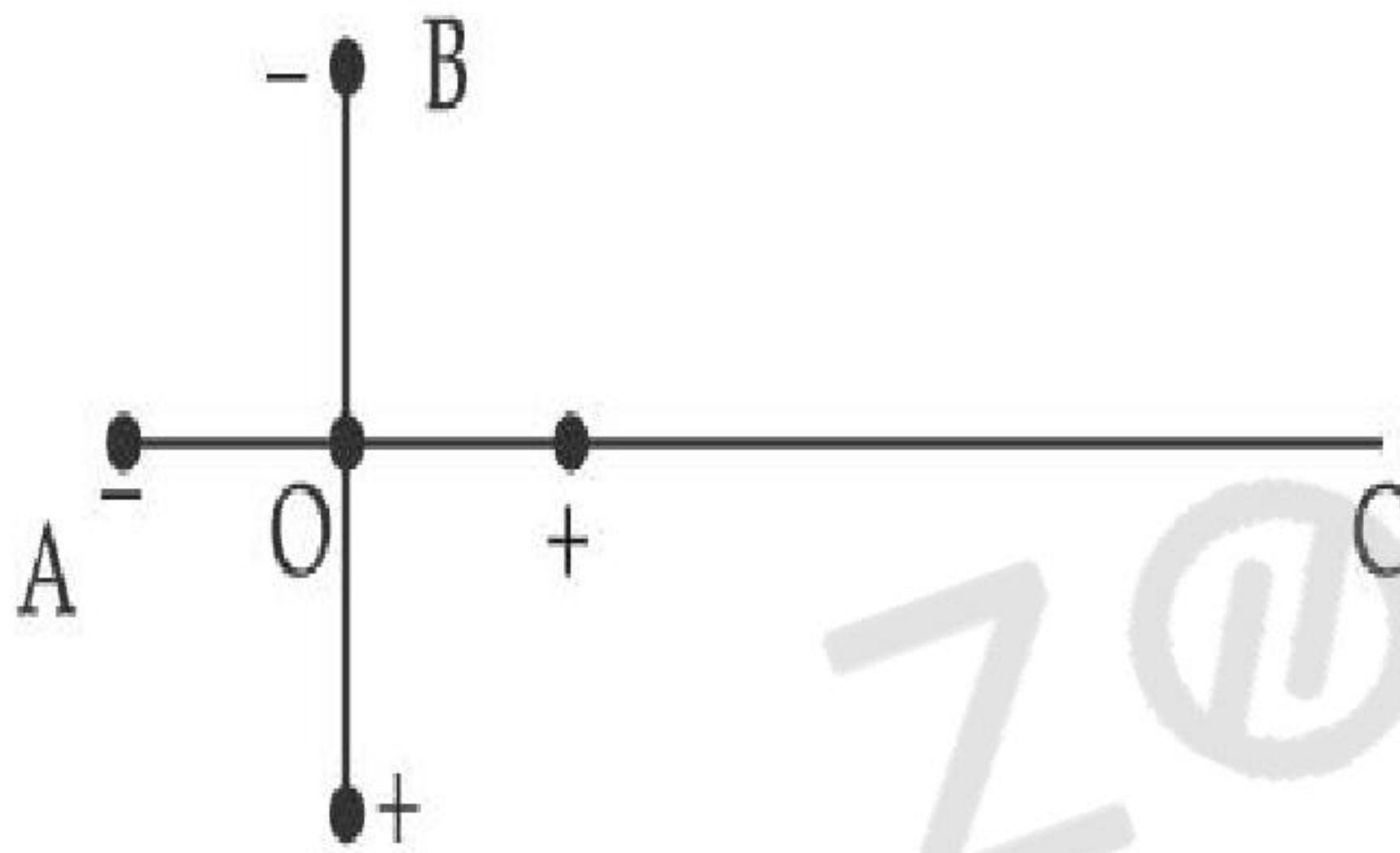
Question Number : 12 Question Id : 86435118381 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Two ideal electric dipoles A and B, having their dipole moment p_1 and p_2 respectively are placed on a plane with their centres at O as shown in the figure. At point C on the axis of dipole A, the resultant electric field is making an angle of 37° with the axis.

The ratio of the dipole moment of A and B, $\frac{p_1}{p_2}$ is : (take $\sin 37^\circ = \frac{3}{5}$)



Options :

86435161735. $\frac{4}{3}$

86435161736. $\frac{3}{2}$

86435161737. $\frac{2}{3}$

86435161738. $\frac{3}{8}$

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