Code: 1G511

B.Tech. I Year Supplementary Examinations March 2021
Engineering Mechanics
(Common to CE & ME)

Max. Marks: 70   Time: 3 Hours

Answer any **five** questions
All Questions carry equal marks (**14 Marks** each)
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1. A force of 100N makes angles of 300 , 600 and 1000 with x, y, z axes respectively. Find the components of the force along the x, y and z axes.

2. State and prove Lami's theorem

3. a) Distinguish between centre of gravity and centroid.
    b) With respect to the coordinate axes x and y locate the centroid of the shaded area shown in figure.
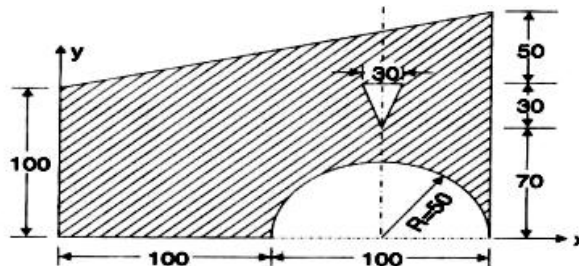
4. Find the mass moment of inertia of a solid cone of height h and base radius R about:
    a) Its axis of rotation and b) An axis through vertex normal to the axis of rotation.

5. Find the position of the centroid of the solid combination, consisting of a solid cone of height 50 mm and base diameter 80 mm and a cylinder of base diameter 80 mm and height 100 mm, with a semi – circular cut at bottom as shown in figure
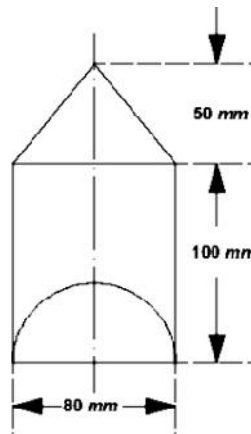
6. Two cars are travelling towards each other on a single lane road at the velocities 12 m/sec and 9 m/sec respectively. When 100 m apart, both drivers realise the situation and apply their brakes. They succeed in stopping simultaneously and just short of colliding. Assume constant deceleration for each case determine: i) Time required for car to stop. ii) Deceleration of each car. iii) The distance travelled by each car while slowing down

7. A flywheel is rotating at 200rpm and after 10seconds it is rotating at 160rpm. If the retardation is uniform, determine the number of revolutions made by the flywheel before it comes to rest from the speed of 200rpm.

8. A beam AB of span 8 m carries two point loads of 10 kN and 15 kN at 3 m and 5 m from the end A respectively. Determine the beam reactions by the principle of virtual work.

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Hall Ticket Number :

R-13

Code: 1GC12

B.Tech. I Year Supplementary Examinations March 2021
Engineering Physics
(Common to All Branches)

Max. Marks: 70   Time: 3 Hours

Answer any **five** questions
All Questions carry equal marks (**14 Marks** each)
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1. a) What is diffraction grating and explain
   b) How grating forms diffraction spectrum

2. a) Explain Bragg's law of diffraction
   b) Illustrate Laue method of X-ray diffraction

3. Illustrate Kronig-penney model

4. a) Describe Hall effect in semiconductor
   b) Brief about working of LED

5. Explain ionic, electronic and orientation polarizations

6. a) Illustrate joshepson effect
   b) compare Type-I and Type-II superconductors

7. Deduce expressions for acceptance angle and numerical aperture of optical fiber

8. Explain the production of nano materials by ball milling method

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Code: 1GC14

B.Tech. I Year Supplementary Examinations March 2021
Mathematics-I
(Common to All Branches)

Max. Marks: 70   Time: 3 Hours
Answer any **five** questions
All Questions carry equal marks (**14 Marks** each)
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1. Solve $(x+1)\dfrac{dy}{dx} - y = e^{3x}(x+1)^2$.

2. Solve $(D-2)^2 y = 8(e^{2x} + \sin 2x + x^2)$.

3. A rectangular box open at the top is to have volume of 32 cubic ft. Find the dimensions of the box requiring least material for its construction.

4. Trace the curve $a^2 y^2 = x^2(a^2 - x^2)$

5. Evaluate $\displaystyle\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dx dy$ by changing into polar coordinates.

6. Find the inverse Laplace transform of $\dfrac{2s^2 - 6s + 5}{s^3 - 6s^2 + 11s - 6}$.

7. Solve $\dfrac{d^2 x}{dt^2} + 9x = \cos 2t$, if $x(0) = 1, x(\dfrac{f}{2}) = -1$.

8. Find the directional derivative of $f(x, y, z) = xy^3 + yz^3$ at the point (2, -1, 1) in the direction of a vector $\bar{i} + 2\bar{j} + 2\bar{k}$.

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