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Code: 7G522

I B.Tech. II Semester Supplementary Examinations February 2022

**Engineering Mechanics and Dynamics**

(Common to CE &amp; ME)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks )

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Marks

**UNIT-I**

1. a) Deduce the general expression to determine the maximum height and horizontal range of projectile
- b) Maximum range of a eld gun is 2000 m. If a target at a distance of 1200 m is to be hit, what should be the angle of projection?

**OR**

2. Motion of a particle is given by the equation  $x=t^3 - 3t^2 - 9t + 12$ . Determine the time, position and acceleration of the particle when its velocity becomes zero.

**UNIT-II**

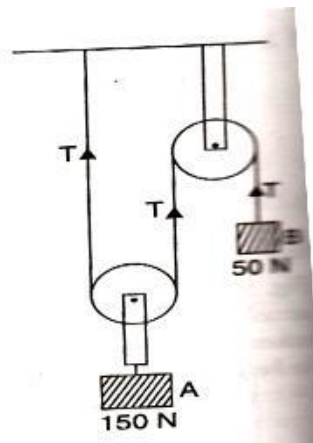
3. A ladder AB leaning against a wall and resting on a floor, slides down as shown in figure. If the velocity of the end A is 2 m/s towards the right, for the position shown, determine
  - (i) The angular velocity of the ladder and
  - (ii) The velocity of the end B

**OR**

4. Two points A and B located 10 cm apart on a rotating disc have velocities respectively 10 m/s and 15 m/s. Determine (i) the angular velocity of the disc, and (ii) the radial distances of points A & B.

**UNIT-III**

5. Determine the tensions in the strings and accelerations of blocks A and B weighing 150N and 50N connected by a string and a frictionless and weightless pulley as shown in figure.

**OR**

6. Two bodies of mass 100 kg and 40 kg are connected by a thread and move along a horizontal plane under the action of a force 450 N applied to the first body of mass 100 kg as shown in figure. The coefficient of friction between the sliding surfaces of bodies and the plane is 0.3. Determine the acceleration of the two bodies and the tension in the thread using D'Alembert's principle.

**UNIT-IV**

7. A mass of 10 kg is dropped through 2 cm on a spring of stiffness  $k = 100 \text{ N/cm}$ . Working from the first principles, find the maximum displacement of the spring.

**OR**

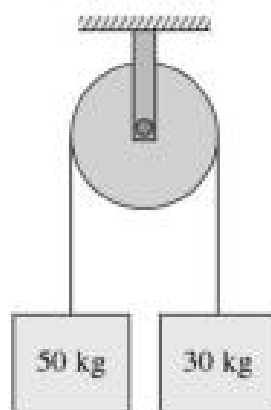
8. A block weighing 100 N is moving along a horizontal rough surface of friction coefficient 0.2 with a velocity of 5 m/s. A push of 80 N inclined at  $30^\circ$  to the horizontal acts on the block. Using work – energy principle, find the velocity of the block after it had moved through a distance of 20 m.

**UNIT-V**

9. A string is wound several times around a solid cylinder of 2 kg mass. The free end of the string is fixed to the ceiling and the cylinder is released from rest. Determine its velocity after it has fallen through a height of 2 m. also, determine the tension in string,

**OR**

10. The block and pulley arrangement shown in figure, when released from rest, determine the acceleration of the system and the tension in each portion of the string. Assume the pulley to be a solid cylinder of 20 kg mass and 15 cm radius.



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<b>R-17</b>
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**Code: 7GC24**

I B.Tech. II Semester Supplementary Examinations February 2022

**Engineering Mathematics-II**  
(Common to All Branches)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

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Marks

<b>UNIT-I</b>
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1. a) Trace the curve  $a y^2 = x^2 (a^2 - x^2)$  7M

b) Change the order of integration in  $\int_0^1 \int_0^{\sqrt{1-x^2}} y^2 dy dx$  and hence evaluate. 7M

**OR**

2. a) Trace the curve  $y^2 (x - a) = x^2 (x + a)$  14M

<b>UNIT-II</b>
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3. a) Find the Laplace Transform of  $t e^{-t} \sin t$  7M

b) Find the Laplace Transform of  $\cosh^2 2t$  7M

**OR**

4. a) Find the Laplace Transform of  $\int_0^t \frac{\sin t}{t} dt$ . 7M

b) Evaluate  $\int_0^{\infty} t e^{-2t} \cos t dt$  7M

<b>UNIT-III</b>
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5. a) Find the inverse transform of  $\frac{s + 2}{s^2 - 4s + 13}$ . 7M

b) Find the inverse transform of  $\frac{s^2 - 3s + 4}{s^3}$ . 7M

**OR**

6. Find  $L^{-1} \left\{ \frac{2s^2 - 6s + 5}{s^3 - 6s^2 + 11s - 6} \right\}$  14M

## UNIT-IV

7. a) Find the angle between the surface  $x^2 + y^2 + z^2 = 12$  and  $x^2 + y^2 - z = 12$  at the point  $(2, 2, 2)$  7M
- b) Show that  $\nabla^2\left(\frac{1}{r}\right) = 0$  7M

**OR**

8. a) Show that  $\text{div}(\text{grad } r^n) = n(n+1)r^{n-2}$  7M
- b) Prove that  $\text{div curl } \vec{F} = 0$  7M

## UNIT-V

9. Verify stoke's theorem for a vector field  $\vec{F} = (x^2 + y^2)\vec{i} - 2xy\vec{j}$  taken round the rectangle bounded by the lines  $x = \pm a$ ,  $y = 0$ ,  $y = b$ . 14M

**OR**

10. Verify Divergence thermo for  $\vec{F} = (x^2 - yz)\vec{i} + (y^2 - zx)\vec{j} + (z^2 - xy)\vec{k}$  taken over the rectangular parallelepiped  $0 \leq x \leq a$ ,  $0 \leq y \leq b$ ,  $0 \leq z \leq c$  14M

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<b>R-17</b>
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**Code: 7GC23**

I B.Tech. II Semester Supplementary Examinations February 2022

**Engineering Physics**

(Common to CE, ME and CSE )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks )

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Marks

**UNIT-I**

- 1. a) Describe construction of optical fiber 6M
- b) Write the application of optical fiber in communication system 8M

**OR**

- 2. a) Illustrate the procedure for finding Acceptance Angle and Numerical Aperture of Optical fiber 10M
- b) Distinguish Interference and Diffraction of light 4M

**UNIT-II**

- 3. a) Show that FCC is closely packed than SC and BCC structures 10M
- b) Draw the plane of miller indices of (111) and (121) 4M

**OR**

- 4. a) Define ultrasonics and write its properties 6M
- b) Describe the production of ultrasonics by Inverse Peizo electric effect 8M

**UNIT-III**

- 5. a) Explain postulates of free electron model 6M
- b) How the solids are classified on the basis of energy band theory 8M

**OR**

- 6. a) Define conductivity and drive its equation for metals 8M
- b) Distinguish metals, semiconductors and insulators 6M

**UNIT-IV**

- 7. a) Explain Hall effect and write its applications 10M
- b) What is photo diode explain it 4M

**OR**

- 8. a) Explain the diamagnetic nature of superconductors by Meissner's effect 8M
- b) Mention the applications of superconductors 6M

**UNIT-V**

- 9. a) Explain Hysterisis loop of ferromagnet 6M
- b) Derive magnetic moment of magnetic material through origin 8M

**OR**

- 10. a) Narrate the importance of nano materials by basic principles 6M
- b) justify the importance of chemical vapour deposition technique by the synthesis of nano materials 8M

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<b>R-17</b>
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**Code: 7G121**

I B.Tech. II Semester Supplementary Examinations February 2022

**Data Structures**

(Common to All Branches)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks )

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Marks

**UNIT-I**

- 1. a) Using pointers write a C program which finds the maximum among the list of elements. 10M
- b) Write a C program to swap two numbers using pointers. 4M

**OR**

- 2. a) What is a pointer? What are the features of pointers? Write a C program to print address of a variable 7M
- b) Explain dynamic memory allocation functions in C in detail. 7M

**UNIT-II**

- 3. a) Write a C Program to sort the given array in descending order using Bubble Sort. 7M
- b) Write a C program to find the given element using linear searching. 7M

**OR**

- 4. a) Define Structures. Explain with an example how structure members are initialized and accessed 7M
- b) Write a C program to copy the contents from one file to another file. 7M

**UNIT-III**

- 5. What is a stack? How it can be represented in "C" using arrays? 14M

**OR**

- 6. a) What is Data Structure? Explain in detail about different type of data structures. 7M
- b) Write the steps for evaluating postfix expression 7M

**UNIT-IV**

- 7. What is a Doubly Linked List.? Explain different operations of a Doubly linked list with suitable examples. 14M

**OR**

- 8. Write a C program to implement the following operations on a singly Linked List  
i) Insert at beginning ii) deletion at end iii) Traversing a List 14M

**UNIT-V**

- 9. a) Define and describe the terms: Tree, Binary Tree, Complete Binary Tree and Degree of a tree. 7M
- b) Draw a complete undirected graph having five nodes. 7M

**OR**

- 10. Construct Binary search tree for the following elements: 67, 12, 45, 98, 80, 73, 7, 120, 85, 30, 42 then Delete 73, 67, 12, 98. 14M

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**R-17**

**Code: 7G521**

I B.Tech. II Semester Supplementary Examinations February 2022

**Engineering Graphics-II**

(Common to CE & ME)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks )

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Marks

**UNIT-I**

1. a) A hexagonal pyramid, base 25mm side and axis 50mm long, has an edge of its base on the ground. Its axis is inclined at  $30^{\circ}$  to the ground and parallel to the VP. Draw its projections. 07M
- b) Draw the projections of a cone, base 75mm diameter and axis 100mm lying on the HP on one of its generators with the axis parallel to the VP. 07M

**OR**

2. A pentagonal pyramid, base 25mm side and axis 50 mm long has one of its triangular faces in the V.P and the edge of the base contained by that face makes an angle of  $30^{\circ}$  with the H.P. Draw its projections 14M

**UNIT-II**

3. A pentagonal prism, side of base 50 mm and length 100 mm has a rectangular face on the H.P. and the axis parallel to the V.P. It is cut by a vertical section plane, the H.T. of which makes an angle of  $30^{\circ}$  with xy and bisects the axis. Draw the sectional front view, top view and true shape of the section. 14M

**OR**

4. A cone, diameter of base 45 mm and axis 60 mm is resting on its base on the HP. It is cut by a section plane perpendicular to the VP and inclined at  $80^{\circ}$  to the HP. The section plane passes through the apex. Draw the sectional top view and also obtain the true shape of the cut section. 14M

**UNIT-III**

5. A square prism of base 50 mm side and height 125 mm stands on the ground with its side of base inclined at an angle of  $30^{\circ}$  to VP. It is penetrated by a cylinder of diameter 50 mm and axis 125 mm long. The axis of the cylinder is parallel to both HP and VP and bisects the axis of the prism. Draw the projection showing fully the curves of intersection. 14M

OR

6. A cube of 50 mm long edges is resting on the H.P. with a vertical face inclined at  $30^\circ$  to the V.P. It is cut by a section plane, perpendicular to the V.P. inclined at  $30^\circ$  to the H.P. and passing through a point on the axis, 38 mm above the H.P. Draw the sectional top view, true shape of the section and development of the surface of the remaining portion of the cube. 14M

## UNIT-IV

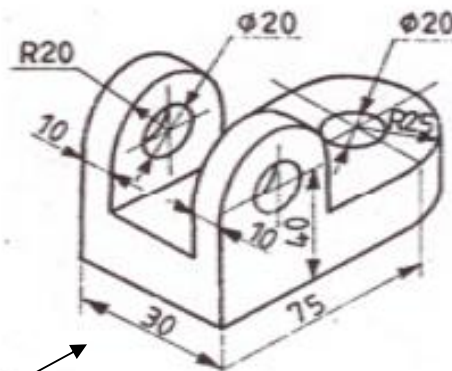
7. Draw the isometric projection of a pentagonal pyramid, with side of base 25mm and axis 60mm long. The pyramid is resting on its base on HP, with an edge of the base parallel to the VP. 14M

OR

8. Draw the isometric view of a square prism with the side of the base 40mm and length of the axis 70mm. when its axis is i) vertical ii) horizontal. 14M

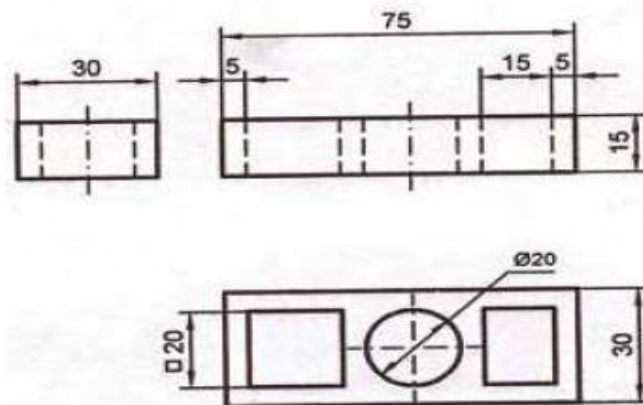
## UNIT-V

9. Draw the front view, top view and right side view for the following figure



14M

10. Draw the isometric view for the following figure



14M

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