

Code: 19A322T

I B.Tech. II Semester Supplementary Examinations June 2024

Engineering Mechanics

(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)

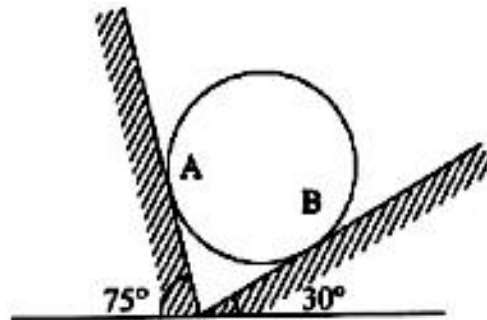
Marks CO BL

UNIT-I

1. State the law of parallelogram of forces and show that the resultant $R = \sqrt{P^2 + Q^2}$ when the two forces P and Q are acting at right angles to each other. Find the value of R if the angle between the forces is zero. 14M 1 3

OR

2. a) State and prove Varignon's theorem. 7M 1 1
 b) A 20 kg homogeneous smooth sphere rests on two inclined planes as shown in figure. Determine the contact forces at A and B.



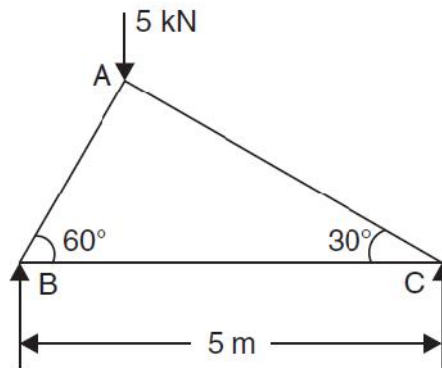
7M 1 3

UNIT-II

3. a) State the laws of friction. 7M 2 1
 b) A body of weight 100 Newtons is placed on a rough horizontal plane. Determine the co-efficient of friction if a horizontal force of 60 Newtons just causes the body to slide over the horizontal plane. 7M 2 3

OR

4. Find the forces in the members AB, AC and BC of the truss shown in Fig



14M 2 3

UNIT-III

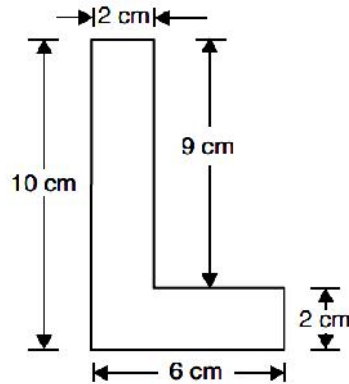
5. a) From the first principle find the centroid of a right angle triangle of height h and breadth b . 7M 3 3

Important Note: 1. On completing your answers. Compulsorily draw diagonal cross line on the remaining blank pages. 2. Any revealing of identification, appeal to evaluator and/or equations written eg. 32+8=40, will be treated as malpractice.

- b) Derive the mass moment of inertia of a solid cylinder of radius r , height h and mass m about centroidal x and y axes. 7M 3 3

OR

6. Find the centre of gravity of the L-section shown in Fig.



14M 3 3

UNIT-IV

7. A car covers 100m in 10seconds, while accelerating uniformly at a rate of 1 m/s^2 . Determine (i) initial and final velocities of the car. (ii) distance traveled before coming to this point assuming it started from rest and (iii) its velocity after the next 10 seconds. 14M 4 3

OR

8. A particle moves along a straight line so that its displacement is metre from a fixed point is given by, $S=2t^3 + 4t^2 - 6t + 8$ Find : (i) velocity at start, (ii) velocity after 5 seconds, (iii) acceleration at start and (iv) acceleration after 5 seconds. 14M 4 3

UNIT-V

9. The driver of a car 2 ton mass moving at 60 kmph applies sudden brakes to bring the car to a stop in 2 seconds. Determine the average braking force. 14M 5 3
- OR**
10. A tangential force of 1800 N is acting on a shaft of diameter 10 mm. Find the work done by the force for one revolution of the shaft. 14M 5 3

Hall Ticket Number :

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R-19

Code: 19AC23T

I B.Tech. II Semester Supplementary Examinations June 2024

Engineering Physics

(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)

| | Marks | CO | BL |
|---|-------|-----|----|
| UNIT-I | | | |
| 1. a) State kepler's laws of gravitation | 7M | CO1 | L2 |
| b) Describe Focault's pendulum in detail | 7M | CO1 | L2 |
| OR | | | |
| 2. a) Summarize the angular momentum of rigid body | 7M | CO1 | L2 |
| b) Differentiate inertial and non-inertial frames of reference | 7M | CO1 | L2 |
| UNIT-II | | | |
| 3. a) Mention the factors influence reverberation time | 9M | CO2 | L2 |
| b) What is ultrasonic and write properties | 5M | CO2 | L1 |
| OR | | | |
| 4. a) State and explain Sabine's formula | 8M | CO2 | L2 |
| b) Brief the inverse piezo-electric effect | 6M | CO2 | L2 |
| UNIT-III | | | |
| 5. a) Classify three types of magnetic materials and write properties | 10M | CO3 | L2 |
| b) What is dielectric and give any three examples | 4M | CO3 | L1 |
| OR | | | |
| 6. a) List the applications of magnetic materials | 5M | CO3 | L2 |
| b) Derive ionic polarizability of dielectric in an electric field | 9M | CO3 | L3 |
| UNIT-IV | | | |
| 7. a) Brief the working principle of optical fiber in propagation of signal | 7M | CO4 | L2 |
| b) Distinguish spontaneous and stimulated emissions | 7M | CO4 | L2 |
| OR | | | |
| 8. a) Write the application of optical fiber in communication system | 7M | CO4 | L1 |
| b) Discuss the construction and working of He-Ne laser | 7M | CO4 | L2 |
| UNIT-V | | | |
| 9. Write a detailed note on various types of sensors | 14M | CO5 | L2 |
| OR | | | |
| 10. a) Brief the temperature sensor | 5M | CO5 | L2 |
| b) Narrate Hall effect sensor in detail | 9M | CO5 | L3 |

END

Hall Ticket Number :

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R-19

Code: 19A521T

I B.Tech. II Semester Supplementary Examinations June 2024

Python Programming

(Common to CE, ME & CSE)

Max. Marks: 70

Time: 3 Hours

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

UNIT-I

Marks CO BL

1. a) Write about the process of computational problem solving 7M CO1 L2
b) Who invented python? Write what you know about python programming. 7M CO1 L2

OR

2. a) Illustrate infinite loop with an example 7M CO1 L2
b) Write a program using while statements in Python 7M CO1 L3

UNIT-II

3. a) Describe the typical operations performed on lists 7M CO2 L3
b) Write a Python program using programmer-defined functions 7M CO2 L3

OR

4. Write a python program for temperature conversion using functions 14M CO2 L4

UNIT-III

5. a) Discuss about string traversal in python 8M CO3 L2
b) What is exception handling? 6M CO3 L2

OR

6. a) Differentiate between a text file and a binary file 7M CO3 L3
b) How to deal with text files in python? 7M CO3 L3

UNIT-IV

7. a) Describe the use of object references 7M CO4 L2
b) Define class and explain it with suitable example 7M CO4 L2

OR

8. a) Infer about constructors in Python 7M CO4 L4
b) Summarize the concept of memory allocation and deallocation. 7M CO4 L5

UNIT-V

9. What is stack? Demonstrate stack operations with the example. 14M CO5 L3

OR

10. Write an algorithm for Single Linked List-traversing and explain it with an example. 14M CO5 L5

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Hall Ticket Number :

R-19

Code: 19AC21T

I B.Tech. II Semester Supplementary Examinations June 2024

Differential Equations and Vector Calculus

(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)

UNIT-I

1. Solve $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = xe^{3x} + \sin 2x$

Marks CO BL

14M CO1 L3

OR

2. a) Solve $(D^2 + 4)y = \cos x$

7M CO1 L3

b) Solve $(D^2 + 6D + 9)y = e^{-3x}$

7M CO1 L3

UNIT-II

3. Solve $x^2 \frac{d^2y}{dx^2} - 4x \frac{dy}{dx} + 6y = x^2$

14M CO2 L3

OR

4. Solve the simultaneous equations $\frac{dx}{dt} + 2y + \sin t = 0$, $\frac{dy}{dt} - 2x - \cos t = 0$ given that $x = 0$ and $y = 0$ when $t = 0$.

14M CO2 L3

UNIT-III

5. Solve $(p^2 + q^2)y = qz$ by using Charpits method.

14M CO3 L3

OR

6. a) Form the partial differential equation by eliminating arbitrary function from

$z = f(x^2 + y^2)$

7M CO3 L3

b) Solve $pyz + qzx = xy$

7M CO3 L3

UNIT-IV

7. If $\vec{F} = 4xz\vec{i} - y^2\vec{j} + yz\vec{k}$, evaluate $\int_c \vec{F} \cdot \vec{n} ds$, where S is the surface of the cube bounded by $x=0, x=a, y=0, y=a, z=0, z=a$.

14M CO4 L2

OR

8. a) Find $\text{div } \vec{f}$ where $\vec{f} = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$

7M CO4 L2

b) Find the angle between the surfaces $x^2 + y^2 + z^2 = 9$ and $z = x^2 + y^2 - 3$ at the point (2, -1, 2)

7M CO4 L2

UNIT-V

9. Verify Stokes theorem for the function $\vec{F} = x^2\vec{i} + xy\vec{j}$ integrated around the square in the plane $z=0$ whose sides are along the lines $x=0, y=0, x=a, y=a$.

14M CO5 L3

OR

10. Verify Gauss divergence theorem for $\vec{F} = x^2\vec{i} + y^2\vec{j} + z^2\vec{k}$, over the cube formed by the planes $x=0, x=a, y=0, y=b, z=0, z=c$.

14M CO5 L3
