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R-19

Code: 19AC23T

I B.Tech. II Semester Regular Examinations Nov/Dec 2020

Engineering Physics
(Common to CE & ME)

Max. Marks: 70

Time: 3 Hours

Answer any five questions from the following (5 x 14 = 70 Marks)

	Marks	CO	Blooms Level
1. a) Describe the scalars and vectors quantities with examples	6M	1	BTL2
b) Show that conservative force is equivalent to negative gradient of potential energy	8M	1	BTL3
2. a) What is reverberation time? Explain	4M	2	BTL2
b) Derive Sabine's reverberation time formula with necessary diagrams.	10M	2	BTL4
3. a) Explain principle, construction and working of piezoelectric oscillator for the production of ultrasonic waves.	10M	2	BTL4
b) Give some applications of ultrasonic waves.	4M	2	BTL2
4. a) What is Polarization? Describe different types of Polarizabilities.	7M	3	BTL2
b) Show that the electronic polarizability is directly proportional to the cube of the radius of the molecule.	7M	3	BTL4
5. a) Explain hysteresis of ferromagnetic material.	6M	3	BTL2
b) Describe the classification of magnetic materials based on hysteresis.	8M	3	BTL3
6. a) What are Einstein's coefficients? Derive the relation between Einstein's coefficients.	9M	4	BTL 5
b) Write few applications of lasers	5M	4	BTL2
7. a) What is an optical fibre? Explain its principle with neat sketch.	4M	4	BTL2
b) What is numerical aperture? Derive an expression for numerical aperture of a fibre?	10M	4	BTL5
8. a) What is sensor? Describe the pressure and piezoelectric sensors.	10M	5	BTL2
b) What are applications of the sensors?	4M	5	BTL2

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Code: 19A521T / 19A522T

I B.Tech. II Semester Regular Examinations Nov/Dec 2020

Python Programming / Programming Through Python

(Common to CE, ME & CSE) (Common to EEE & ECE)

Max. Marks: 70

Time: 3 Hours

Answer any five questions from the following (5 x 14 = 70 Marks)

	Marks	CO	Blooms Level
1. Describe the various expressions in python with suitable examples.	14M	CO1	L1
2. a) Define a program that displays different data types using variables and literal constants.	7M	CO1	L1
b) Show that for a program to perform addition, subtraction, multiplication, integer division, floor division and modulo division (on two integers and float) python data types are crucial.	7M	CO1	L1
3. a) Illustrate the need and importance of function in python.	7M	CO2	L3
b) What is python List? Describe the List usage with suitable examples	7M	CO2	L1
4. a) Model a program to exchange the value of two variables with temporary variables	7M	CO2	L3
b) Examine the properties of Dictionary keys with examples	7M	CO2	L3
5. a) Write a python program to count the number of vowels in a string provided by the user.	7M	CO3	L3
b) Determine the need of Exception with Arguments.	7M	CO3	L3
6. a) Define classes in python with suitable example	7M	CO4	L1
b) Recall the fundamental object oriented concepts used in python.	7M	CO4	L1
7. Describe the concept of queue implementation using python list.	14M	CO5	L1
8. Examine abstract data type with its types along with the syntax used.	14M	CO5	L1 & L3

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Code: 19AC21T

I B.Tech. II Semester Regular Examinations Nov/Dec 2020

Differential Equations and Vector Calculus

(Common to All Branches)

Max. Marks: 70

Time: 3 Hours

Answer any five questions from the following (5 x 14 = 70 Marks)

	Marks	CO	Blooms Level
1. a) Solve $\frac{d^2y}{dx^2} + 16y = x \sin 3x$	7M	CO1	
b) Solve $y'' - 2y' + 2y = x + e^x \cos x$	7M	CO1	
2. Using method of variation of parameters, solve $y'' - 2y' + y = e^x \log x$	14M	CO1	
3. Solve $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = \log x \sin(\log x)$	14M	CO2	
4. Solve $(2x - 1)^2 \frac{d^2y}{dx^2} + (2x - 1) \frac{dy}{dx} - 2y = 8x^2 - 2x + 3$	14M	CO2	
5. Solve $(p^2 + q^2)y = qz$ by Charpit's method.	14M	CO3	
6. a) Find the directional derivative of $f(x, y, z) = xy^3 + yz^3$ at the point (2, -1, 1) in the direction of the vector $\bar{i} + 2\bar{j} + 2\bar{k}$.	7M	CO4	
b) Prove that $\text{div}(r^n \bar{r}) = (n + 3)r^n$	7M	CO4	
7. a) If $\bar{f} = \text{grad}[x^3y + y^3z + z^3x - x^2y^2z^2]$ then find $\text{div}\bar{f}$ and $\text{curl}\bar{f}$.	7M	CO4	
b) If $\bar{F} = (5xy - 6x^2)\bar{i} + (2y - 4x)\bar{j}$, evaluate $\int_C \bar{F} \cdot d\bar{r}$ along the curve C in the xy-plane, $y = x^3$ from the point (1, 1) to (2, 8).	7M	CO4	
8. Verify Green's theorem for $\int_C [(3x - 8y^2)dx + (4y - 6xy)dy]$ where c is the boundary of the region bounded by $x = 0$, $y = 0$ and $x + y = 1$.	14M	CO5	

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Engineering Graphics-II

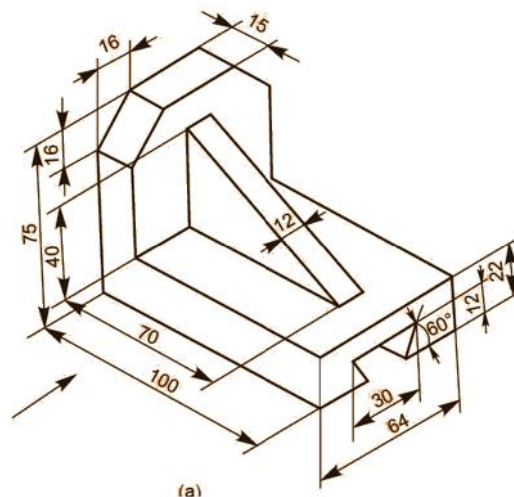
(Common to CE & ME)

Max. Marks: 70

Time: 3 Hours

Answer any five questions from the following (5 x 14 = 70 Marks)

- | | Marks | CO | Blooms Level |
|--|-------|------|--------------|
| 1. A hexagonal pyramid, base 30 mm side and axis 65 mm long, is resting on its base on the H.P. with two edges parallel to V.P. It is cut by a section plane, perpendicular to the V.P., inclined at 45° to the H.P. and intersecting the axis at a point 25 mm above the base. Draw the front view, sectional top view, sectional side view and true shape of the section. | 14M | CO1 | L4 |
| 2. A cone, base 75 mm diameter and axis 80 mm long is resting on its base on the H.P. It is cut by a section plane perpendicular to the V.P., inclined at 45° to the H.P. and cutting the axis at a point 35 mm from the apex. Draw its front view, sectional top view, sectional side view and true shape of the section. | 14M | CO1 | L4 |
| 3. A right regular pentagonal pyramid, side of base 36 mm and height 64 mm rests on its base upon the ground with one of its base sides parallel to V.P. A section plane perpendicular to V.P. and inclined at 30° to H.P. cuts the pyramid, bisecting its axis. Draw the development of the truncated pyramid. | 14M | CO2 | L3 |
| 4. A right circular cone, 70 mm base and 70 mm height, rests on its base on the ground plane. A section plane perpendicular to V.P. and inclined at 30° to H.P. cuts the cone, bisecting its axis. Draw the development of the lateral surface of the cone. | 14M | CO2 | L3 |
| 5. A vertical cylinder of 80 mm diameter is completely penetrated by another cylinder of 60 mm diameter, their axes bisecting each other at right angles. Draw their projections showing curves of penetration, assuming the axis of the penetrating cylinder to be parallel to the V.P. | 14M | CO3 | L4 |
| 6. Draw the isometric projection of a hexagonal plane of side 25mm, assuming the surface of the plane to be (i) parallel to V.P and (ii) parallel to H.P | 14M | CO4M | L4 |
| 7. Draw the isometric view 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 VP. | 14M | CO4M | L4 |
| 8. Draw the Front view, Top view and side view for the following figure. | | | |



14M CO5 L4

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Engineering Mechanics

(Common to CE & ME)

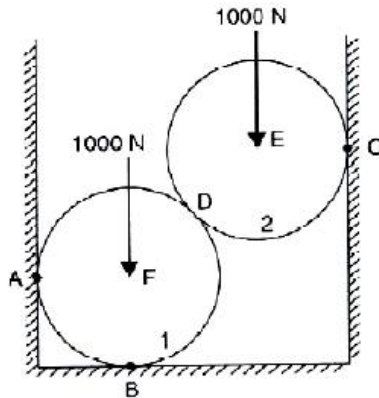
Max. Marks: 70

Time: 3 Hours

Answer any five questions from the following (5 x 14 = 70 Marks)

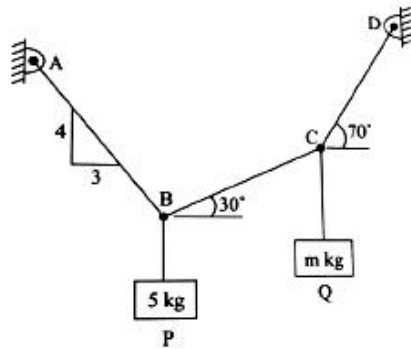
Marks CO Blooms Level

1. Two spheres, each of weight 1000N and radius 25cm rest in a horizontal channel of width 90cm as shown in the figure. Find the reactions on the points of contact A, B and C.



14M CO1

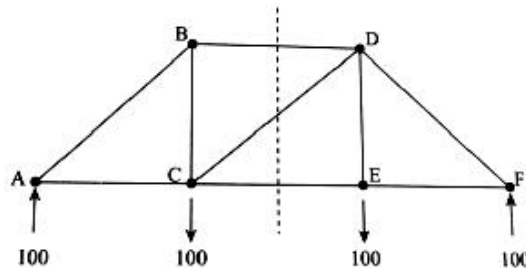
2. a) Block P of mass 5kg and block Q of mass m kg, suspended through a cord, are in the equilibrium position as shown in figure. Determine the mass m.



7M CO1

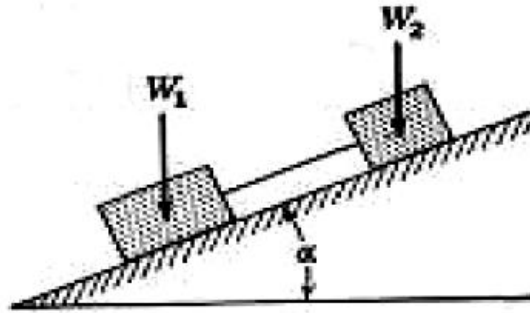
7M CO1

- b) State and prove Varignon's theorem.
3. a) Find the forces in members BD, CD and CE of the truss as shown in figure (the loads are indicated in newtons).



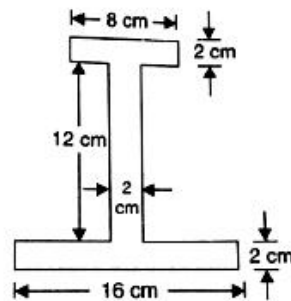
7M CO2

- b) Two blocks of weight W_1 and W_2 rest on a rough inclined plane and are connected by a short piece of string as shown in figure. If the coefficients of friction are $\mu_1 = 0.2$ and $\mu_2 = 0.3$. Find the angle of inclination of the plane for which sliding will impend. Assume $W_1 = W_2 = 5$ N.



7M CO2

4. Deduce an equation for moment of inertia of right circular solid cone about its generating axes of base radius 'R' and altitude 'h'.
5. Find the centre of gravity of the I-section shown in figure.

CO3
14M

14M CO3

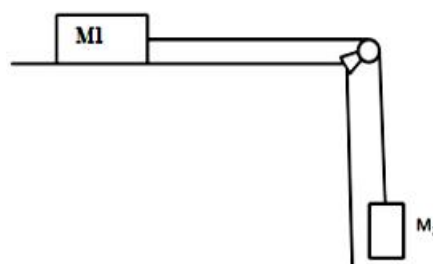
6. a) An airplane is flying horizontally with a velocity of 450 km/hr at an altitude of 1960m towards a target on the ground which is to be bombed. Estimate where the bomb must be released in order to hit the target and the time of travel of the bomb. What is the velocity with which the bomb will hit the target? Also find the angle made by the line of sight of the pilot when the bomb is released.
- b) The motion of a particle is defined by the relation $x = t^3 - 12t^2 + 36t + 30$ where x is expressed in meters and t is in sec. Determine the time, position and acceleration, when $v = 0$.
7. a) A stone dropped into a well is heard to strike the water after 4 seconds. Find the depth of the well, if the velocity of sound is 350 m/sec.
- b) A projectile is aimed at a target on the horizontal plane and falls 12m short when the angle of projection is 15° while it overshoots by 24m when the angle is 45° . Find the angle of projection to hit the target.
8. Two blocks of masses M_1 and M_2 are connected by a string as shown in Figure.7 below. Assuming the coefficient of friction between block M_1 and the horizontal surface to be μ . if the system is released from rest, find the velocity of the block A after it has moved a distance of 1 m Assume $M_1=100$ kg.and $M_2=150$ kg and $\mu =0.20$.

5M CO4

9M CO4

7M CO4

7M CO4



14M CO5
