

CODE: 20EST203

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech. I Semester Regular & Supplementary Examinations December-2022

ENGINEERING MECHANICS

(Common to CIVIL & ME)

Time: 3 Hours

Max Marks: 60

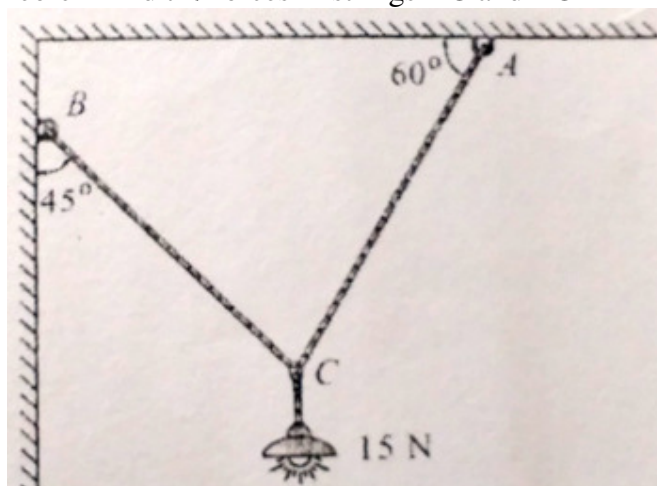
Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. An electric light weighing 15N hangs from a point C by the two strings AC and BC as shown in Figure. AC is inclined at 60° to the horizontal and BC at 45° to the vertical shown in figure. Using Lami's theorem find the forces in strings AC and BC



(OR)

2. The resultant of two forces acting at a point is 65kN. It is observed that one force is double than that of the other and if the direction of one of them is reversed the resultant becomes 45kN. Find the magnitudes of forces and the angle between them

UNIT-II

3. a State and prove Varignon's theorem
b Explain the concept of Free Body Diagram with example

(OR)

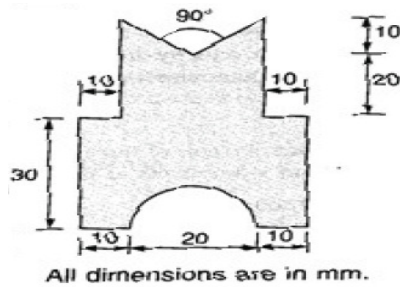
Marks	CO	Blooms Level
[10 M]	CO1	L3

[10 M]	CO1	L3
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Marks	CO	Blooms Level
[5M]	CO2	L2
[5M]	CO2	L2

[5M]	CO2	L2
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8. Determine the moment of inertia about its horizontal axis for the plane [10 M] CO4 L3 section as shown in figure



Marks CO Blooms Level

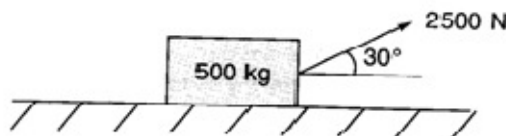
UNIT-V

9. A ball is projected vertically upwards attains a maximum height of 440m. calculate the velocity of projection and compute the time of flight of air. At what altitude will the is ball meet a second ball projected vertically upwards 4 seconds later with a speed of 120m/s. [10M] CO5 L3
- (OR)
10. a) Stone is dropped into a well without initial velocity. It splash is heard after 4 seconds. Determine the depth of the well, if velocity of sound is 340 m/sec. [8M] CO5 L3
- b) Define kinematics. [2M] CO5 L2

UNIT-VI

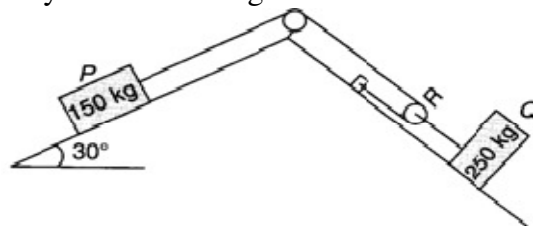
Marks CO Blooms Level

11. A 500 kg block rests on a horizontal plane. Find the acceleration of the block if 2500N force is applied as shown in the figure Take coefficient of friction as 0.22 [10M] CO6 L3



(OR)

12. Two blocks shown in figure. below are originally at rest. Determine (i) [10M] CO6 L3 the acceleration of each block (ii) tension in cables. Assume the effect of friction in the pulleys, between the blocks and inclines as negligible. Mass of the pulley can also be neglected



D.C MACHINES & TRANSFORMERS**(Electrical and Electronics Engineering)****Time: 3 Hours****Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

	<u>UNIT-I</u>	Marks	CO	Blooms Level
1. a)	Classify different types of dc generators according to the ways in which field is excited? Draw the connection diagram of each type.	5	CO1	Understand
b)	A short-shunt dc compound generator supplies 150 A at 100 V. The resistance of armature, series field and shunt field windings are 0.04, 0.03 and 60 Ω respectively. Determine the e.m.f generated. Also determine the e.m.f generated if same machine is connected as a long shunt machine.	5	CO1	Apply
	(OR)			
2. a)	Derive the EMF equation for DC generator	5	CO1	Understand
b)	Name the different parts of a dc machine and state the function of each part	5	CO1	Remember
	<u>UNIT-II</u>			
3. a)	Explain about critical field resistance and critical speed of a DC shunt generator	5	CO2	Understand
b)	Explain the process of commutation in DC generator?	5	CO2	Understand
	(OR)			
4. a)	Explain about internal and external characteristics of a DC generator	5	CO2	Understand
b)	Explain about the losses in a DC generator	5	CO2	Understand
	<u>UNIT-III</u>			
5. a)	Explain the principle of torque production in a dc motor and derive an expression for it	5	CO3	Understand
b)	Explain about back emf in a DC motor.	5	CO3	Understand
	(OR)			
6. a)	With a neat sketch explain the working principle of DC motor	5	CO3	Understand
b)	Illustrate speed-torque and torque-current characteristics of a dc shunt motor	5	CO3	Understand

UNIT-IV

7. a) Explain field control method for speed control of a dc shunt machine. 5 CO4 Understand
- b) Explain with the help of a neat sketch the principle of operation of a four-point starter 5 CO4 Understand
- (OR)
8. a) Explain with diagram how Hopkinson's test is performed on dc machines. What are the advantages and disadvantages of this test? 5 CO4 Understand
- b) A 240 V shunt motor has an armature resistance of $0.2\ \Omega$ and takes armature current of 20 A on full-load. The electromagnetic torque being constant, by how much must the flux be reduced to increase the speed by 40%? 5 CO4 Apply

UNIT-V

9. a) Distinguish between core-type and shell-type transformer. Why is the low voltage winding placed near the core? Why is the core of a transformer laminated? 5 CO5 Understand
- b) A 200 V/400V, 50 Hz transformer has peak flux density of 1.1 Wb/m^2 in the core and the net area of cross section of the core is 0.02 sqm . If the current density in the conductor is 3 A/mm^2 and conductor diameter of primary coil is 3 mm. Determine the kVA rating of the transformer and the number of primary and secondary turns. 5 CO5 Apply
- (OR)
10. a) Draw and explain the phasor diagram of a single-phase transformer with lagging p.f. load. 5 CO5 Understand
- b) A single-phase transformer supplies a load of 20 kVA at a p.f. of 0.8 (lagging). The iron loss of the transformer is 200 W and the copper losses at this load is 180 W. Calculate (i) the efficiency (ii) the new efficiency if the load is now changed to 30 kVA at a p.f. of 0.9 (lagging). 5 CO5 Apply

UNIT-VI

11. a) Explain how parameters of transformer equivalent circuit can be found from open circuit and short circuit tests. 5 CO6 Understand
- b) Discuss about Sumpner's test on a single-phase transformer. 5 CO6 Understand
- (OR)
12. Explain with the help of connection and phasor diagrams how a Scott connection is used to obtain two-phase supply from three-phase supply 10 CO6 Understand

**PYTHON PROGRAMMING
(Common to ECE, CSE, IT & AIML)****Time: 3 Hours****Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-IMarks CO Blooms
Level

1. a) Discuss various data type conversion functions with examples. 5 1 2
- b) What are conditional statements? Write a program that takes inputs as no of units consumed and generates the current bill as follows 5 1 3

If units !=0 and <= 99 then bill is minimum Rs 180/-
 If units > 99 and <=199 then bill is minimum bill upto
 99 Units + Rs 2/- per unit upto 199 Units.
 If units > 199 then bill is minimum bill upto 99 Units
 + Rs 2/- per unit upto 199 Units + Rs 3/- per excess
 unit

(OR)

2. a) Discuss about arithmetic operator precedence and associativity. 5 1 2
- b) Explain for loop and while loop statements with example. 5 1 2

UNIT-II

3. a) Explain about sets and write various set operations with examples in python. 5 2 2
 - b) Explain in detail about dictionaries in Python. 5 2 2
- (OR)**
4. a) Discuss List comprehension in Python with example. 5 2 2
 - b) Discuss various string functions and write a python program to count repeated characters in a string. 5 2 2

UNIT-III

5. a) What is Python file handling? Explain the four modes with an example. 5 3 2
- b) Develop a python program to find GCD of two nos using recursion. 5 3 5

(OR)

- | | | | | | |
|----|----|---|---|---|---|
| 6. | a) | Discuss in detail function calling with examples. | 5 | 3 | 2 |
| | b) | Discuss any five methods associated with file object. | 5 | 3 | 2 |

UNIT-IV

- | | | | | | |
|----|----|---|---|---|---|
| 7. | a) | What is module? Differentiate import statement and from import statement in python. | 5 | 4 | 2 |
| | b) | Develop a python program to obtain a module to find Fibonacci nos and import the module to another program. | 5 | 4 | 5 |

(OR)

- | | | | | | |
|----|----|--|---|---|---|
| 8. | a) | Explain briefly about name spaces with examples. | 5 | 4 | 2 |
| | b) | Discuss various features of modules. | 5 | 4 | 2 |

UNIT-V

- | | | | | | |
|----|----|--|---|---|---|
| 9. | a) | Discuss the features of object oriented programming languages. | 5 | 5 | 2 |
| | b) | Develop a program to implement class and object concept. | 5 | 5 | 5 |

(OR)

- | | | | | | |
|-----|----|--|---|---|---|
| 10. | a) | Write a python program that describes inheritance. | 5 | 5 | 5 |
| | b) | Explain database connectivity with example. | 5 | 5 | 2 |

UNIT-VI

- | | | | | | |
|-----|----|--|---|---|---|
| 11. | a) | What is a regular expression? Write a program that reads the data from a file as per the regular pattern designed with a regular expression. | 5 | 6 | 3 |
| | b) | Discuss various methods supported by compiled regular expression objects. | 5 | 6 | 2 |

(OR)

- | | | | | | |
|-----|----|---|---|---|---|
| 12. | a) | Discuss match() and findall() methods with example. | 5 | 6 | 2 |
| | b) | Implement the following | 5 | 6 | 3 |
| | | i) re.sub | | | |
| | | ii) Match.group | | | |

AR18

CODE: 18CET204

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech I Semester Supplementary Examinations, December, 2022

**SURVEYING AND GEOMATICS
(Civil Engineering)**

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) What are the basic principles of surveying? Explain. 6M
- b) What are the points to be remembered while selecting a survey station? 6M

(OR)

2. a) Distinguish between 6M
 - i) Magnetic Meridian and True Meridian
 - ii) Whole circle bearing and Quadrantal bearing
- b) Following are the bearing of the sides of a closed traverse 6M

Line	Fore Bearing
AB	$107^{\circ} 15'$
BC	$22^{\circ} 00'$
CD	$318^{\circ} 30'$
DE	$189^{\circ} 15'$
EA	$124^{\circ} 45'$

Draw a neat sketch of the traverse. Work out the interior angles of the traverse and apply the check.

UNIT-II

3. a) The following staff readings were observed successively with a level. The instrument has been shifted after the second, fifth and eighth readings. 12M
0.675, 1.230, 0.750, 2.565, 2.225, 1.935, 1.835, 3.220, 3.115 and 2.875.
The first staff reading was taken with the staff held on a benchmark of RL 100.00. Enter the readings in a level book and calculate the RL's of all the points. Also apply the arithmetic readings in a level book and calculate the RL's of all the points. Also apply necessary checks. Use Height of Instrument method
- (OR)**
4. a) What are the different classifications of levelling? Explain. 6M
- b) What is interpolation of contours? Explain any one method of interpolation. 6M

UNIT-III

5. a) Explain the temporary adjustments of transit theodolite. 6M
b) In order to determine the R.L. of the top of the chimney the Theodolite was set up at a distance of 30m from its base. The vertical angle measured to the top of chimney was $25^{\circ} 30'$. The back sight taken on a nearby B.M of R.L 152.260 was 1.225m. Determine the R.L of the top of the chimney. 6M

(OR)

6. a) How do you determine the constants of a tacheometric in the field? Explain. 6M
b) What is total station? What are the features and uses of total station? 6M

UNIT-IV

7. a) What is the principle of stereoscopic vision? 4M
b) Define relief. Derive an expression for displacement due to the ground relief. 8M

(OR)

8. a) Explain briefly the aspects of flight planning for an aerial survey. 6M
b) What are different types of aerial photographs? Explain. 6M

UNIT-V

9. a) Define remote sensing and briefly explain the principle of remote sensing. 6M
b) What do you understand by GIS? Briefly explain. 6M

(OR)

10. a) Explain briefly about i) energy interaction with earth ii) remote sensing platforms. 8M
b) Write a note on application of remote sensing. 4M

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) State and explain Coloubs Law? 6 M
b) Give the rectangular coordinates of the vector field $H = 20a_r - 10a_\phi + 3a_z$ at point P (x=5, y=2, z=-1) 6 M

(OR)

2. a) Derive the expression for Potential gradient. $E = -\nabla V$ 6 M
b) Express vector $B = \frac{10}{r} a_r + r \cos \theta a_\theta + a_\phi \theta$ 6 M
in Cartesian and cylindrical coordinates. Find B at (—3, 4, 0) .

UNIT-II

3. a) Derive the boundary conditions for conductor to dielectric interface for static electromagnetic fields? 6 M
b) Given a point charge of $200 \pi \epsilon_0$ C at (3,-1,2), a line charge of $40 \pi \epsilon_0$ C/m on the x-axis, and a surface charge of $8 \epsilon_0$ C/m² on the plane x = -3, all in free space, find the potential at P(5,6,7) if V=0 at Q(0,0,1)? 6 M

(OR)

4. a) Derive an expression for Laplace equation from fundamentals 6 M
b) Derive an expression for torque on a dipole placed in an electric field E bar. 6 M

UNIT-III

5. a) State and explain Biot-Savarts law. 6 M
b) A circuit carrying a direct current of 10A forms a regular hexagon inscribed in a circle of radius of 1.5 m. Calculate the magnetic flux density at the center of the hexagon. Assume the medium to be free space 6 M

(OR)

6. a) Derive an expression for H due to infinite line of current. 6 M
b) Derive the equation to show that curl of magnetic field intensity is equal to current density. $\nabla \times H = J$ 6 M

UNIT-IV

7. a) Determine the inductance of a solenoid of 2500 turns wound uniformly over a length of 0.25m on a cylindrical paper tube, 4 cm in diameter and the medium is air. 6 M
b) Derive an expression for Lorentz force equation. 6 M

(OR)

8. a) Derive the expression for the force between two finite current carrying loops. 6 M
b) Derive the expression for self-inductance of a toroid. 6 M

UNIT-V

9. a) Explain (i) Conduction Current. (ii) Displacement current. 6 M
b) Derive the Maxwell's four equations for time varying fields. 6 M

(OR)

10. State Poynting theorem and derive an expression for it. 12 M

Time: 3 Hours**Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) State and prove Lami's theorem. 6M
b) The body shown in the Fig.1 is acted on by four forces. Determine the resultant. 6M
- (OR)
2. a) What is moment of a force? Explain with suitable example. 6M
b) What is the moment that this force exerts about point A and point B from the fig.2? 6M

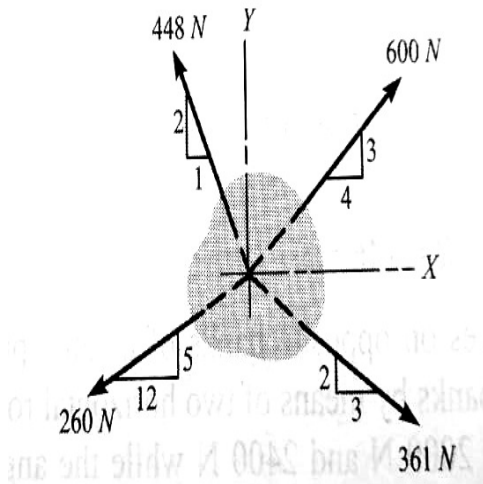


Fig.1

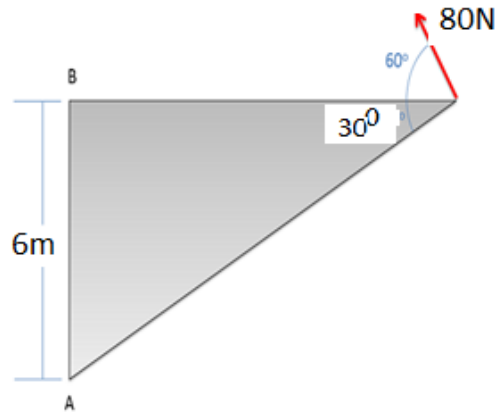


Fig.2

UNIT-II

3. a) Mention the steps involved in drawing of a free-body diagram. 4M
b) The 300 N sphere in Fig.3 is supported by the pull P and a 200 N weight passing over a frictionless pulley. If $\alpha=30^\circ$, compute the values of P and θ . 8M
- (OR)
4. a) What are the applications of moment of a force? Explain with suitable diagrams. 4M
b) Use Varignon's theorem to find the moment that the forces exert about point A in the Fig.4. 8M

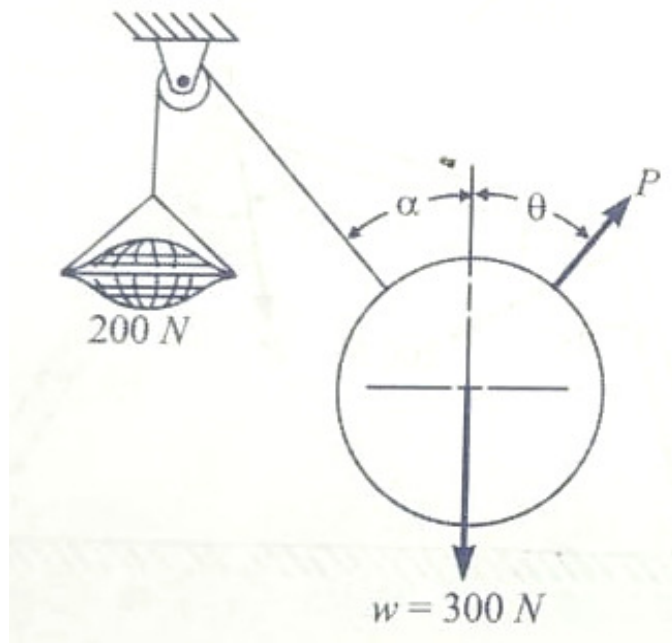


Fig.3

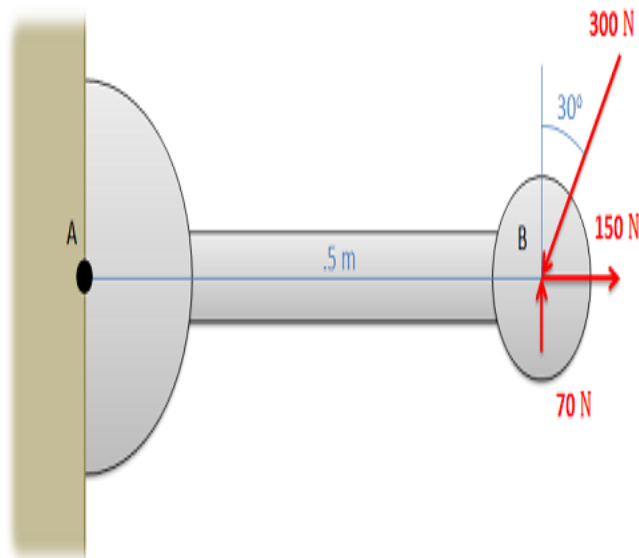


Fig.4

UNIT-III

5. a) Explain why sliding friction is less than static friction. 4M
- b) Determine the force P required to start the wedge shown in Fig.5. The angle of friction for all surfaces in contacts is 15° . 8M

(OR)

6. Determine the force in each member of the crane truss shown in Fig.6 by using 12M method of joints.

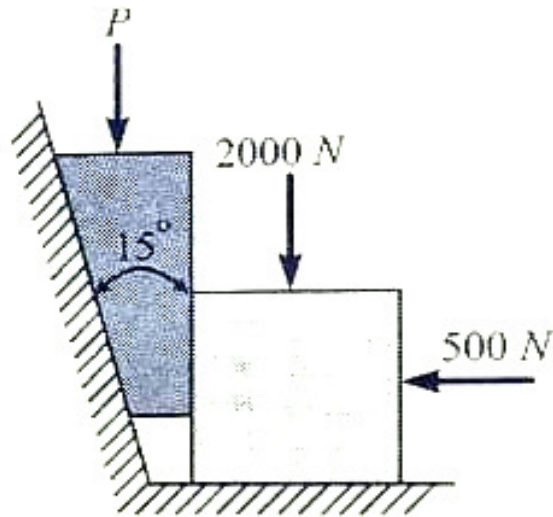


Fig.5

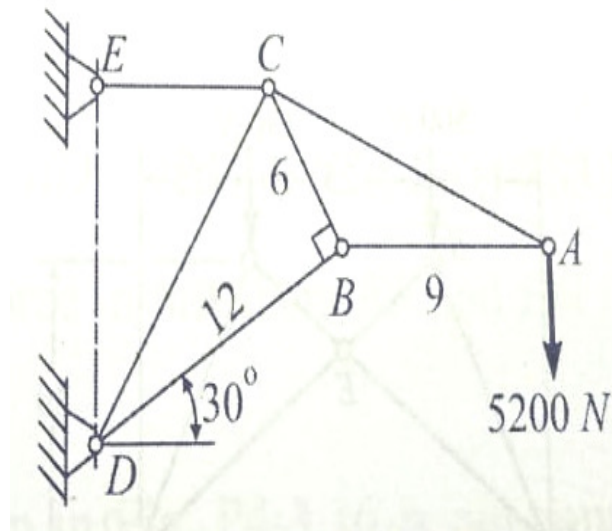


Fig.6

UNIT-IV

7. a) State and explain theorem of Pappus. 4M
 b) Determine the centroid of the lines that form the boundary of the shaded area in fig. 7. 8M

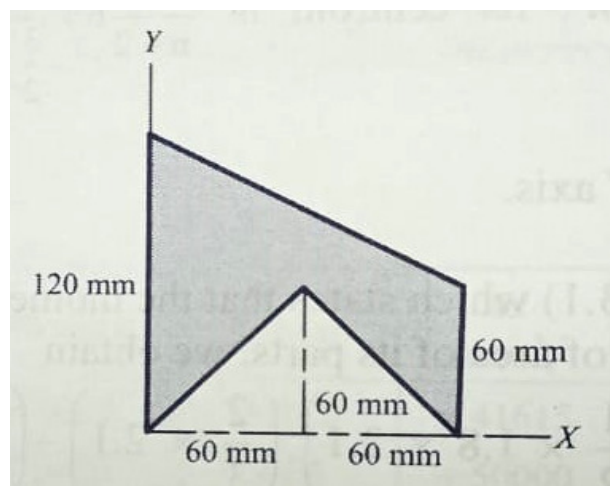


Fig. 7
 3 of 4

(OR)

8. Show that the moment of inertia for the area of any regular polygon is a constant with respect to all centroidal axes in the plane area.

UNIT-V

9. a) Define plane motion? Write an application of kinematic equations? 4M
b) The compound wheel shown in fig.8 rolls without slipping. At the given position, the velocity of A is 2 m/s and the acceleration of A is 6 m/s^2 , both directed to the right. Compute the acceleration of points B and C. 8M

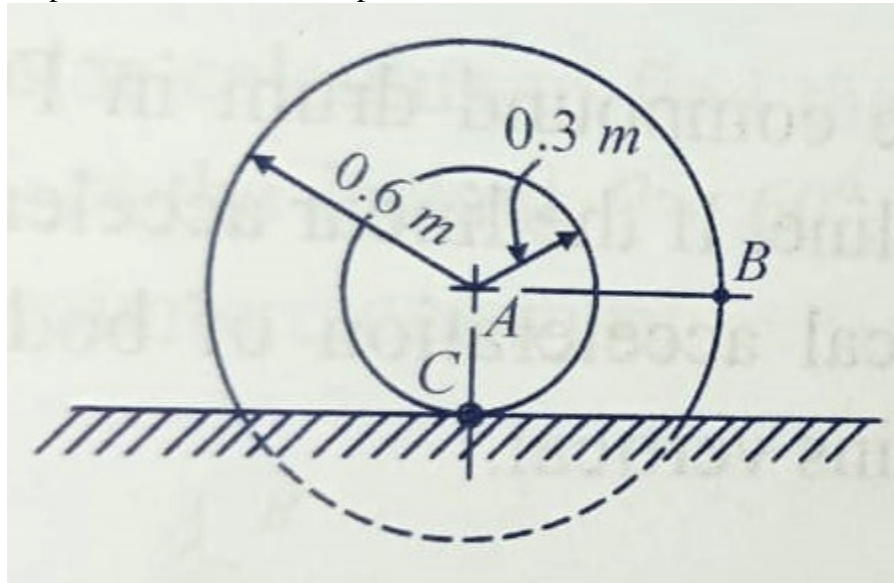


Fig. 8

(OR)

10. A solid cylinder and a homogeneous sphere, each of weight W and radius r , roll without slipping down a plane inclined at θ° with the horizontal. For each body, determine the minimum coefficient of friction to prevent slipping and the acceleration of the mass center. 12M

CODE: 16CE2004 **SET-1**
ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, December, 2022
SURVEYING
(Civil Engineering)

Time: 3 Hours**Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) What is Surveying? What are the principles of surveying? 7M
 b) Discuss briefly about the errors in chaining. 7M

(OR)

2. The bearings of the lines of traverse are given below. Find the included angles and correct the bearings for local attraction, if any. 14M

Line	F.B	B.B
AB	73°40' ¹	252°30' ¹
BC	113°50' ¹	295°20' ¹
CD	164°20' ¹	344°20' ¹
DE	223°40' ¹	43°00' ¹
EA	303°50' ¹	123°45' ¹

UNIT-II

3. a) Define i) Mean sea level ii) Horizontal Plane iii) Level Surface iv) Bench Mark 8M
 b) Explain the methods of levelling. 6M

(OR)

4. The following staff readings were observed successfully with level, the instrument having been moved forward after the second, fourth and eighth readings: 0.875, 1.235, 2.310, 1.385, 2.930, 3.125, 4.125, 0.120, 1.875, 2.030, and 3.765. The first reading was taken with the staff held upon a BM of elevation 132.135m. Enter the readings in level book form and reduce the levels. Apply the usual checks. Find also the difference in levels between the first and last points. 14M

UNIT-III

5. a) Explain briefly the temporary adjustments of theodolite. 10M
 b) What are the advantages of total station 4M

(OR)

6. A line was levelled tacheometrically with tacheometer fitted with an anallactic lens, the value of the multiplying constant being 100. The following observations were made, the staff having been held vertically. 14M
RL of BM=583.66m. Compute the RL's of P, Q and R.

Instrument station	Height of instrument	Staff held	Vertical angle	Staff reading(m)		
				Bottom	Centre	Top
P	1.40	BM	-1° 35'	1.120	2.330	3.540
P	1.40	Q	+2° 54'	1.210	2.380	3.550
Q	1.38	R	+3° 12'	0.865	2.425	3.985

UNIT-IV

7. Explain briefly the methods of traversing by fast needle method. 14M
(OR)
8. Calculate latitudes, departures and closing error for the following traverse and adjust using Bowditch's rule. 14M

Line	Length (m)	Whole circle bearing
AB	89.31	45°10'
BC	219.76	72°05'
CD	151.18	161°52'
DE	159.10	228°43'
EA	232.26	300°42'

UNIT-V

9. The top (Q) of a chimney was sighted from two stations P and R at very different levels, the stations P and R being in the line with the top of the chimney. The angle of elevation from P to the top of the chimney was 38° 21' and that from R to the top of the chimney was 21° 18'. The angle of elevation from R to a vane 2m above the foot of the staff held at P was 15° 11'. The heights of the instrument at P and R were 1.87m and 1.64m respectively. The horizontal distance between P and R was 127m and the reduced level of R was 112.78m. Find the R.L of the top of the chimney and the horizontal distance from P to the chimney. 14M
(OR)
10. The chainage of the intersection of two straights having the deflection angle of 50° is 1680.50m. If the radius of the curve is 450m, calculate the following: 14M
- Tangent distance
 - Length of the curve
 - Chainages of point of curvature and point of tangency
 - Length of long chord
 - Degree of curve
 - Apex distance
 - mid-ordinate.