Code No. 2006

FACULTY OF ENGINEERING

B.E. I - Year (Backlog) Examination, December 2019

Subject : Engineering Mechanics

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions from Part-A & any five questions from Part-B.

PART – A (25 Marks)

1	State the Polygon Law of Forces.	2
2	Explain Force Law of Equilibrium for three concurrent forces acting on a body.	3
3	Write the equilibrium equations of a concurrent, noncoplanar system of forces.	2
4	Differentiate between static friction and dynamic friction.	3
5	Differentiate between centre of gravity and centroid.	2
6	Determine the Area moment of inertia of a rectangle with respect to its base by means of the parallel axis theorem.	3
7	Explain normal and tangential components of acceleration.	3
8	Differentiate between kinematics and kinetics of a rigid body motion.	2
9	Derive work energy equation for translation.	3
10	State Impulse momentum equation.	2

PART- B (50 Marks)

11 (a) The 100 N resultant of four forces together with three of those four forces is shown in Fig 1. Determine the fourth force. 5

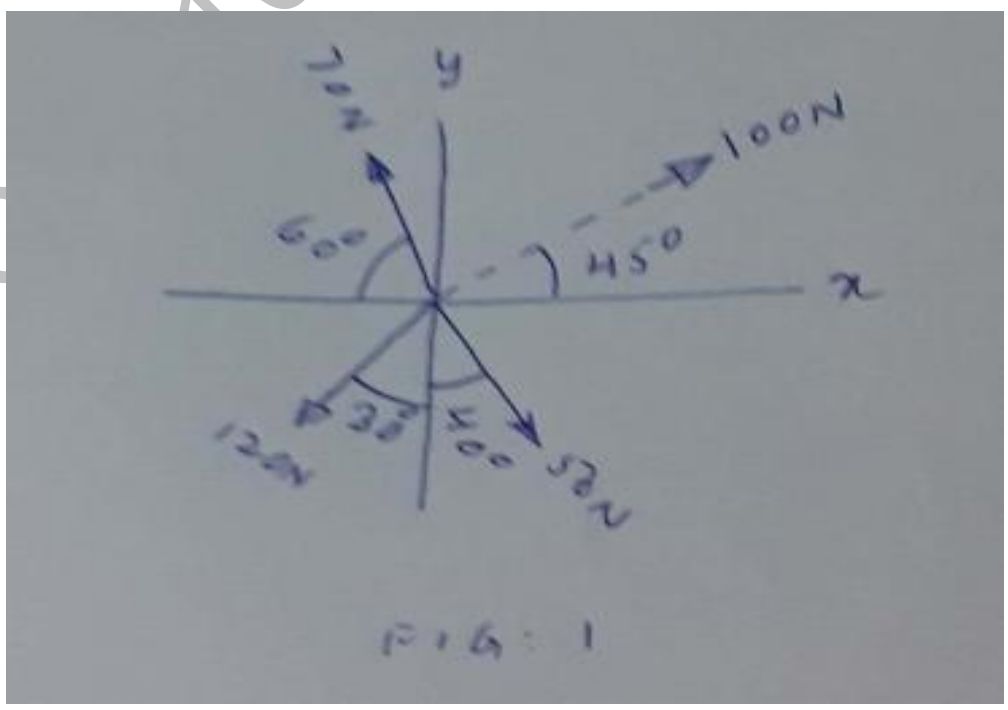


Fig : 1

(b) A and B, weighing 40 N and 30 N respectively, rest on smooth planes as shown in Fig. 2. They are connected by a weightless cord passing over a frictionless pulley. Determine the angle θ and the tension in the cord for equilibrium. 5

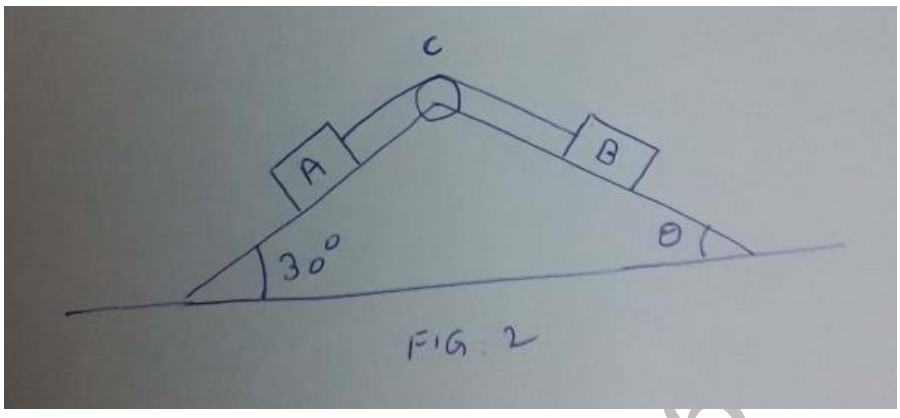


FIG. 2

12 (a) A force F = 3i – 4j +12k acts at a point A, whose co-ordinates are (1, -2, 3). Find the moment of force about the point B (2, 1, 2) and the vector component of force F along AB & moment of this force about the origin. 5

(b) What should be the value of θ in Fig. 3 which will make the motion of 900 N block down the plane to impend? The coefficient of friction for all contact surfaces is 0.33. 5

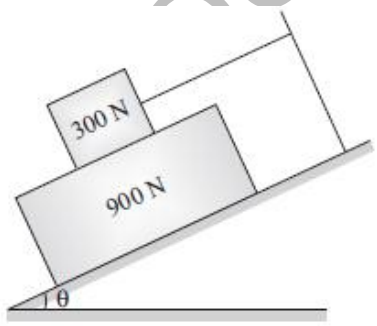


Fig. 3

13 (a) Determine the centroid of the lamina shown in Fig. 4. 5

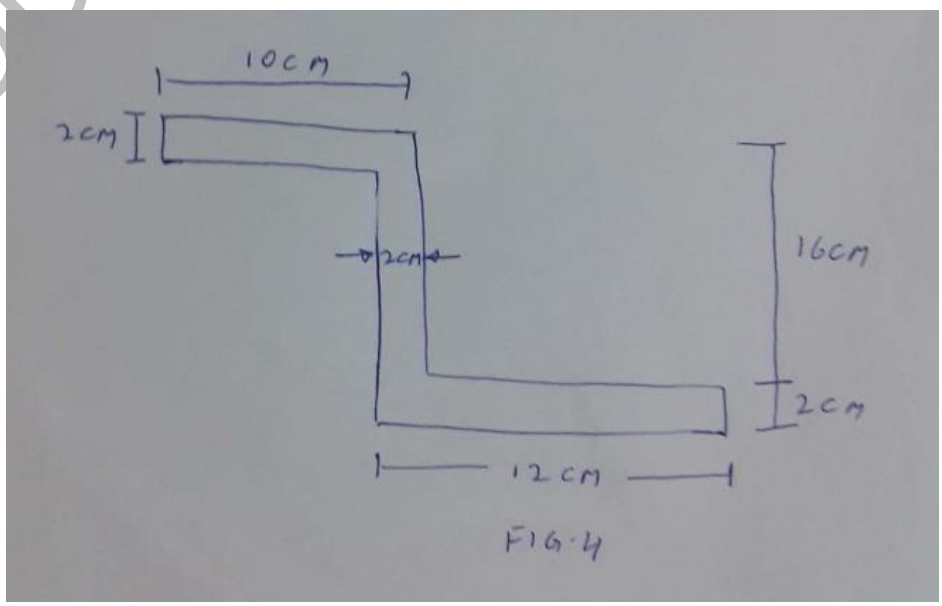


FIG. 4

(b) Determine the mass moment of inertia of a solid sphere of radius R about its diametral axis. 5

14 (a) The angle of rotation of a body is $\theta = \theta_0 + at + bt^2$. If the initial angular velocity be 3Π radian per second and after two seconds the angular velocity is 8Π radian per second, obtain expressions for the angular velocity and angular acceleration of the body. 5

(b) Block A 25 Kg and Block B 35 Kg are connected by an inextensible cord as shown in Fig.5. If both blocks are released simultaneously, what distance do they move in 0.5 seconds? Take coefficient of friction for all the surfaces as 0.3. 5

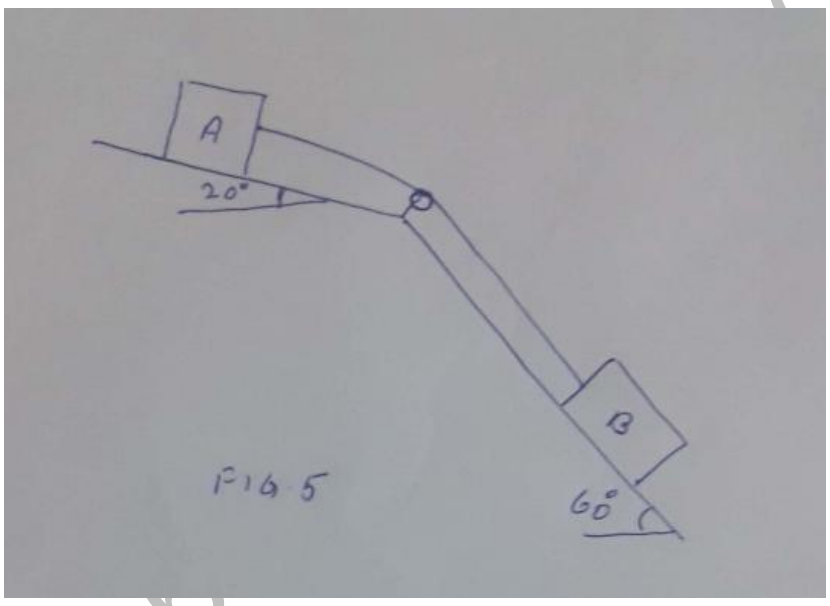


FIG 5

15 (a) A body weighing 350 N is pushed up a 30° plane by a 400 N force acting parallel to the plane as shown in Fig.6. If the initial velocity of the body is 1.25 m/sec and coefficient of kinetic friction is 0.2, what velocity will the body have after moving 6m? 5

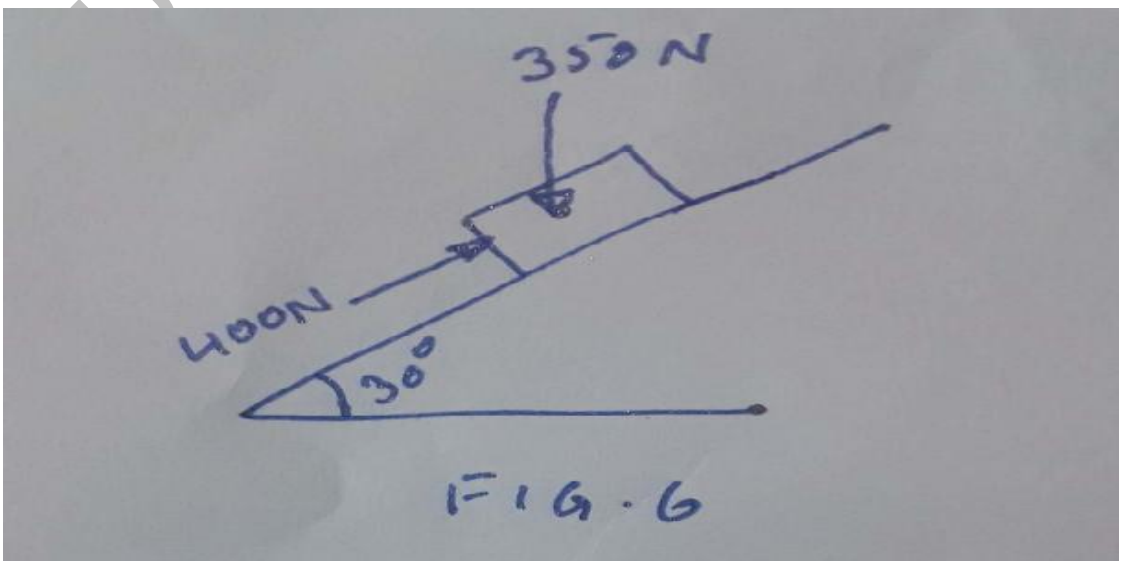


FIG. 6

(b) The system shown in Fig. 7 has a rightward velocity of 4m/sec, just before a force P is applied. Determine the value of P that will give a leftward velocity of 6 m/sec in a time interval of 20 sec. Take coefficient of friction as 0.3. 5

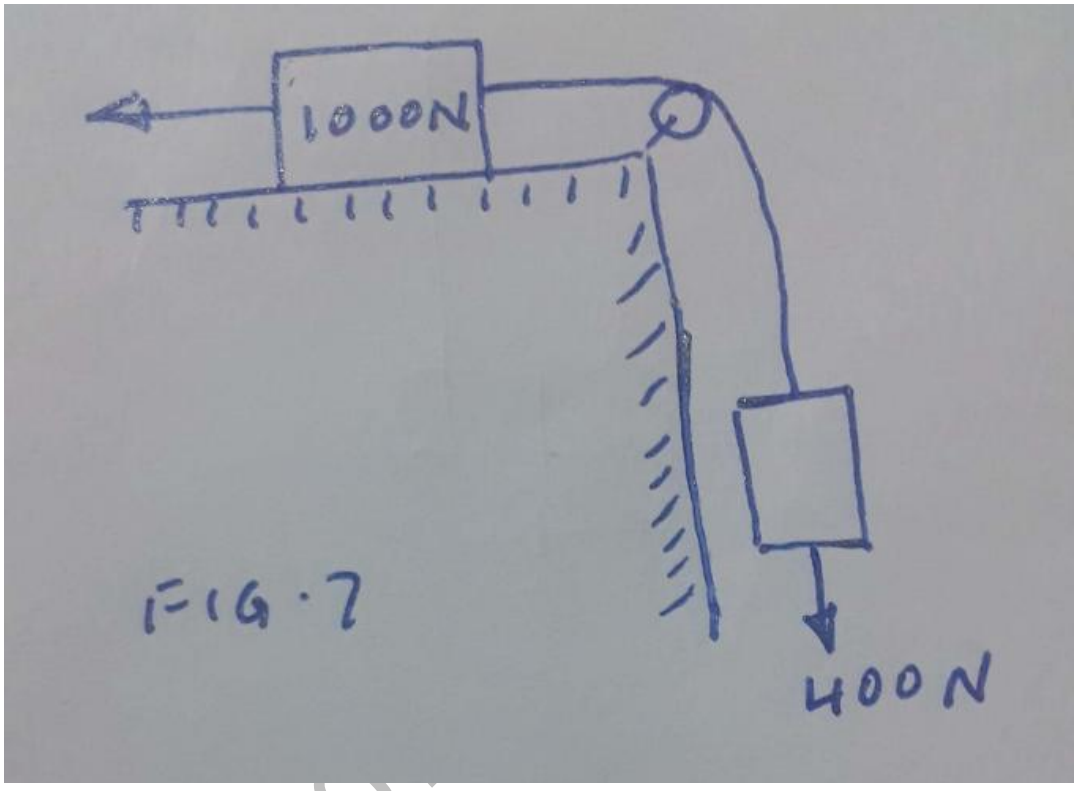


FIG. 7

16 (a) Two cylinders A of weight 3500 N and B of weight 2500N rest on smooth inclines as shown in Fig. 8. They are connected by a bar of negligible weight hinged to each cylinder at its geometric centre by smooth pins. Find the force P to be applied as shown such that it will hold the system in the given position. 5

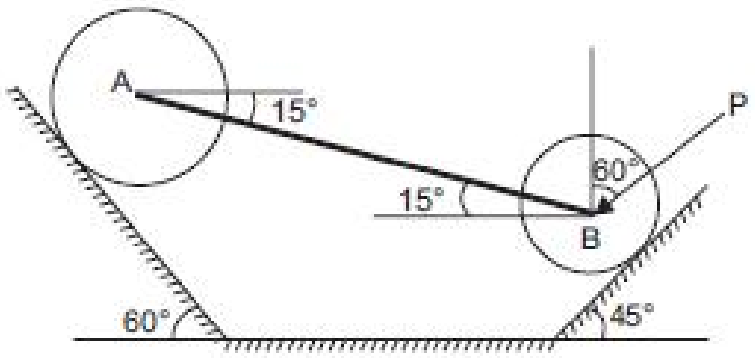


Fig.8

(b) Determine the force **P** required to start the wedge as shown in Fig. 9. The angle of friction for all surfaces of contact is 15°. 5

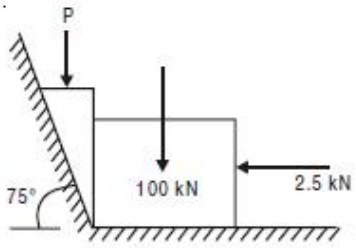


Fig. 9

17 (a) A semicircular cut is made in a rectangular wooden beam as shown in Fig.10. Determine moment of inertia about the centroidal axes. All dimensions are in mm. 5

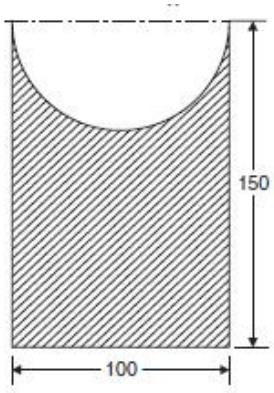
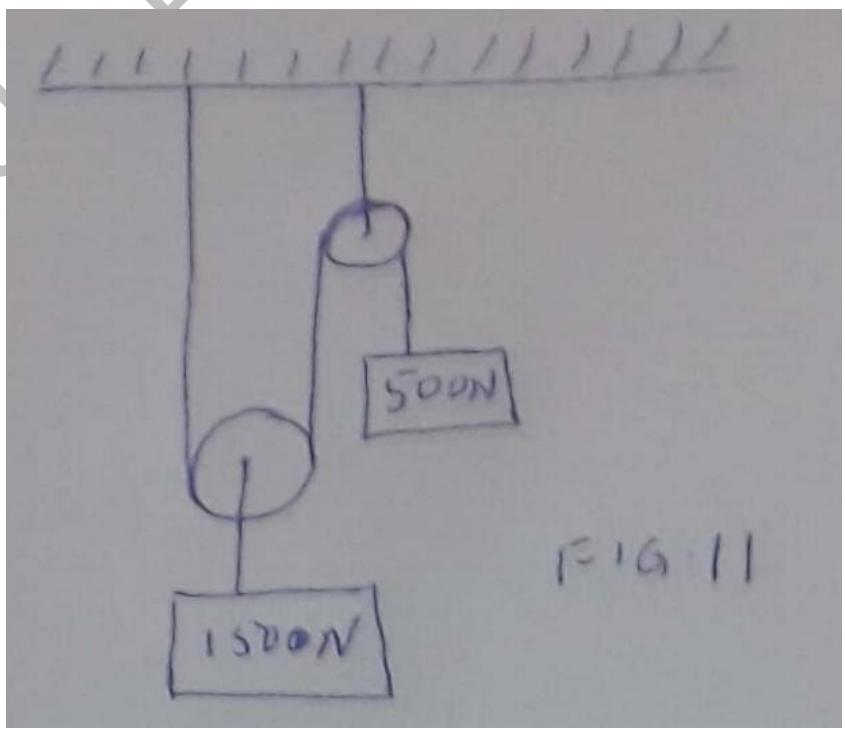


Fig. 10

(b) Determine the tension in the string of blocks A and B weighing 1500 N and 500 N connected by an inextensible string as shown in Fig. 11.
Assume pulleys are frictionless and weightless. 5



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Code No: 2506/CBCS

FACULTY OF ENGINEERING

BE I-Semester (CBCS) (Backlog) Examination, December 2019

Subject: Engineering Chemistry-I

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

Note: Answer All Questions from Part-A and Any Five Questions From Part-B

PART- A (20 Marks)

1. What is state function? Give examples. (2M)
2. Define thermodynamic term 'Heat' and give its importance. (2M)
3. Define degrees of freedom. Calculate degrees of freedom if number of components are two and number of phases are two. (2M)
4. What are solders? Give examples. (2M)
5. Give the reasons for expressing the hardness in terms of $CaCO_3$ equivalents. (2M)
6. What are the specifications of potable water? (2M)
7. Differentiate between homo polymer from co-polymer. (2M)
8. Give structures of monomers of Kevlar. (2M)
9. What is Viscosity index? (2M)
10. Give uses of white wares. (2M)

PART – B (50 Marks)

11.a) One mole of liquid water at 97^0C is placed in a thermostat maintained at 27^oC. Calculate the Entropy changes in the system (water at 97^oC) and in the surroundings (thermostat at 27^oC) C_p for $H_20(l)$=18cal deg^{-1}. (4M)

b) Explain entropy changes in reversible and irreversible expansion of an ideal gas against Vacuum. (6M)

12. a) Define the terms of phase rule with examples. (4M)
    b) Discuss the phase diagram of Cu-Ni system with its application. (6M)

13. a) Discuss reverse osmosis for desalination of water. (4M)
    b) Give principle and method of determination of permanent hardness and temporary hardness of water by EDTA method. (6M)

14. a) Explain preparation, properties and uses of Bakelite. (5M)
    b) Explain conduction mechanism of poly acetylene and give uses of conducting polymers. (5M)

15. a) Explain the mechanism of extreme pressure lubrication and properties of lubricants used for this lubrication. (5M)
    b) Explain determination of refractoriness under load(RUL) and porosity. (5M)

16. a) Discuss the criteria in terms of free energy for spontaneity and reversibility of a process with significance. (5M)
    b) Explain ion exchange process for softening of water. (5M)

17. a) Explain the purpose of glazing of white ware and uses of white ware (5M)
    b) Discuss the differences between thermoplasts and thermosets with examples. (5M)

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