Register Number: ……………………..

**B.E / B.TECH DEGREE EXAMINATIONS: MAY/JUNE 2014**

(Regulation 2013)

Second Semester

**U13MET201: ENGINEERING MECHANICS**

(Common to AERO, AUTO, CE,MCT,MECH & TXT)

**Time: Three Hours**                                      **Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 1 = 10 Marks)**

1. Which of the following is a scalar quantity?
   a) Force
   b) Speed
   c) Velocity
   d) Acceleration

2. If two forces of magnitude p act at an angle θ, then resultant will be---------------------

3. The unit of moments is
   a) Nm
   b) N
   c) Nm/s²
   d) kgf

4. Roller support has-------------------- no of reactions

5. The centroid of a semi circle of radius "r" is at a distance of "h" from the diameter where "h" is equal to
   a) r/3π
   b) 3r/4π
   c) r/4π
   d) 4r/3π

6. If the angle of friction is zero then the body will experience —— friction

7. The polar moment of inertia is
   a) IP = Ixx + IYY
   b) IP= Ixx × IYY
   c) IP=Ixx-IYY
   d) Ixx/IYY

8. In cone friction,_____ angle is equal to angle of friction

9. The study of geometry and time dependent aspect of motion without considering the forces causing the motion
   a) Kinematics
   b) kinetics  c
   c) statics
   d) dynamics

10. The freely projected particle which moves under the combined effect of vertical and horizondal motion is--------------- motion

**PART B (10 x 2 = 20 Marks)**

**(Not more than 40 words)**

11. State the triangle law of forces.

12. The equal forces are acting at a point at an angle of 50º between them the resultant force is equal to 10. Find the magnitude of each force.

13. State lame's theorem.

14. What is meant by free body diagram?

15. State parallel axis theorem.

16. State the perpendicular axis theorem.

17. What is work energy equation?

18. Define limiting friction.

19. What is co- efficient of restitution?

20. Write down the equation of motion in the vertically upward direction.

**PART C (5 x 14 = 70 Marks)**

**(Not more than 400 words)**

**Q.No. 21 is Compulsory**

21.         Determine the magnitude and direction of the resultant of force acting on the hook shown in   fig .1.
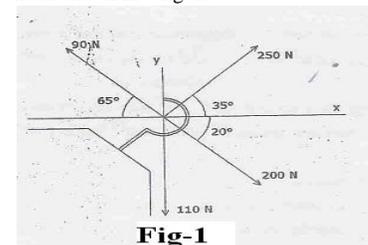


**Fig-1**

22. a)    String AO holds a smooth sphere on an inclined plane ABC, as shown in fig .2. The weight of the sphere is 1000N, and the plane is smooth. Calculate the tension in the string and the reaction at the point of contact B.
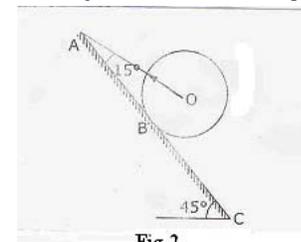


**Fig-2**

**(OR)**

b) Block A and B weight 2000N and 1000N respectively, rest on a 30° inclined plane and are attached to the post which is held perpendicular to the plane by force P, parallel to the plane, as shown in fig. 3. Assume that all surface are smooth and that the cords are parallel to the plane. Determine the value of P. and also find the normal reaction of blocks A and B.
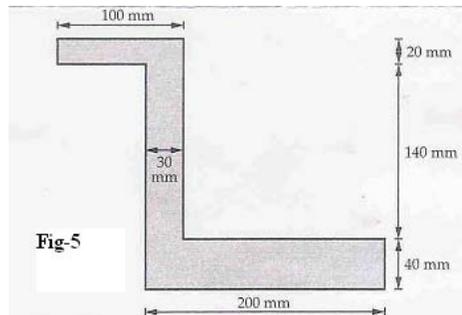


Fig-3
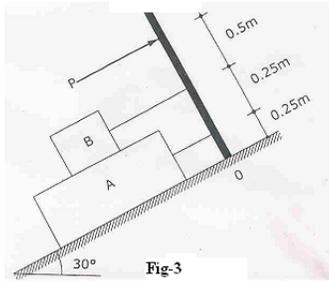
23. a) a fixed crane has a mass of 1000kg and is used to lift 2400 kg crate. It is held in place by a pin at A and a rocker at B shown in fig .4. The center of gravity of the crane is located at G. determine the component of reaction at A and B.
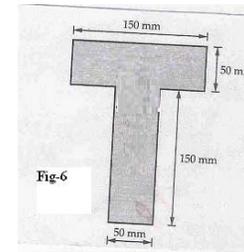


Fig-4
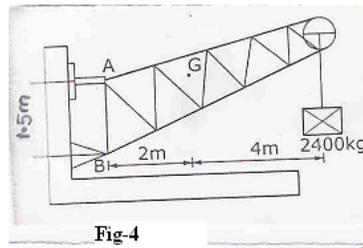
(OR)

b) Determine the moment of inertia about centroidal axes for the lamina shown in fig.5.
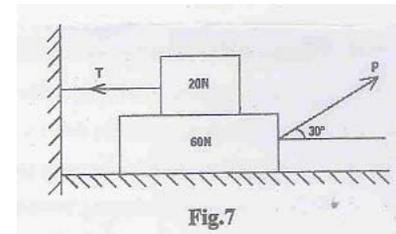


Fig-5

24. a) Find the moment of inertia of the T- section shown in fig .6, about centroidal axis.

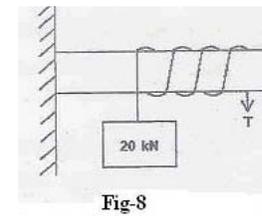

Fig-6

(OR)

b) (i) Determine load P and tension T for the fig .7. shown                    (7)



Fig.7

(ii) A rope is wrapped three times on a rod as shown in fig 8. Determine the force (7) required on the free end of the rope to support a load of 20 KN weight. The co-efficient of friction between the rope and the rod is 0.3.



Fig-8

25. a) Two blocks A and B having masses of 50 kg and 100 kg respectively are connected by a string which passes over frictionless pulley as shown in fig.9. Coefficient of friction between block and surface is 0.2 for both A and B. Determine force P If, the system is just on the point of moving towards right.

Fig-9
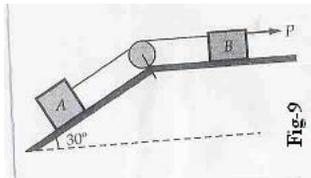
**(OR)**

b)　　The perfectly elastic bodies A,B & C of masses 2kg, 6kg & 12 kg are moving in the same direction with velocity 12 m/s , 4 m/s & 2 m/s respectively. If the ball a strikes with the ball B, which in turn, impings with ball C. Prove that the ball A and B will brought to rest by the impact.

**************