Scheme – I

Sample Question Paper

Program Name : **Mechanical, Civil, Chemical and Fabrication Technology and Erection Engineering Program Group**

Program Code : **AE/CE/CR/CS/CH/FG/ME/PT/PG**

Semester : **Second**

22203

Course Title : **Applied Mechanics**

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

Instructions:

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.
6. Use of non programmable calculator is permissible.

Q.1) Attempt any FIVE of the following. **10 Marks**

a) Define force and state its S.I. unit.

b) State law of machine.

c) State Varignon's theorem.

d) State Lami's theorem.

e) Define angle of repose.

f) Define centroid and centre of gravity.

g) Write relation between resultant and equilibrant.

Q.2) Attempt any THREE of the following. **12 Marks**

a) Write characteristics of force with sketch.

b) Calculate efficiency of a machine to lift a load of 1000 N if the velocity ratio of the machine is 25 and Law of machine is P=(0.01W+5)N.

c) Explain reversible and non- reversible machine. State condition for them.

d) Write two advantages and two disadvantages of friction.

Q.3) Attempt any THREE of the following. **12 Marks**

a) The resultant of a system of forces as shown in Fig. No.1 is 500 N and acts along X-axis towards the right. Calculate analytically magnitude of unknown force P and its inclination with X-axis.

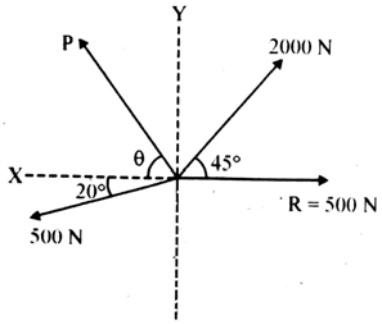

Fig. No. 1

b) State law of parallelogram of forces with sketch and state its limitations.

c) Calculate efficiency of a screw jack having diameter of effort wheel as 300 mm and pitch as 6 mm and can lift a load of 1200 N using effort of 200 N.

d) Calculate the effort required to lift a load of 3 kN. If the machine can lift a load of 1 kN by an effort of 56 N and 2 kN load by an effort of 96 N.

Q.4) Attempt any THREE of the following. **12 Marks**

a) Calculate the moment of all three forces acting along the sides of square as shown in Fig. No.2 about point C.

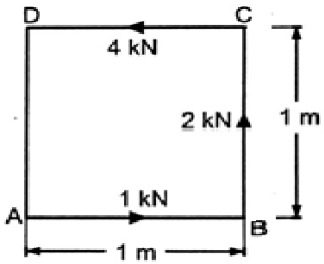

Fig. No.2

b) Calculate the reactions offered by surfaces, as shown in Fig. No.3 if a cylinder weighing 500 N is resting on those surfaces inclined at 60° and 70° with horizontal.

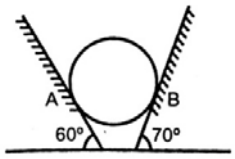

Fig. No.3

c) Calculate graphically the reactions of a beam loaded as shown in Fig No.4

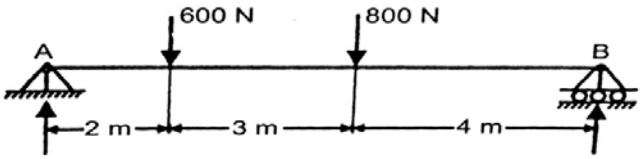

Fig. No.4

d) A block of weight 500 N resting on a horizontal surface requires a horizontal force of 200 N to just move the block. Calculate i) Normal reaction ii) Frictional resistance iii) Resultant reaction and iv) Coefficient of friction.

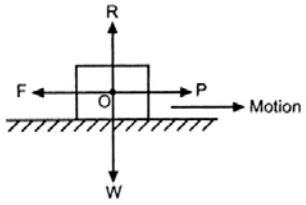

Fig. No.5

e) Calculate magnitude of force P and tension in the wire OA, if an electric bulb of weight 10 N hangs vertically from a ceiling as shown in the fig. no. 6.

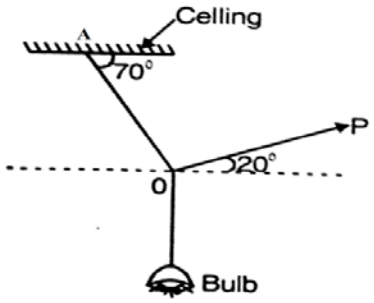

Fig. No.6

Q.5) Attempt any TWO of the following. 12 Marks

a) Calculate the reactions of beam loaded as shown in fig. no.7 using analytical method.

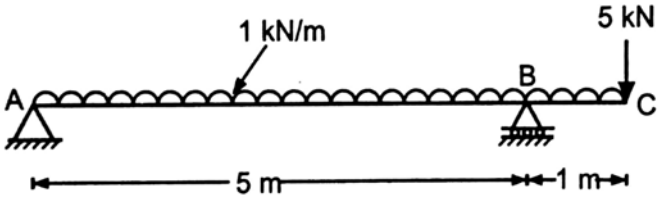

Fig. No.7

b) A block having weight of 400N just starts moving down the plane making an angle of 35° with the horizontal due to its own weight. Calculate the force applied parallel to the plane to keep the block in equilibrium. Use $\mu = 0.10$

c) Locate the resultant with magnitude and direction for the force system shown in fig.no. 8 wrt the point A.

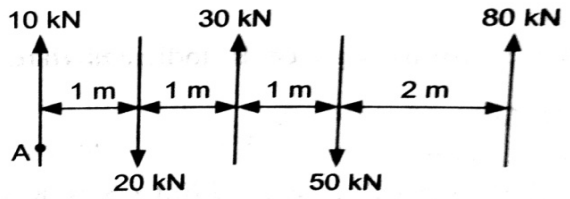

Fig. No.8

Q.6) Attempt any TWO of the following. 12 Marks

a) Calculate position of centroid for an unsymmetrical I- section as shown in Fig. No. 9.

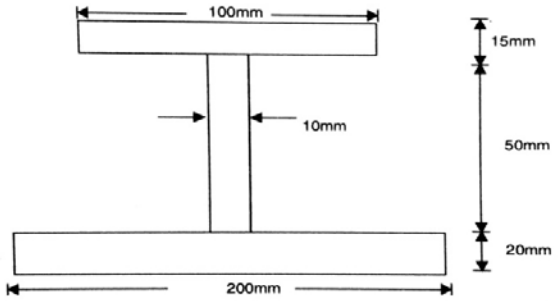

Fig. No.9

b) Locate the centroid of shaded area as shown in Fig. No.10 wrt origin.

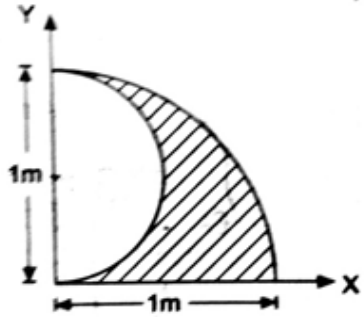

Fig. No.10

c) Calculate centre of gravity of frustum of solid circular cone as shown in fig. no. 11 wrt bottom.

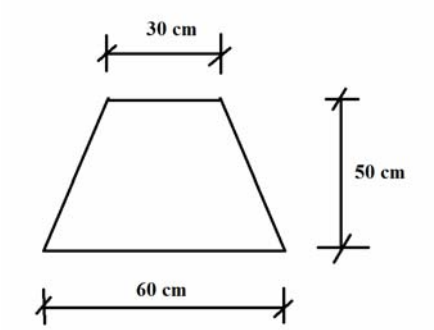

Fig No.11

Scheme – I

Sample Test Paper –I

(60% of 5-Unit curriculum and 50% of 6-Unit curriculum)

Program Name : **Mechanical, Civil, Chemical and Fabrication Technology and Erection Engineering Program Group**

Program Code : **AE/CE/CR/CS/CH/FG/ME/PT/PG**

Semester : **Second**

22203

Course Title : **Applied Mechanics**

Max. Marks : **20** **Time: 1 Hour**

Instructions:

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.
6. Use of non programmable calculator is permissible.

Q.1 Attempt any FOUR of the following. **08 Marks**

a) Write classification of coplanar force system.
b) State relation between MA, VR and efficiency.
c) State the principle of transmissibility of force.
d) State four effects of a force on a rigid body.
e) Define MA and VR.
f) Differentiate between ideal machine and actual machine.

Q.2 Attempt any THREE of the following. **12 Marks**

a) Resolve a force of 100 N into two directions 40° and 50° on either side of it acting on positive X- axis.
b) Determine the effort required to lift a load of 1500 N, if the efficiency of machine is 40 %. and velocity ratio is 50.
c) Calculate the force required to prevent body from falling down the plane if body of weight 600 N is resting on rough inclined plane of 40° and $\mu = 0.58$.
d) Calculate the horizontal force required to drag a body of weight 100 N along horizontal plane. If the plane is raised gradually up to 16° the body will begin to slide.

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Scheme – I

Sample Test Paper – II

(60% of 5-Unit curriculum and 50% of 6-Unit curriculum)

Program Name : **Mechanical, Civil, Chemical and Fabrication Technology and Erection Engineering Program Group**

Program Code : **AE/CE/CR/CS/CH/FG/ME/PT/PG**

Semester : **Second**

Course Title : **Applied Mechanics**

22203

Course Code : **22203**

Max. Marks : **20** **Time: 1 Hour**

Instructions:

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.
6. Use of non programmable calculator is permissible.

Q.1 Attempt any FOUR of the following. **08 Marks**

a) Define resultant force.
b) State triangle law of forces. State its use.
c) Define funicular polygon. State its use.
d) State conditions of equilibrium for concurrent force system.
e) Differentiate between centroid and centre of gravity.
f) Write use of Lami's theorem**.**

Q.2 Attempt any THREE of the following. **12 Marks**

a) Calculate tension in strings if a weight 200 N is attached by two strings AC and BC as shown in Fig. No.1

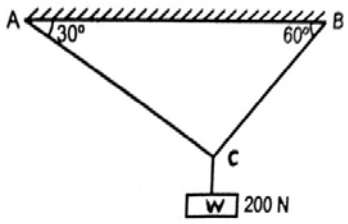

Fig. No. 1

b) Calculate the reactions offered by the notch surface if a sphere of weight 1200 N is resting in the notch as shown in the figure no.2.

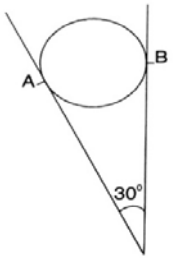

Fig. No.2

c) Find the position of centroid of an unequal angle as shown in Fig. No. 3

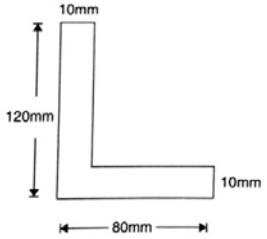

Fig. No.3

d) Calculate center of gravity of solid assembly from apex of cone as shown in the fig. no.4.

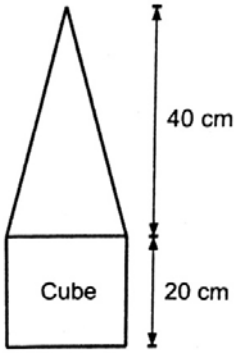

Fig. No.4

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