# 24048

**B.Tech. 3rd Semester (ME) F. Scheme Examination,**

**December–2014**

**ENGINEERING MECHANICS**

**Paper–ME-205-F**

*Time allowed : 3 hours]* *[Maximum marks : 100*

***Note :*** *Attempt any **five** questions, at least **one** question from each section. **Question No. 1 is compulsory.** All questions carry equal marks.*

**1.** Discuss the following : 5×4

(i) Varingnon's theorem

(ii) Integration method of centroid

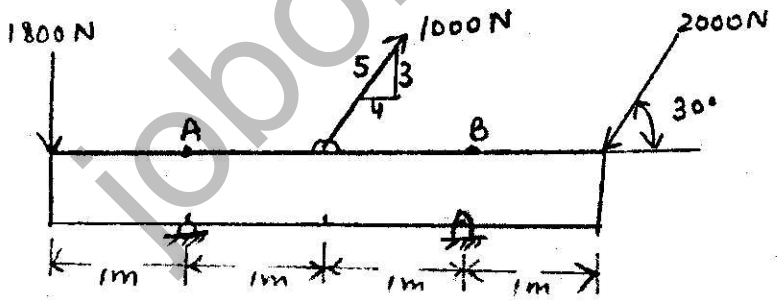
(iii) Translation and rotation of rigid bodies

(iv) Work energy equation.

**Section–A**

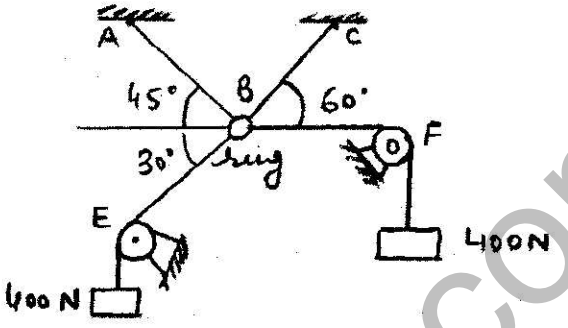
**2.** (a) Explain the law of parallelogram of forces. 10

(b) A beam acted upon by three forces is shown. Determine the moment of each of the three forces about point B on the beam. 10



3. (a) Discuss the resultant of parallel force systems in space. 10

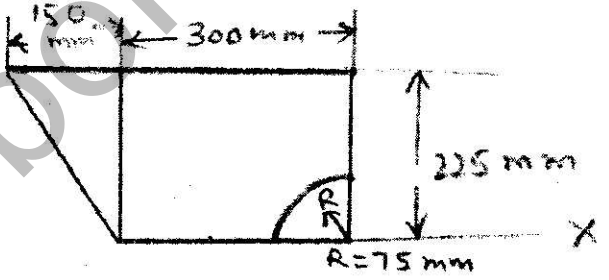
(b) Compute the tensile forces in cables AB and CB. The pulleys E and F are frictionless. 10




## Section–B

4. (a) Discuss the various methods for analysis of truss. 10

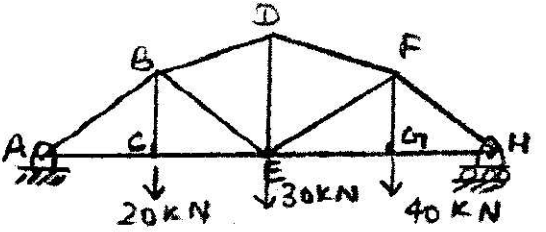
(b) Locate the centroid of the area shown in fig. 10



5. (a) Locate the centroid of the volume of a hemisphere with reference to the cutting plane. The radius of the hemisphere is r. 10

(b) The truss shown in fig. is acted upon by loads. Solve for the stresses in members BD, BE and CE.

AC = CE = EG = GH = 4.5 m




10

## Section–C

6. (a) Discuss polar moment of inertia of plane areas and transfer formula for parallel axes. 10

(b) In a machine shop, a grinding wheel has a rated speed of 1800 rev/min. When power is turned on, the wheel attains the speed in 5 s. assuming uniformly accelerated motion, how many rotations does the wheel make to attain the rated speed ? 10

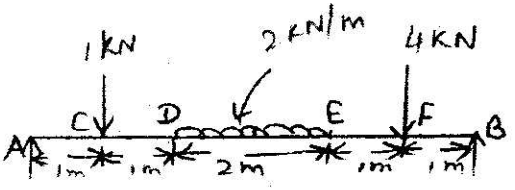
7. (a) Discuss Chasle's theorem in detail. 10

(b) Determine the moments of inertia of the homogeneous rectangular parallel equipped of mass m about the centroidal $x_g$ axis; z-axis and about the x-axis through one end. 10

## Section–D

8. (a) Discuss Energy method of dynamics in detail. 10

(b) Draw the Shear force and bending moment diagrams for the beam shown. Mark the position of the maximum bending moment and determine its value. 10




9. (a) A 9 MN train is accelerated at a constant rate up a 2% grade. The train resistance is constant at 5 N per KN. The velocity increases from 9 m/s to 18m/s in a distance of 600 m. Determine the maximum power developed by the locomotive. 10

(b) Discuss linear momentum considerations for an aggregate of particles. 10