

GANPAT UNIVERSITY

B. TECH SEM- I & II ALL BRANCH OF ENGINEERING

REGULAR - REMEDIAL NEW CBCS EXAMINATION- APRIL-JUNE 2016

2CI102 Engineering Mechanics

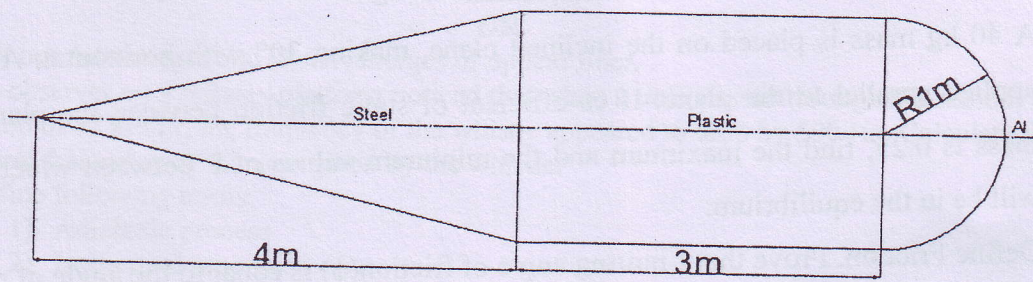
TIME: 3 HRS

TOTAL MARKS: 60

Instructions: (1) This Question paper has two sections. Attempt each section in separate answer book.
(2) Figures on right indicate marks.

SECTION: I

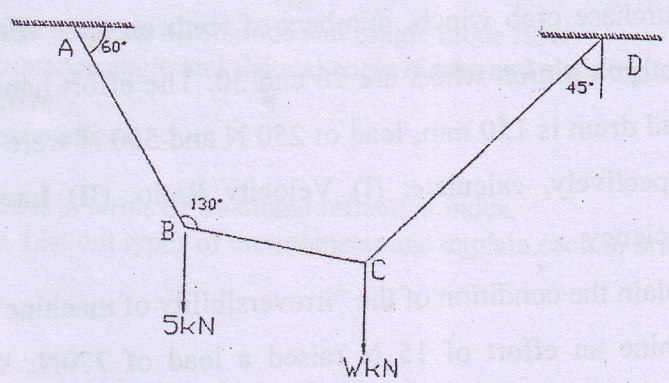
- Que.1 A State and explain Lami's theorem. 5
- B A composite solid is made of a hemisphere, cylinder and a cone from aluminum, plastic and steel respectively as shown in figure. Find the center of gravity of the solid. Take density of aluminum, plastic and steel as 3000kg/m^3 , 2000kg/m^3 & 7800kg/m^3 . 5



OR

- Que.1 A State and explain Varignon's theorem of moments. 5
- B An I-section having dimensioned of upper flange 100 X 20 mm, Web 150 X 30 mm and bottom flange 200 X 40 mm Find out (1) The moment of inertia about centroidal x-axis parallel to the flanges. (2) M.I. Iyy. 5

- Que.2 A State and explain pappus-guldinus theorem. 5
- B Find tensions in each part of a string as shown in figure also find W. 5



OR

- Que.2 A Explain Parallelogram law of forces. 5
- B A coplanar concurrent force system has forces P and 2P and its resultant equal to 2.5P. Find the angle between applied forces and the angle of resultant. 5

- Que.3 A A simply supported beam AB of Span 6 m is subjected to point load 2 kN and 5 kN, 1.5 m and 4.5 m respectively from left End of the beam. It is also subjected to U. D. L. of 2 kN/m up to 1.5 m from right end. Determine reaction at support A and B.
- B The following forces act at a point: 20 N inclined at 30° towards North of East, 25 N towards North, 30 N towards North West, 35 N inclined at 40° towards south of West. Find the magnitude and direction of the resultant force.

SECTION: II

- Que.4 A Explain the following terms. 5
 (a) Space (b) Mass (c) Particle (d) Rigid body (e) Continuum
- B 2 kg and 3 kg blocks are hanged in one string and moved up with a common acceleration of 2 m/s^2 . Find the magnitude of tensions (T1 & T2) in the strings. (take $g = 10 \text{ m/s}^2$). 5

OR

- Que.4 A Describe in brief Newton's Law of motions. 5
- B A 40 kg mass is placed on the inclined plane, making 30° with horizontal. A push P is applied parallel to the plane. If co-efficient of static friction between the plane and the mass is 0.25, find the maximum and the minimum values of P between which the mass will be in the equilibrium. 5
- Que.5 A Define Friction. Prove that Limiting angle of friction(ϕ) is equal to the angle of repose(α). 5
- B The crank and connecting rod of a steam engine are 0.475 m and 1.85 m respectively. The crank makes 6 r.p.s. in the clockwise direction. When the crank has turned 45° from the inner dead center, determine analytically: 5
 i. Angular velocity of connecting rod and
 ii. Velocity of piston.

OR

- Que.5 A What do you mean by Force? Describes the effect of force and list its characteristics. 5
- B In a double purchase crab winch, numbers of teeth on spur wheels are 60 and 40, and numbers of teeth on pinion wheel are 20 and 30. The effort handle is 300 mm long and diameter of load drum is 150 mm, load of 250 N and 500 N were lifted by efforts of 25 N and 45 N respectively, calculate: (I) Velocity Ratio, (II) Law of machine and (III) Maximum Efficiency 5
- Que.6 A Define and explain the condition of the "irreversibility of machine". 5
- B In lifting machine an effort of 15 N raised a load of 770N. What is the mechanical advantage? Final velocity ratio if the efficiency at this load is 60%. If on the machine an effort of 25 N raised a load of 1320 N, what is the efficiency? What will be the effort required to raise a load of 500 N? Calculate the maximum M.A. and maximum efficiency. 5

-----END OF PAPER-----