Reg. No. | | | | | | | | | | | | |

Question Paper Code : 60843

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Second Semester

Civil Engineering

ME 2151/ME 25/080120002/CE 1151/10122 ME 205 — ENGINEERING MECHANICS

(Common to Aeronautical, Automobile, Marine, Mechanical, Production, Chemical, Petroleum Engineering, Biotechnology, Polymer, Textile, Textile (Fashion), Plastic Technology, Materials Science and Engineering, Manufacturing Engineering, Mechatronics Engineering, Industrial Engineering, Industrial Engineering and Management, Environmental Engineering, Geoinformatics, Mechanical and Automation Engineering, Petrochemical Engineering, Chemical and Electrochemical Engineering, Petrochemical Technology, Pharmaceutical Technology, Textile Chemistry and Mechanical Engineering (Sandwich))

(Regulations 2008/2010)

(Also common to 10122 ME 205 — Engineering Mechanics for BE. (Part-Time) First Semester — Mechanical Engineering — Regulations 2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is coplanar force system?
2. What are equivalent forces?
3. State varignon's theorem of moments.
4. What do you mean by a rigid body?
5. Define centroid and centre of gravity of an area.
6. Define polar moment of inertia.
7. What is work-energy principle?
8. What is curvilinear motion?
9. What do you mean by Translation?
10. What is fixed axis Rotation?

PART B — (5 × 16 = 80 marks)

11. (a) Determine the value of F and θ so that the particle A shown in Fig 11.1 is in equilibrium.

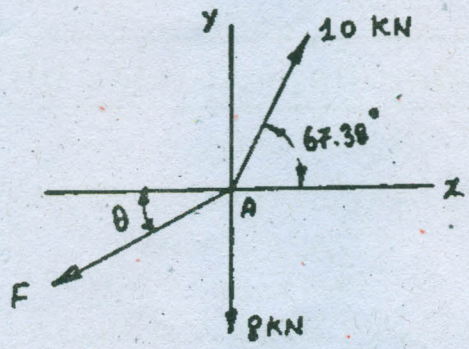

Fig. 11.1

Or

(b) Reduce the given system of forces acting on the beam AB, as the Fig. 11.2 to (i) an equivalent force-couple system at A, (ii) an equivalent force- couple system at B and also (iii) replace the system of forces by an equivalent resultant force and indicate its point of application.

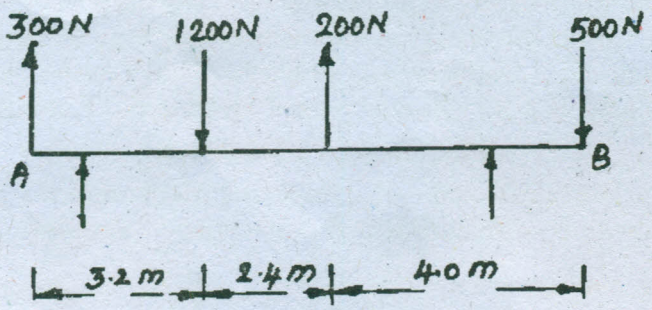

Fig. 11.2

12. (a) Determine the reactions at the fixed support A for the loaded frame shown in Fig.12.1. Take the diameter of the pulley as 250 mm.

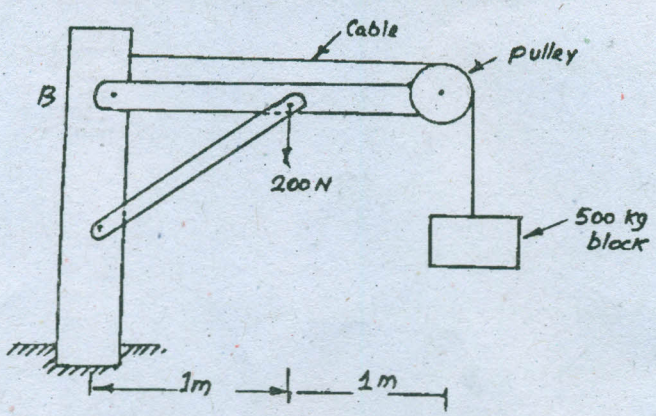

Fig. 12. 1

Or

(b) Explain briefly the concept of couples in space.

13. (a) Determine the centre of gravity of the unsymmetrical I-section shown in Fig. 13.1.

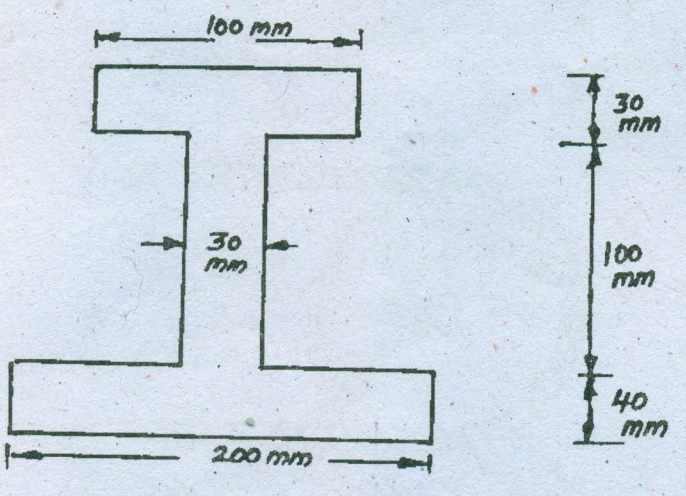

Fig. 13. 1

Or

(b) State the Parallel axis theorem as applied to mass moment of inertia.

14. (a) The 50 kg block shown Fig 14.1 is stopped by a spring of constant is 15 kN/m as shown. The spring is initially compressed 100 mm. Determine the velocity v of the block so that the additional deflection of 30 mm is caused in the spring. Take the coefficient of kinetic friction between the block and the surface as .20.

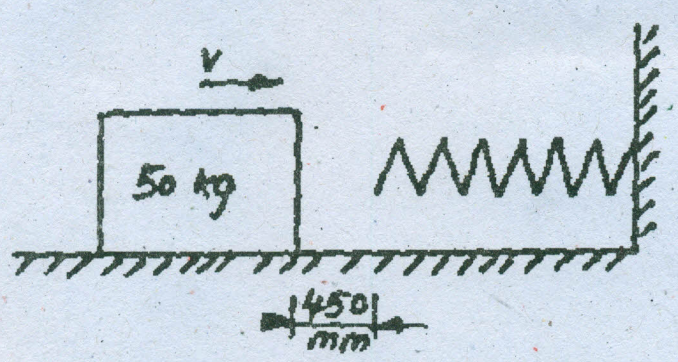

Fig. 14.1

Or

(b) A 2000 kg automobile moving with a velocity of 0.8 m/s hits a wall and is brought to rest in 50×10^{-3} seconds. Determine the average impulsive force exerted by the wall on the car during the impact.

15. (a) The cylinder as shown in fig 15.1 and the thin inextensible string wrapped around it are initially at rest. If the cylinder has a uniform angular acceleration of 100 rad/s^2 counter clockwise, determine (i) the acceleration of point A of the string and (ii) the magnitude of the acceleration of point C of the cylinder after 3.5 s.

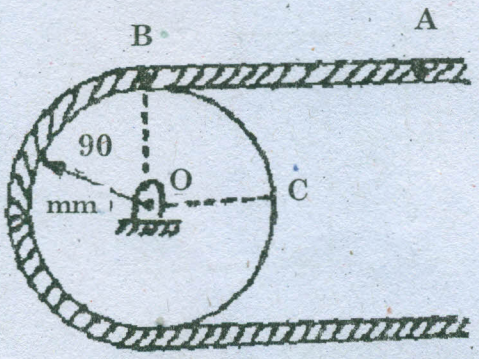

Fig. 15.1

Or

(b) A 50 kg. flywheel having a radius of gyration about its centre of 450 mm is subjected to a turning moment $M = 8(1 - e^{-2t})N.m.$ where 't' is in seconds. If the flywheel is at rest at time $t = 0$. Determine its angular velocity at time $t = 2s$.