

INTERNATIONAL CENTRE FOR APPLIED SCIENCES (Manipal University) I SEMESTER B.S. DEGREE EXAMINATION – NOV. / DEC. 2016 SUBJECT: ENGINEERING STATICS AND DYNAMICS (CE 111) (COMMON TO ALL BRANCH) Thursday, 8 December 2016

Reg.No.

Time: 3 Hours

Max. Marks: 100

- ✓ Answer ANY FIVE full Questions.
- ✓ Missing data, if any, may be suitably assumed

1A. Explain the following terms:

- i. Resultant
- ii. Free Body diagram
- iii. Moment of a couple
- iv. Roller support
- 1B. A system of concurrent coplanar forces has six forces of which only five are shown in Fig. 1B. If the resultant is a force of magnitude R = 300kN acting vertically upwards along the Vertical, find the unknown sixth force "F6". (8+12)
- 2A. Explain: (i) the parallelogram law of forces. (ii) Principle of transmissibility
- 2B. A ladder of length 5m has a weight of 200N. The foot of the ladder rests on the floor and the top of it leans against the vertical wall. Both the wall and floor are smooth. The ladder is inclined at 60° with the floor. A weight of 300N is suspended at the top of the ladder. Find the value of the horizontal force to be applied at the foot of the ladder to keep it in equilibrium.

(5+15)

- 3A. Define limiting friction and state the laws of dry friction.
- 3B. The bodies shown in Fig. 3B are separated by a uniform strut weighing 100 N which is attached to the bodies at A and B with frictionless pins. Coefficient of friction under each body is 0.30. Determine force P that will just start the system to move to rightwards. Weight of block A = 400N, block B = 200N. (8+12)
- 4A. Determine the support reactions for the truss shown in Fig. 4A
- 4B. Find the forces in the members of the truss shown in Fig. 4B. (By method of joints).

(10+10)

- 5A. Explain with the help of sketch: (i)Plane truss (ii) Space Truss
- 5B. Find the forces in members DF, EF and EG of the truss shown in Fig. 5B (By Method of sections)

(6+14)

6. Locate centroid of the shaded area shown the Fig. 6. (20 Marks)

- 7A. State and Explain D' Alembert's principle.
- 7B. A motorist traveling at a speed of 72kmph suddenly applies his brakes and comes to a stop after skidding 45m. Determine (i) Time required for the car to stop. (ii)The coefficient of friction between the tyres and the pavement. (10+10)
- 8. An engine weighing 500 kN drags carriages weighing 1500kN up an incline of 1 in 100 against a resistance of 5N/kN starting from rest. It attains a velocity of 36 kmph (10m/s) in 1 km distance with a constant draw bar pull supplied by the engine. What is the power required for the same ? What is the tension developed in the link connecting the engine and carriages?

(20 Marks)



