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C14-M-105

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BOARD DIPLOMA EXAMINATION, (C-14)

MARCH/APRIL—2017

DME—FIRST YEAR EXAMINATION

ENGINEERING MECHANICS

Time : 3 hours ]

[ Total Marks : 80

PART—A

3×10=30

- Instructions** : (1) Answer **all** questions.  
(2) Each question carries **three** marks.  
(3) Answer should be brief and straight to the point and shall and not exceed *five* simple sentences.

1. Name any three specifications of force.
2. State the conditions of equilibrium of a body acted by co-planar forces.
3. What is cone of friction?
4. Define the following :
  - (a) Static friction
  - (b) Limiting friction
5. State parallel axis theorem.
6. Define angular displacement and angular velocity.
7. State Newton's first law of motion.
8. Define the terms (a) 'velocity ratio' and (b) 'mechanical advantage'.

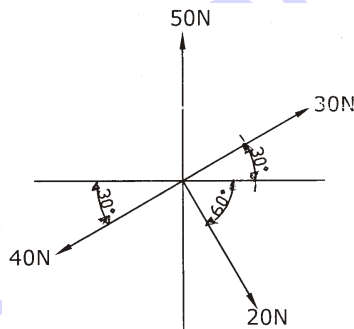
- \* 9. Define ideal machine and self-locking machine.
10. Define the terms (a) 'lower pair' and (b) 'higher pair'.

**PART—B**

10×5=50

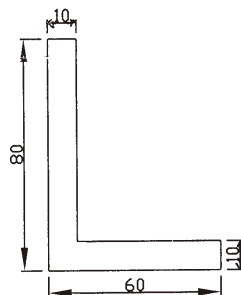
- Instructions :** (1) Answer *any five* questions.  
 (2) Each question carries **ten** marks.  
 (3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. Determine the magnitude and direction of the resultant of the following system of forces : 10



12. Find the effort required at the end of lever 300 mm long of screw jack. The mean diameter of screw is 26 mm, load acting is 20 kN, helix angle is  $15^\circ$  and coefficient of friction between the screw and the nut is 0.22. 10

13. Find the moment of inertia of the following section about its centroidal axes : 10



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- 14.** A flywheel makes 50 revolutions per second, and is slowed down uniformly to 10 revolutions per second in 1200 revolutions. How long it take, and how many more revolutions will it make before coming to rest? 10
- 15.** Find the amplitude and time period of a particle, moving with simple harmonic motion, whose velocities are 9 m/sec and 4 m/sec at distances of 2 m and 3 m respectively from the centre. 10
- 16.** (a) Two unequal forces inclined to one another at an angle of  $120^\circ$  have a resultant of 86.6 N. The resultant makes an angle of  $30^\circ$  with one of the forces. Find the magnitude of the two forces. 5
- (b) A T-section is made up of a top flange 60 mm  $\times$  15 mm and a central web of 80 mm  $\times$  15 mm. Locate its centroid. 5
- 17.** In a simple lifting machine, an effort of 500 N is required to lift a load of 6 kN. The velocity ratio of the machine is 25. Determine—
- (a) frictional effort;
- (b) frictional load;
- (c) efficiency. 4+4+2=10
- 18.** (a) Explain the slider crank mechanism with neat sketch. 5
- (b) There are 4 pulleys arranged in third system. Find the effort required to lift a load of 5000 N. Assume efficiency of the machine is 85%. 5

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