C16–M–**105**

# 6056

**BOARD DIPLOMA EXAMINATION, (C–16)**

**OCT/NOV—2018**

**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) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

(4) Assume missing data wherever necessary.

**1.** What do you understand by engineering mechanics? Give any two applications of it.　　　　　　1+2=3

**2.** State *(a)* Lami's theorem, and *(b)* triangle law of forces.

1½+1½=3

**3.** Define *(a)* normal reaction, and *(b)* coefficient of friction.

1½+1½=3

**4.** List out different types of friction.　　　　1×3=3

**5.** Define *(a)* radius of gyration, and *(b)* moment of inertia.

1½+1½=3

**6.** A car starts from rest and attains a velocity of 24 kmph in 30 seconds. Find its acceleration and displacement.

**7.** Define simple harmonic motion. Give any two examples. 1+2=3

**8.** Express graphically the law of machine for *(a)* idle machine, and *(b)* practical machine. 1½+1½=3

**9.** Define the following terms with respect to simple machine :

1½+1½=3

*(a)* Idle effort

*(b)* Idle load

**10.** Define *(a)* lower pair, and *(b)* higher pair and give at least one example of each. 1½+1½=3

### 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 force of the following force system :
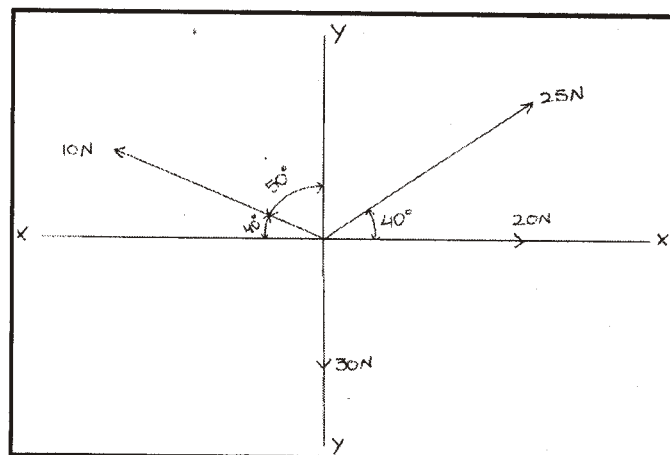
**12.** An effort of 1960 N is required just to move a certain body up inclined plane of angle 15°, the force acting parallel to the plane. If the angle of the plane is made 20°, the effort required again applied parallel to the plane is found to be 2254 N. Find *(a)* the weight of the body, and *(b)* the coefficient of friction.

**13.** Calculate moment of inertia about centroidal axes for the given I-section. The dimensions are as follows :

> Top flange : 90 mm × 20 mm
> Web : 20 mm × 100 mm
> Bottom flange : 150 mm × 40 mm

**14.** A body is moving with uniform acceleration. In the eleventh and fifteenth seconds from the commencement it moves through 7·2 m and 9·6 m respectively. Find the velocity and the acceleration with which it moves.

**15.** A wheel rotating about a fixed axis at 30 RPM is uniformly accelerated 50 seconds during which it makes 40 revolutions. Find *(a)* the angular velocity at the end of ths interval, and *(b)* time period for the speed to reach 80 RPM.

**16.** A double purchase crab has load drum diameter 200 mm and the length of handle is 400 mm. The number of teeth of spur wheel is 75 and 90 and the number of teeth on pinion is 20 and 30. When tested it was found that an effort of 90 N was required to lift a load of 1800 N and an effort of 135 N was required to lift a load of 3150 N. Determine *(a)* the law machine, *(b)* the effort required to lift a load of 6000 N, *(c)* the efficiency in above case, *(d)* the maximum efficiency, and *(e)* the maximum mechanical advantages.

**17.** *(a)* The resultant of two equal forces acting at a point with an angle of 60° between them is 80 N. Find the magnitude of each force.                                          5

*(b)* A lifting machine consists of pulleys and arranged in second order. There are four pulleys in each block. An effort of 200 N is applied to lift a load of 1000 N. Calculate the efficiency of the machine.                                          5

**18.** *(a)* Find the centroid of T-section as shown below :    5
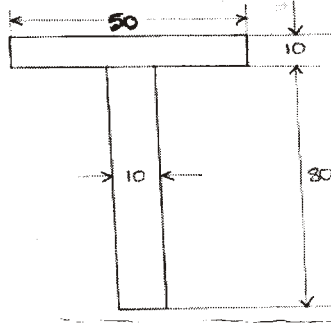


All dimensions are in mm

*(b)* Explain coupled wheels of locomotive with a neat sketch.    5

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