6056

BOARD DIPLOMA EXAMINATION
MARCH/APRIL - 2019
DIPLOMA IN MECHANICAL ENGINEERING
ENGINEERING MECHANICS
FIRST YEAR EXAMINATION

Time: 3 Hours **Total Marks: 80**

PART - A (3m x 10 = 30m)

Note 1:Answer all questions and each question carries 3 marks

2:Answers should be brief and straight to the point and shall not exceed 5 simple sentences

1. Define the following terms and give examples: *(a)* Base units *(b)* Derived units
2. State Triangle law of forces
3. Write any three laws of fluid friction
4. A body of weight 150 N is placed on a horizontal plane. It is pulled by a horizontal force of 75 N just causes the body to slide over the horizontal plane. Find the coefficient of friction
5. Find the moment of inertia about its base of a triangular section of base 100 and height 150 mm
6. A body moving with a velocity of 12 m/s and attains a velocity of 85 m/s in 10 seconds. Find the acceleration and distance travelled
7. The piston of the steam engine moves with SHM, the crank rotates at 120 r.p.m. with a stroke of 2 m. Find the velocity and acceleration of the piston when it is at a distance of 0·75 meter from the centre
8. Define frictional effort and frictional load and write the expressions
9. What is a lever of third kind? Give two examples
10. What is a kinematic chain? Give the correct relation between number of links and number of pairs for kinematic chain

PART - B (10m x 5 = 50m)

Note 1:Answer any five questions and each carries 10 marks

2:The answers should be comprehensive and the criteria for valuation is the content but not the length of the answer

11. Find the magnitude and direction of resultant force for the following forces acting at a point

    (a) 30 kN due North-East

    (b) 40 kN at 60° East of South

    (c) 60 kN at 60° South of West

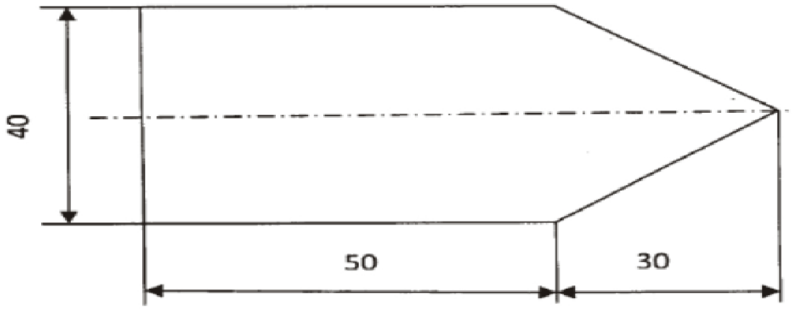
    (d) 20 kN at 60° West of North

12. A body resting on a rough horizontal plane required a pull of 180 N inclined at 30° to the plane just to move it. It was found that a push of 220 N inclined at 30° to the plane just moved the body. Determine the weight of the body and the coefficient of friction

13. Find moment of inertia of an unequal angle 150 × 120 × 20 mm about centroidal axes

14A. Two unequal forces inclined to one another at an angle of 120^0 have a resultant of 86.6 N, which makes an angle of 30^0 with one of the forces. Find the magnitude of two forces

B. Find the centroid of the composite section shown below. All dimensions are in mm:



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

16. A bullet of a gun of mass 0·05 kg and is fired with a velocity of 300 m/s. What is the kinetic energy of the bullet? If the bullet penetrates into a block of wood 300 mm deep, what is the resistance offered by wood to the bullet? What is the exit velocity of the bullet if the same bullet is fired into a similar block of wood of 200 mm thick?

17. In a lifting machine an effort of 98 N can lift a load of 1460 N and an effort 178.4 N can lift a load of 2800 N. Find the law of the machine. What is the effort required to lift a load of 4500N

18A. Derive an expression for velocity ratio of screw jack

B. Explain the Pantograph with line diagram

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