4054

BOARD DIPLOMA EXAMINATION, (C-14)
OCTOBER/NOVEMBER-2018
DME– FIRST YEAR EXAMINATION

ENGINEERING MECHANICS

Time : 3 Hours]   [Total Marks: 80

PART-A

4X10=40

Instructions   :   1. Answer **All** questions.
                         2. Each question carries **four** marks.
                         3. Answer should be brief and straight to the point and shall not exceed
                            five simple sentences.

1. (a) Define statics

    (b) What is couple?

2. (a) Find the magnitude and direction of resultant force when 40 KN act towards east
        and 10 KN towards west.

    (b) What are various characteristics of force?

3. (a) What is meant by Angle of Repose?

    (b) What is cone of friction?

4. (a) State nay two laws of static friction

    (b) Define limiting friction.

5. (a) Write an expression for moment of inertia of a rectangular section about the axis
        passing though the center of gravity.

    (b) Define radius of gyration.

6. (a) State the law of conservation of energy

    (b) Define centrifugal force

7. (a) Write any two examples for rotary motion

    (b) Write any two examples for simple harmonic motion.

www.manaresults.co.in

8. (a) Draw a legible sketch of fixed pulley

   (b) What is simple machine?

9. (a) List out any four simple machines.

   (b) What is power arm?

10. (a) Define power pair

    (b) Write any two examples for higher pair.

PART-B

10X4=40

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

11. (a) A single force of 10N is resolved into two concurrent forces of 6N each. Find the

    angle between them

    (b) A lamp weighing 5N is suspended from the ceiling by means of a wire. It is pulled

    to one side by horizontal cord, until the wire makes an angle of 60^0 with the ceiling.

    Find the tension in the wire and cord.

12. (a) A body weighing 250N lying on the rough horizontal plane. A horizontal effort of

    50N is required to cause the body to slide. Determine:

          (a) Limiting friction and

          (b) Coefficient of friction.

    (b) A body of weight 500N is just pulled up on a plane inclined at 30^0 to the horizontal

    by a pull of 400N, inclined at 20^0 with the plane. What is the coefficient of friction

    between the body and the plane?

13. (a) A bar of T-section has a flange 60mm x 8mm. The web is 45mm x 80mm. Find the

    moment of inertia about centroidal axis XX.

    (b) State and prove theory of parallel axis.

14. (a) Find the resultant force from the following figure:
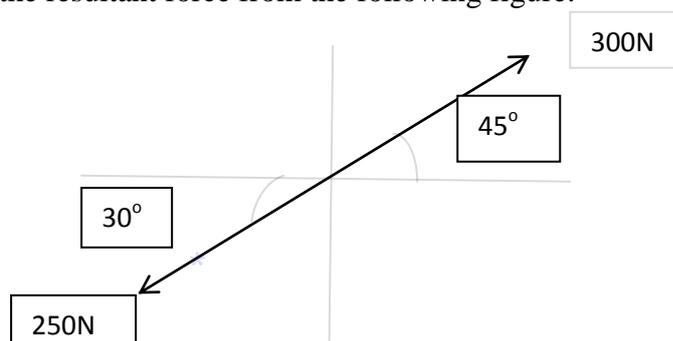
(b) An angle (L-section) specified as 120mm x 80mm x 20mm. Find centroid.

15. (a) A car starts from rest and attains velocity of 24 m/s in 30s. Find its acceleration and displacement during this time.

(b) A body projected vertically upwards attains maximum height of 475 meters. Calculate the velocity of projection and compute time of flight in air.

16. (a) Obtain an expression for the distance covered by particle in the nth second.

(b) Find the amplitude and time period of particle making simple harmonic motion, which has a velocity of 9m/s and 4 m/s at a distance of 2m and 3m respectively from the center.

17. (a) Draw legible sketch of differential wheel and axle. Derive an expression for its velocity ratio.

(b) A single purchase crab winch handle length 20mm and drum diameter of 100mm. The gear ratio is 6. The efficiency of the machine is 0.75. Find the maximum load that can be lifted, if the maximum effort that can be applied is 300N.

18. (a) In a system of pulleys of the first type, there are three pulleys and a weight of 300N can be supported by an effort of 50 N. Find the efficiency of the machine and the amount of friction in terms of effort and load.

(b) Explain Beam engine with neat sketch.

****