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4054
BOARD DIPLOMA EXAMINATION, (C-14)
JUNE-2019
DME - FIRST YEAR EXAMINATION
ENGINEERING MECHANICS

Time: 3 Hours

Max. Marks : 80

PART -A

10X3=30M

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

- 1) State the parallelogram law of forces.
- 2) State the lami's theorem.
- 3) State the laws of static friction.
- 4) Define angle of repose.
- 5) Define (a) Centroid (b) Centre of gravity.
- 6) State Newton's third law of motion and give two examples.
- 7) State law of conservation of momentum.
- 8) In a first system of pulleys there are four movable pulleys and a weight of 750 N can just be supported by an effort of 50 N.
Find efficiency of the machine.
- 9) Define reversible and irreversible machine.
- 10) Differentiate machine and mechanism.

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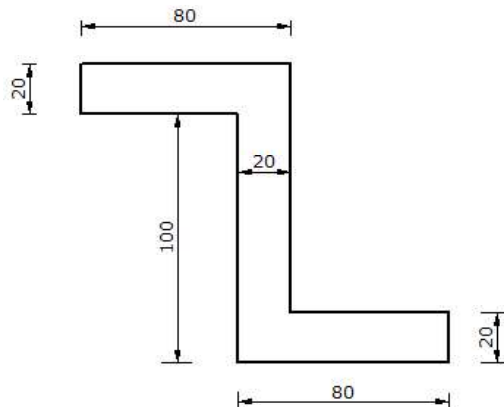
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PART-B

5X10=50M

- 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 answer.

- 11) Four forces of magnitude P , $2P$, $3\sqrt{3}P$ and $4P$ acting at a point 'O'. The angles made by these forces with X-axis are 0° , 60° , 150° and 300° respectively. Find the magnitude and direction of the resultant force.
- 12) An effort of 1960 N is required just to move a certain body up an inclined plane of angle 15° , The force acting parallel to the plane. If the angle of inclination of the plane is made 20° , the effort required is 2254 N applied parallel to the plane. Find the weight of the body and coefficient of friction.
- 13) Find the moment of inertia of the following planar figure about centroidal axes.

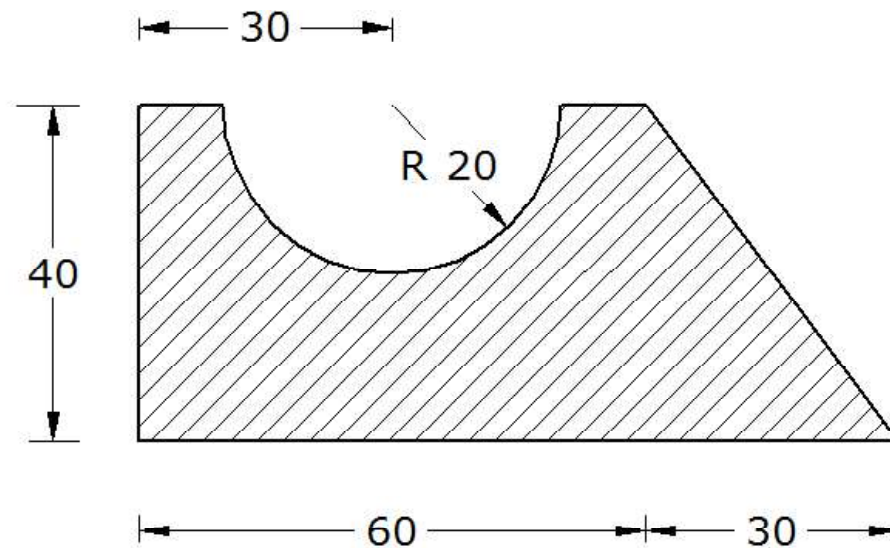


(All dimensions are in mm)

- 14) A stone is dropped into a well and sound is heard to strike the water after 4 sec. Find the depth of well, if the velocity of sound is 350 m/s.
- 15) A particle moving with SHM performs 10 complete oscillations per minute and its speed when at a distance of 20 cm from the centre of oscillation, is $\frac{3}{5}$ th of the maximum speed. Find the amplitude, the maximum acceleration and speed of the particle when it is 15 cm from the centre of oscillation.

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- 16) In a single purchase crab, length of the handle is 160 mm and the gear ratio is 5. Find the velocity ratio and efficiency of the machine, if a load of 1000N is lifted by an effort of 50N. Diameter of drum is 60mm.
- 17) (a) Explain (i) Co-planar system of forces
(ii) Non-coplanar system of forces.
(b) Explain four bar chain.
- 18) (a) Determine the centroid of the shaded portion of the shape shown in the figure. (5M)



- (b) Explain about law of machine with diagram. (5M)

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