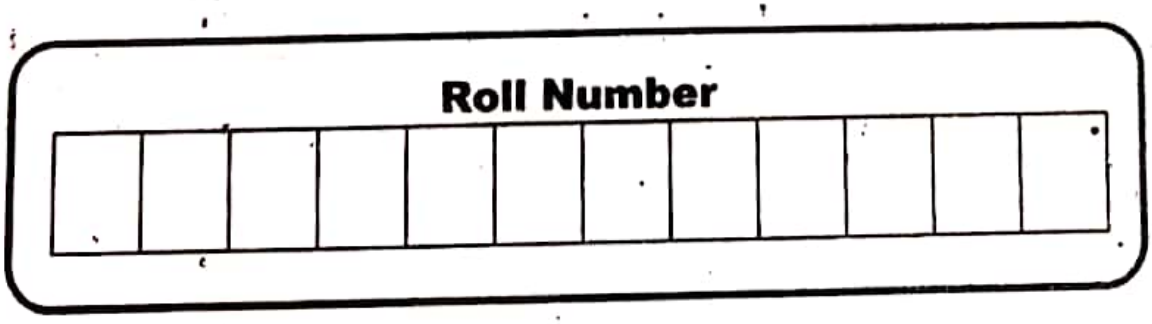
2101268

DIPLOMA OF VOCATION
Mechanical Manufacturing
Subject: Applied Mechanics
Subject Code: ME-403
Semester: Third
January 2021
Theory (External): 35 Marks
Time: 03 Hours

Instructions to the Students

1. This Question paper consists of two Sections. All sections are compulsory.
2. Section A comprises 10 questions of objective type in nature. All questions are compulsory. Each question carries 1 mark.
3. Section B comprises 8 essay type questions out of which students need to do any 5. Each question carries 5 marks.
4. Read the questions carefully and write the answers in the answer sheets provided.
5. Do not write anything on the question paper.
6. Wherever necessary, the diagram drawn should be neat and properly labelled



SECTION –A (SHORT/OBJECTIVE TYPE QUESTIONS)
(10x1=10 Marks)

A. A _____ is a single force which can replace two or more forces and produce the same effect as the forces
   (a) Concurrent
   (b) Coplanar
   (c) Resultant
   (d) Composition of force

B. Four forces P, 2P, 3P and 4P act along the sides taken in order of a square, the resultant force is
   (a) Zero
   (b) $1.2\sqrt{2}P$
   (c) 2P
   (d) $\sqrt{5}P$

C. A pulley used to draw water from a well with the help of a bucket is a _____ machine.
   (a) Reversible
   (b) Irreversible
   (c) Both (a) and (b)
   (d) None of the above

D. The force of friction between two bodies in contact is
   (a) A function of the relative velocity between them
   (b) Always normal to the surface of contact
   (c) Never shown in the free body diagram of the system of these two bodies
   (d) Dependent on the areas of contact.

E. A zero angle of friction implies that
   (a) Frictional force is infinite
   (b) Frictional force is zero

(c) Frictional force acts normal to the plane
(d) Frictional force acts along the direction of motion.

F. The rotational tendency of a force is called
(a) Couple
(b) Resultant force
(c) Moment
(d) Coplanar force

G. In actual machine mechanical advantage is
(a) Equal to velocity ratio
(b) Greater than velocity ratio
(c) Less than velocity ratio
(d) Unity

H. The law of machine relates
(a) Load lifted and efficiency
(b) Effort applied and efficiency
(c) Mechanical advantage and Velocity ratio
(d) Load lifted and effort applied

I. Unit of work is
(a) N-m
(b) N/m
(c) N/m^2
(d) $N-m^2$

J. If a number of forces are acting simultaneously on a particle, then the resultant of these forces will have the same effect as produced by the all the forces. This is known as
(a) Principle of physical independence of forces.
(b) Principle of transmissibility of forces.
(c) Principle of resolution of forces.
(d) None of the above.

SECTION –B (ESSAY TYPE QUESTIONS)
(5x5=25 Marks)

1. Make a clear distinction between mass, force and weight.
2. A triangle ABC has its side AB = 40 mm along positive x-axis and side BC = 30 mm along positive y-axis. Three forces of 40 N, 50 N and 30 N act along the sides AB, BC and CA respectively. Determine magnitude of the resultant of such a system of forces.
3. State triangle law of forces and polygon law of forces.
4. 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.
5. Explain the term angle of friction; angle of repose; and coefficient of friction.
6. (a) Define Mechanical Advantage; Velocity ratio and efficiency of a machine

   .(b) Clearly explain the conditions for the reversibility and self-locking of a machine.
7. Explain with sketches the constructional and working detail of screw jack.
8. A square ABCD has forces acting along its sides as shown in Figure 1. Find the values of P and Q, if the system reduces to a couple. Also find magnitude of the couple, if the side of the square is 1 m.

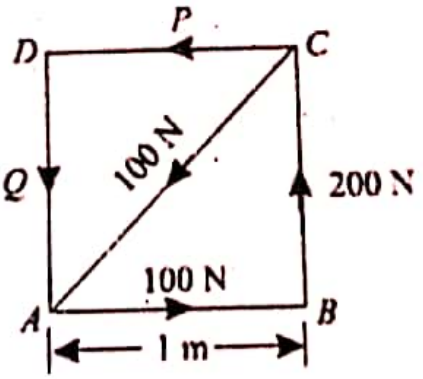


Figure 1

END OF PAPER