BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – Dip.CE-2024/Dip.EE-2024/Dip.ME-2024/Dip.RA-2024/Dip.EE-2025/Dip.ME-2025
Course Name – Engineering Mechanics
Course Code - DES00003
(Semester II)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Select the unit of power in S.I.
a) Newton meter b) Watt
c) Joule d) Kilogram meter/sec

(ii) Identify the forces, that meet at one point, but their lines of action do not lie in a plane.
a) Coplanar non-concurrent forces b) Non-coplanar concurrent forces
c) Non-coplanar non-concurrent forces d) Intersecting forces

(iii) Identify the following is not a scalar quantity.
a) Time b) Mass
c) Volume d) Acceleration

(iv) Identify from the following options that is not a vector quantity.
a) Weight b) Velocity
c) Acceleration d) Speed

(v) The ratio of limiting friction and normal reaction is defined as,
a) Coefficient of friction b) Angle of friction
c) Angle of repose d) Sliding friction

(vi) Select the position of C.G. of a right circular solid cone of height h.
a) It lies at the distance of h/2 from the base b) It lies at the distance of h/3 from the base
c) It lies at the distance of h/4 from the base d) It lies at the distance of h/6 from the base

(vii) Identify the following factors are related by work energy principle.
a) force, displacement and time b) force, velocity, time and mass
c) force, velocity, displacement d) displacement, time and mass

(viii) Select the incorrect condition for the equilibrium in free body diagram for calculation of the normal forces.
a) $\sum Fx = 0$ b) $Fy = 0$

c) $\sum Fz = 0$ d) $\sum F \neq 0$

(ix) Choose the following lamina which do not have centroid at its geometrical center.

a) Circle b) Equilateral triangle
c) Right angled triangle d) None of the mentioned

(x) The working principle of simple machine derives from,

a) couple b) moment
c) lever d) moment of inertia

(xi) Identify the efficiency for a self-locking lifting machine,

a) 0.5 b) More than 50%
c) Less than 50% d) 1

(xii) Choose the correct option from the following,

a) In ideal machines, mechanical advantage is equal to velocity ratio. b) In ideal machines, mechanical advantage is less than velocity ratio.
c) In ideal machines, mechanical advantage is greater than velocity ratio. d) None of these

(xiii) Determine the velocity ratio of a simple wheel and axle with D and d as the diameters of effort wheel and load axle.

a) D+d b) D-d
c) D/d d) None of these

(xiv) Choose the the radius of gyration of a circular plate of diameter 10 cm,

a) 1.5cm b) 2.0cm
c) 2.5cm d) None of these

(xv) Choose the correct option about the working principle of simple machine from the following,

a) couple b) moment
c) lever d) moment of inertia

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Identify the magnitude of the resultant of two forces equal to 50N and 30N acting at an angle of 60°. (3)

3. With a neat sketch explain collinear forces and non coplanar forces. (3)
4. Explain about the role of Centre of gravity for affecting the balance. (3)
5. Define the term limiting friction. (3)
6. Conclude a short note on a screw jack. (3)

OR

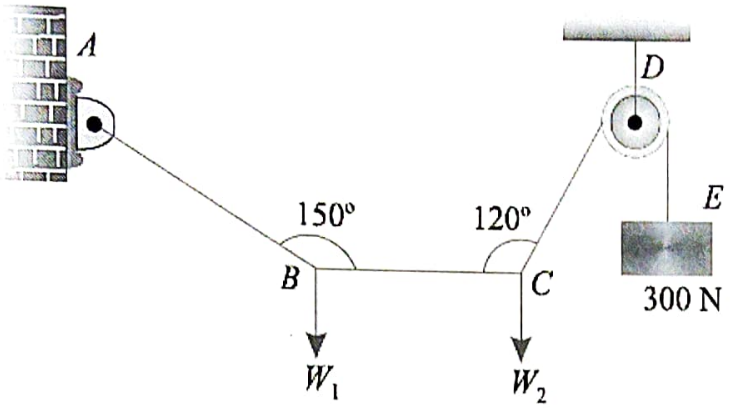
Evaluate a short note on differential wheel and axle. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Three forces acting on a particle are in equilibrium. The angles between the first and second is 90° and that between the second and third is 120°. Estimate the ratio of the forces. (5)

8. A light string ABCDE whose extremity A is fixed, has weights W_1 and W_2 attached to it at B and C. It passes round a small smooth peg at D carrying a weight of 300 N at the free end E as shown in Fig. If in the equilibrium position, BC is horizontal and AB and CD make 150° and 120° with BC, tell the following values - (i) Tensions in the portion AB, BC and CD of the string and (ii) Magnitudes of W_1 and W_2. (5)



9. A uniform plank ABC of weight 30 N and 2 m long is supported at one end A and at a point B 1.4 m from A. Calculate the maximum weight W, which can be placed at C, so that the plank does not topple. (5)

10. Explain in details about the co-efficient of friction with required diagram. (5)

11. Calculate the center of gravity of a T-section having cross-section of 150 mm X 120 mm X 25 mm. (5)

12. Explain the difference between simple machine and compound machine. (5)

OR

Illustrate the working principle of a simple wheel and axle with proper diagram. (5)

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