JHARKHAND Rai University
RANCHI

PRACTICE SET

End Semester Examination, Spring- 2026

Program: Diploma
Semester:II
Subject: Engineering Mechanics
Subject Code: 8DESC104

UNIT I

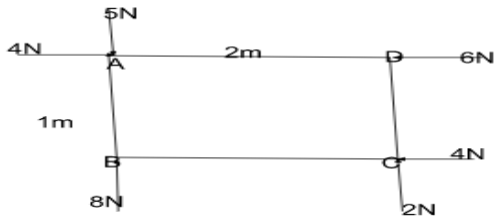
Section II (10 marks)

1. Illustrate what is force with its S.I unit. Also explain effect and characteristic of force.
2. Explain System of Forces with diagram.
3. Find the magnitude of the two forces, such that if they act at right angles, their resultant is √20 N but if they act at 60°, their resultant is √28 N.
4. Explain moment of Force with its unit and state and explain Varignon's principle of moments.
5. State and explain Law of transmissibility of forces.
6. Explain the following terms with diagram:

(i) Coplanar forces
(ii) Concurrent forces
(iii) Non – coplanar concurrent forces

Section III (20 marks)

7. State and prove the law of parallelogram of forces. Show that the resultant $R = \sqrt{F_1^2 + F_2^2}$ when the two forces F_1 and F_2 are at right angles to each other. Find the value of R if the angle between the forces is zero.
8. Find the moment of all the forces about point A, B, C and D.



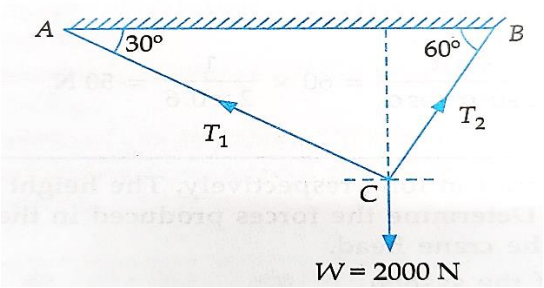
UNIT II

Section II (10 marks)

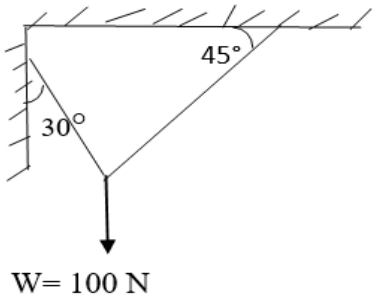
9. What do you mean by the equilibrium of forces and what are the conditions of equilibrium?
10. What is beam? Explain all types of beams with diagram.
11. Explain types of end supports with diagram
12. Explain all types of loads acting in a beam with diagram.

Section III (20 marks)

13. Explain Lami's theorem. A weight of 2000N is supported by two chains AC and BC as shown in figure. Determine the tension in each chain.



14. A weight of 100 N hangs from a point C by means that the strings AC and BC as shown in figure below. Using Lami's theorem, determine the forces in the string.



UNIT III

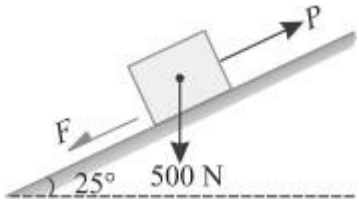
Section II (10 marks)

15. What do you understand by the term friction? What are the different types of friction?
16. Write the characteristics of frictional force.
17. Define Limiting friction, angle of friction, angle of repose and co-efficient of friction.
18. Elaborate the laws of friction. A body of weight 300 N is lying on a rough horizontal plane having a coefficient of friction as 0.3. Find the magnitude of the force, which can move the body.
19. List the advantages and disadvantages of friction

Section III (20 marks)

20. Derive the equation for equilibrium of a body weighing W kept on a rough inclined plane at an angle α with horizontal subjected to a force P acting at an angle θ with the inclined plane.

21. **:** A body of weight 500 N is lying on a rough plane inclined at an angle of 25° with the horizontal. It is supported by an effort (P) parallel to the plane as shown in Fig. Determine the minimum and maximum values of P, for which the equilibrium can exist, if the angle of friction is 20°.



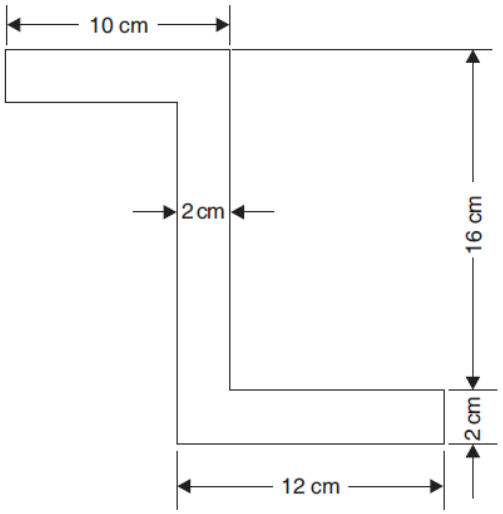
UNIT IV

Section II (10 marks)

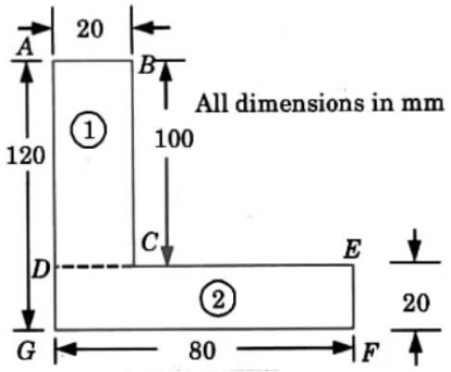
22. Differentiate between center of gravity and centroid.
23. What do you mean by simple lifting machine, Load & Effort?
24. Explain the following terms:
    i. Mechanical advantage
    ii. Velocity ratio
    iii. Efficiency of a machine
25. Explain reversibility and non-reversibility of a machine.
26. A screw jack has mean diameter of 60 mm and pitch of 12 mm. If the co-efficient of friction between its screw and nut is 0.15. Find the effort required at the end of 800 mm long handle to raise a load of 15 kN. Also find the effort to lower the same load.

Section III (20 marks)

27. Find the centroid of the Lamina given below:



28. Locate the centroid of L- section as shown in figure.



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Disclaimer: - This is a practice set. The Question in End term examination will differ from the practice set. This practice set is meant for practice only.