

GANPAT UNIVERSITY
B. TECH SEM-I (CIVIL/ME/MC/EE)
REGULAR EXAMINATION (CBCS) – NOV-DEC-2014
2CI102: Engineering Mechanics

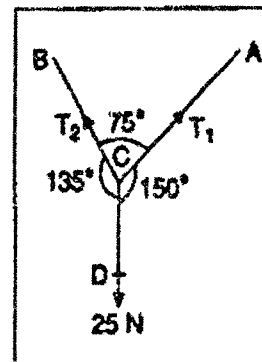
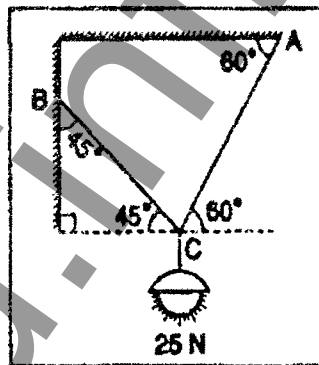
Max. Time: 3 Hours

Max. Marks: 60

- Instructions:** (1) This Question paper has two sections. Attempt each section in separate answer book.
 (2) Figures on right indicate marks.
 (3) Be precise and to the point in answering the descriptive questions.

Section - I

- 1 (A) Enlist and Explain Newton's Laws of motions. (5)
- (B) A cantilever beam of span of 8m carries an UDL of 6kN/m over entire length of the beam. The beam also subjected to point load of 20kN (downward) and 10kN (upward) at distance 3m and 6m respectively from fixed end. Find reaction at support. (5)
- OR**
- 1 (A) Explain 'Types of Supports' with neat sketches. (5)
- (B) A Simply supported beam of span 10m carrying a downward concentrated load of 20kN, W_1 kN and W_2 kN at 2m, 5m, and 7m respectively, from the left support. If reactions offered by each supports are of 5kN in magnitude (upward), then calculate W_1 and W_2 . (5)
- 2 (A) State and Explain: Law of Parallelogram of Forces. (5)
- (B) The following four coplanar forces are acting at a point O as given below. (1) 200N North - East, (2) 120 N inclined at 50° West of North, (3) 50 N inclined at 60° towards West to South and (4) 100 N South-East. Determine the resultant in magnitude and direction analytically. (5)
- OR**
- 2 (A) State and Prove : Lami's Theorem (5)
- (B) An electric light fixture weighing 25 N hangs from a point C, by two strings AC and BC. The string AC is inclined at 60° to the horizontal and BC at 45° to the vertical; as shown in **figure below**. Determine the forces in the strings AC and BC. (5)



- 3 (A) Derive equation for finding out velocity ratio of "Wheel and Differential axles" with neat sketch (5)
- (B) In lifting machine an effort of 15 N raised a load of 770N. What is the mechanical advantage? Find velocity ratio if the efficiency at this load is 60%. If on the machine an effort of 25 N raised a load of 1320 N, what is the efficiency? What will be the effort required to raise a load of 500 N? Calculate the maximum M.A. and maximum efficiency (5)

Section - II

- 4 (A) State and explain theorems of Pappus-Guldinus. (5)
(B) Find the centroid of a T – Section lamina of size 100mm X 150mm X 30mm. (5)
- OR**
- 4 (A) Describe in brief D' Alembert's Principle. (5)
(B) A vehicle, of mass 500 kg, is moving with a velocity of 25 m/s. A force of 200 N acts on it for 2 minutes. Find the velocity of the vehicle: (1) When the force acts in the direction of motion, and (2) When the force acts in the opposite direction of the motion. (5)
- 5 (A) State and prove Parallel axis theorem of moment of inertia. (5)
(B) Find the Moment of Inertia of a Channel Section 100mm X 50mm X 15mm about its centroidal horizontal axis and centroidal vertical axis. (5)
- OR**
- 5 (A) Define following terms: Kinematics, Kinetics, Angular velocity, Angular acceleration, Angular displacement. (5)
(B) A car of mass 2.5 tones moves on a level road under the action of 1 KN Propelling force. Find the time taken by the car to increase its velocity from 36 km.p.h. To 54 km.p.h. (5)
- 6 (A) Define friction & State the laws of friction. (5)
(B) A block weight 150 KN is places on a rough inclined plane making angle 30° with horizontal. If coefficient of friction is 0.25. Find out the force applied on the block parallel to the plane. So that block is just on the point of moving up the plane. (5)

End of Paper