

Evening-
Date: 16/12/2015

Student Exam No. _____

GANPAT UNIVERSITY

B. TECH ~~SEM I REGULAR~~ EXAMINATION CBCS (NEW) – NOV DEC-2015

2CI102: ENGINEERING MECHANICS

Max. Time: 3 Hours

Max. Marks: 60

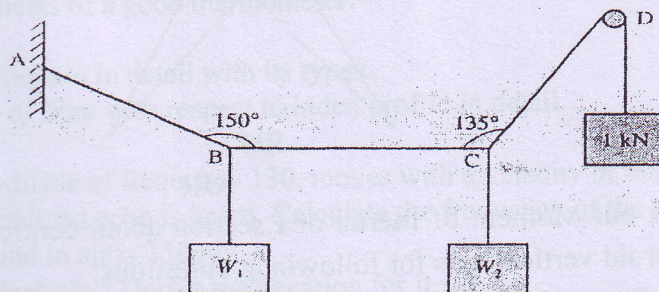
- Instruction:**
- 1 This questions paper has two sections. Attempt each section in separate answer book.
 - 2 Figures on right indicates marks.
 - 3 Be precise and to the point in answering the descriptive questions.

Section – I

- Que. – 1
- A Define “Free Body Diagram” with example. 5
- B Find the weight of a box if it requires 50.5 N efforts parallel to plane to slide it up on the inclined plane making 30° with horizontal plane. Assume co-efficient of friction = 0.20. 5

OR

- Que. – 1
- A State the laws of friction. 5
- B Determine the values of W_1 and W_2 and the tension in all the strings such that the string BC remains horizontal for the system as shown in figure. 5



- Que. – 2
- A Explain motion of body on inclined plane. 5
- B A link AB is moving in a vertical plane. At a certain instant, when the link is inclined at 60° to the horizontal, the point A is moving horizontally at 2 m/s, while B is moving in a vertical direction. Find the velocity of B. 5

OR

- Que. – 2
- A Describe the phenomenon of combined motion of rotation and translation. Give few examples. 5
- B A multiple unit electric train has 800 tones mass. The resistance to motion is 100N per tone of the train mass. If the electric motors can provide 200 kN attractive forces, how long does it take to accelerate the train to a speed of 90 km/hr from rest? 5
- Que. – 3
- A I – Section is made of three rectangles top flange of 60 X 20 mm, web of 100 X 20 mm and bottom flange of 100 X 20 mm. Find the centre of gravity of the section about the horizontal and vertical axis passing through the centre of gravity of the section. 5
- B State and prove Lami's theorem. 5

Section – II

- Que. – 4 A Enlist Fundamental principal of engineering mechanics. explain any two. 5
 B Two equal forces (P) acting at angle θ . The resultant of this two forces is $2P$. 5
 find out the angle between two forces. Also find out direction of resultant forces.

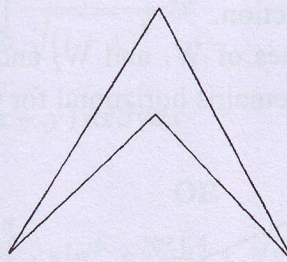
OR

- Que. – 4 A A cantilever beam ABCD is 9 m long. A is fixed support and D is free end. 5
 Span AB carried 10 KN/m uniformly distribution load on 3 m span. 20 KN point load acting upward at center of span BC. Span CD carried 30 KN/m uniformly varying triangular load on 3m span & it is gradually decrease from C to D. Find out reaction of beam.

- B Define following terms: engineering mechanics, scalar quantity, vector quantity, Statics and dynamics. 5

- Que. – 5 A State and prove Parallel axis theorem and perpendicular theorem of moment of inertia. 5

- B Find out center of gravity of about X-X axis and Y – Y axis for given Fig. 5
 Base of triangle is 200 mm. Height of bigger triangle and smaller triangle are 400mm and 300mm respectively.



OR

- Que. – 5 A Find out Moment of Inertia of I section about centroid horizontal axis and centroid vertical axis for following dimensions: 5

Top flange: 200 mm X 15 mm

Web: 20 mm X 400 mm

Bottom flange: 400 mm X 10 mm

- B State and explain Pappus Guldinus theorems. 5

- Que. – 6 A Explain types of support with neat sketches. 5

- B Find out law of machine in which an effort of 15.5 N raised a load of 70 N and an effort of 19.5 N raise a load of 90 N. find what effort is required to lift a load of 100 N? What is the maximum Mechanical Advantage? 5