Student Exam No._____

GANPAT UNIVERSITY

B. TECH SEM- II

(CE/EC/IT/BM&I/MARINE/CIVIL INTERGATED/MECHANICAL INTEGRATED)

REGULAR EXAMINATION (CBCS) – APRIL-JUNE-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 following terms: engineering mechanics, scalar quantity, vector quantity, acceleration & retardation.	5
	B	Find the magnitude and direction of the resultant force of following forces act at a point:	5

        (a) 20 N inclined at 30° towards North of East,
        (b) 25 N towards North,
        (c) 30 N towards North West,
        (d) 35 N inclined at 40° towards south of West.

OR

Que. – 1	A	Explain Newton's Laws of motions.	5
	B	A simply supported beam of 8 m span carries an UDL of 50 KN/m over entire span of beam. The beam subjected to downward point load of 20KN act at distance 2m from left support. The beam subjected to downward point load of 20KN act at distance 2m from right support. Find out reaction at support.	5

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Que. – 2	A	State and explain theorem of Pappus-Guldinus.	5
	B	Find out moment of inertia of I section about centroid horizontal axis and centroid vertical axis having following dimensions: top flange = 60cm x 12cm, bottom flange = 20cm x 20cm, web = 10cm x 48cm.	5

OR

Que. – 2	A	Find out centroid of an ISA 120cm x 70cm x 10cm	5
	B	State and prove: Parallel axis theorem of moment of inertia.	5

Que. – 3	A	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
	B	A cantilever beam of 5m span carries UDL of 20KN/m over entire span of beam. The beam subjected to upward point load of 50 KN act from fixed support at a distance of 2m and also upward point load of 50 KN act at free support. Find out reaction at support.	5

Section – II

Que. – 4   **A**   State and Prove Lami's Theorem.   5

            B   A 4m long ladder has to carry a person of 735N weight at 3.5m distance from floor along the length of ladder. The self weight of ladder is 150N act at centre of gravity. Find the maximum distance of lower end of ladder from vertical wall so that it does not slide. The coefficient of friction between floor and ladder is 0.3 and that between vertical wall and ladder is 0.2.   5

OR

Que. – 4   **A**   A sphere of weight 200 N is tied to a smooth wall by a string as shown in **Fig.** Find the tension (T) in the string and reaction (R) of the wall.   5
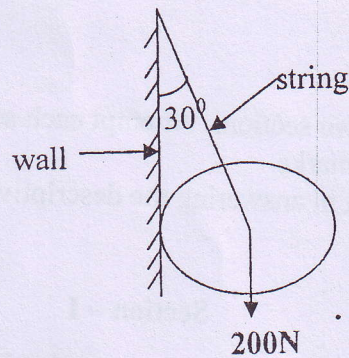
            B   Derive Relation Between Angle of Friction (Φ) and Angle of Repose (α).   5

Que. – 5   **A**   Describe in brief D' Alembert's Principle.   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 2m/s, while B is moving in a vertical direction. Find the velocity of B.   5

OR

Que. – 5   **A**   Define following terms: Angular velocity, Kinematics, Angular acceleration, Angular displacement, kinetics.   5

            B   A body of mass 7.5 kg is moving with a velocity of 1.2 m/s. If a force of 15 N is applied on the body. Determine its velocity after 2 second.   5

Que. – 6   **A**   Find out centroid of a T section 80cm x 80cm x 10cm   5

            B   Prove moment of inertia of rectangular section of width 'b' and depth 'd' about X-X axis, $I_{XX} = bd^3/12$ 5

END OF PAPER