**20ME104**

**Hall Ticket Number:**

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| **I/IV B.Tech (Regular) DEGREE EXAMINATION** | | | |
| **July, 2021** | **Mechanical Engineering** | | |
| **First Semester** | **Engineering Mechanics - I** | | |
| **Time:** Three Hours | | **Maximum:** 70 Marks | |
| *Answer Question No.1 compulsorily.* | | | (14X1 = 14 Marks) |
| *Answer ONE question from each unit.* | | | (4X14 = 56 Marks) |
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| 1. | Answer all questions | | | | (14X1 = 14 Marks) | |
|  | a) | | State parallelogram law of forces. | | |  |
|  | b) | | Differentiate between a particle and a rigid body. | | |  |
|  | c) | | What is a free body diagram? | | |  |
|  | d) | | Distinguish between moment of a force and a couple. | | |  |
|  | e) | | Write the equations of equilibrium of a co-planar general force system. | | |  |
|  | f) | | State the assumptions made in the analysis trusses. | | |  |
|  | g) | | Define angle of friction. | | |  |
|  | h) | | Distinguish between centroid and centre of gravity. | | |  |
|  | i) | | State Pappus-Guldinus theorem-I. | | |  |
|  | j) | | Where does the centroid of a circular area of radius ‘r’ lie? | | |  |
|  | k) | | State Parallel axis theorem. | | |  |
|  | l) | | Write the units of area moment of inertia. | | |  |
|  | m) | | What do you mean by radius of gyration of an area? | | |  |
|  | n) | | Write the expression for moment of inertia of an area of a triangle of base ‘b’ and height ‘h’ about its base. | | |  |
| **UNIT I** | | | | | | | |
| 2. | a) | | | A system of four forces acting on a body is as shown in figure. Determine the magnitude and direction of the resultant. | | 5M | |
|  | b) | | | Two identical rollers, each of weight Q = 1000 N are supported by an inclined plane and a vertical wall as shown in figure. Assuming smooth surfaces, find the reactions induced at the points of support A, B and C.  F79B7F7A | | 9M | |
| **(OR)** | | | | | | | |
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| 3. | Three beams hinged together at their ends are supported and loaded as shown in figure. Determine the reactions at the supports A, B, C and D, if Q = 4450 N. | | | | | 14M | |
| **UNIT II** | | | | | | | |
| 4. | Find the axial forces in the members of the given trus as shown in figure, using method of joints. | | | | | 14M | |
| **(OR)** | | | | | | | |
| 5 | a) | What do you mean understand by the term friction and state the laws of dry friction. | | | | 4M | |
|  | b) | Find the minimum force P required to pull block B as shown in figure. Coefficient of friction between A and B is 0.3 and between B and floor is 0.25. Weights of block A = 100 N and Block B = 200 N. | | | | 10M | |
| **UNIT III** | | | | | | | |
| 6. | Find the coordinates of the centroid of the shaded area as shown in figure. | | | | | 14M | |
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| 7. | |  | | --- | | Determine by direct integration the coordinates of the centroid of the shaded area formed by the integration of a straight line *y = mx* and the parabola *y = kx2*. | | C:\Documents and Settings\tcs\My Documents\Downloads\New Doc 2018-11-29 11.22.48_2.jpg | | | | | | 14M | |
| **UNIT IV** | | | | | | | |
| 8. | Determine the moments of inertia of the shaded area shown in figure about the x-axis and the y-axis.  C:\Users\exam\Desktop\EM1.jpg | | | | | 14M | |
| **(OR)** | | | | | | | |
| 9. | Determine the Moment of Inertia of the section shown in fig about x and y- Axis? | | | | | 14M | |

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