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| **Hall Ticket Number: 20ME204**   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  |  |      |  |  |  | | --- | --- | --- | | **I/IV B.Tech( Regular/Supplementary) DEGREE EXAMINATION** | | | | **September,2022** | **Mechanical Engineering** | | | **Second Semester** | **Engineering Mechanics-II** | | | **Time: Three Hours** | | **Maximum:70 Marks** | |
| |  |  | | --- | --- | | ***Answer question 1 compulsory.*** | **(14X1 = 14 Marks)** | | ***Answer one question from each unit.*** | **(4X14=56 Marks)** | |

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| 1. | a) | | State the relation between velocity, displacement and acceleration in linear motion. | | CO1 | | 1 M |
|  | b) | | Differentiate between rectilinear and curvilinear motion. | | CO1 | | 1 M |
|  | c) | | If the speed of a particle along a curved path is constant, what is the value of tangential acceleration? Why? | | CO1 | | 1 M |
|  | d) | | A body is moving with a velocity of 2 m/sec after 4 seconds the velocity of the body becomes 5 m/sec. What is the average acceleration of the body? | | CO1 | | 1 M |
|  | e) | | What is the difference between kinetics and kinematics? | | CO2 | | 1 M |
|  | f) | | Define dynamic equilibrium | | CO2 | | 1 M |
|  | g) | | Define normal and tangential components of acceleration | | CO2 | | 1 M |
|  | h) | | What do you mean by conservative forces? Give an example | | CO3 | | 1 M |
|  | i) | | Define direct central impact | | CO3 | | 1 M |
|  | j) | | What is the moment of inertia of cylinder of mass ‘M’ and radius ‘R’ about geometric axis? | | CO3 | | 1 M |
|  | k) | | The crank of radius 75 mm has a constant clockwise angular speed of 2000 r.p.m. Find the velocity of the crank at its end. | | CO4 | | 1 M |
|  | l) | | Write the equation of motion for rotation about a fixed axis. | | CO4 | | 1 M |
|  | m) | | The wheel of radius 100 mm has a constant anticlockwise angular velocity of 1000 r.p.m. Find the linear velocity of the wheel at its centre of rotation. | | CO4 | | 1 M |
|  | n) | | What do you mean by instantaneous centre of rotation? | | CO4 | | 1 M |
| **Unit-I** | | | | | | | |
| 2. | a) | A motorist is travelling on a curved section of highway of radius 500m at a speed of 120kmph. The motorist suddenly applies the brakes, causing the automobile to slow down at constant rate. Knowing that after 8sec speed has been reduced to 50kmph, determine the acceleration of automobile immediately after the brakes have been applied. | | | | CO1 | 7M |
|  | b) | A stone is dropped from the top of a tower. When it has fallen a distance of 10m, another stone is dropped from a point 38m below the top of a tower. If both the stones reach the ground at the same time, calculate the i) height of the tower ii) velocity of the stones when they reach the ground | | | | CO1 | 7M |
|  |  | **(OR)** | | | |  |  |
| 3. |  | The position of a particle which moves along a straight line is defined by the relation *x = t3 - 6t2 - 15t + 40*, where *x* is expressed in meters and *t* in seconds. Determine i) the time at which the velocity will be zero, ii) the position and distance travelled by the particle at that time, iii) the acceleration of the particle at that time, iv) the distance travelled by the particle from *t = 4s to t = 6s*. | | | | CO1 | 14M |
|  |  | **Unit-II** | | | |  |  |
| 4. |  | A block of mass 30 kg is resting on a horizontal table 1.5 m from its edge. The block A is attached to the string whose other end is carrying a body B of mass 3 kg. If the coefficient of friction between the block A and the table is 0.06, find the acceleration of the system and the time required for the block A to fall over the edge. | | | | CO2 | 14M |
| **P.T.O**  **20ME204**  **(OR)** | | | | | | | |
| 5. | a) | Explain the concept of D’ Alembert’s principle applied for rectilinear and curvilinear motion | | CO2 | | | 7M |
|  | b) | A mass of 9 kg, while descending vertically down, drags up a mass of 6 kg by means of a string passing over a smooth pulley. Find the acceleration of the system and tension in the string. | | CO2 | | | 7M |
|  |  | **Unit-III** | | | | | |
| 6. |  | A 7,500N hammer falling freely through 1.2m drives a 3,500N pile 150mm vertically into the ground. Assume the hammer and pile to cling together after impact, determine the average ground resistance to penetration by the pile. | | CO3 | | | 14M |
|  |  | **(OR)** | |  | | |  |
| 7. |  | Derive the moment of inertia of a homogeneous cylinder of base radius ‘r’, height ‘h’ and mass ‘m’ with respect to the centroidal axis perpendicular to the geometrical axis. | | CO3 | | | 14M |
|  |  |  | |  | | |  |
|  |  | **Unit-IV** | |  | | |  |
| 8. |  | A grinding wheel is attached to the shaft of an electric motor of rated speed of 1800 r.p.m. When power is switched on the unit attains the rated speed in 5sec and when the power is switched off the unit coasts to rest in 90sec. Assuming uniformly accelerated motion, determine the number of revolution the unit turns to i) attain the rated speed ii) come to rest | | CO4 | | | 14M |
|  |  |  | |  | | |  |
|  |  | **(OR)** | |  | | |  |
| 9. |  | A block of 30N is lifted with the help of a cylindrical pulley from floor at a height of 9m. From that point the block is released. Determine the time required to strike the floor from rest and also the velocity of fall. Mass of pulley = 5kg: radius of gyration of the pulley is 0.95m. | | CO4 | | | 14M |

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