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6th Sem./Automation & Robotics

Subject : Solid Mechanics and Mechanisms

Time : 3 Hrs. M.M. : 60

SECTION-A

Note: Multiple choice questions. All questions are compulsory (6x1=6)

Q.1 _____material is commonly used for its high strength to weight ratio. (CO1)

a) Polymer b) Steel
c) Copper d) Aluminium

Q.2 The unit of stress is: (CO1)

a) Newton b) N/m^2
c) N/cm d) KN/m

Q.3 The bending moment of cantilever will be maximum at: (CO2)

a) Fixed end b) At centre
c) At free end d) None of the above

Q.4 The minimum load at which the column tends to buckle is called_____. (CO4)

a) Tensile load b) Buckling load
c) compressive load d) None of above

SECTION-D

Note: Long answer type questions. Attempt any two questions out of three questions. (2x8=16)

Q.23 Draw stress & strain diagram for ductile materials and explain the significance of various points on it. (CO1)

Q.24 Draw SFD and BMD for a cantilever beam of 4m long carries a UDL of 2KN/m and a additional point load of 3 KN at a distance of 3 m from the its free end. (CO2)

Q.25 State inversions of double slider crank chain. Explain Oldham's coupling with neat sketch. Also write its applications. (CO5)

Q.5 A pair is known as kinematic pair if the relative motion between the links of pair is: (CO5)

a) Completely or successfully constrained

b) Not constrained

c) Not related to each other

d) None of the above

Q.6 Which of these is an inversion of a single slider crank chain? (CO5)

a) Coupling rod of a locomotive

b) Beam engine

c) Watt's indicator mechanism

d) Pendulum pump

SECTION-B

Note: Objective/ Completion type questions. All questions are compulsory. (6x1=6)

Q.7 Define strain. (CO1)

Q.8 Write the significance of factor of safety. (CO1)

Q.9 What do you mean by Young's modulus of elasticity? (CO2)

Q.10 Define strut. (CO3)

Q.11 Define kinematics. (CO4)

Q.12 Define inversion of mechanism. (CO4)

SECTION-C

Note: Short answer type questions. Attempt any eight questions out of ten questions. (8x4=32)

Q.13 State the following: (CO1)

a) Hooke's Law b) Poisson's Ratio

Q.14 A mild steel rod 20mm diameter is subjected to an Axial pull of 45kN. Determine the tensile stress induced in the rod and elongation, if the original length is 4m and $E=2x10^5$ N/m^2 (CO1)

Q.15 Define a beam. List types of load on the beam. (CO3)

Q.16 Write the steps for drawing the S.F. and B.M. diagrams by analytical method for cantilever with point loads and UDL. (CO2)

Q.17 Explain the various end conditions in the column. (CO4)

Q.18 Explain various factors on which strength of column depends. (CO4)

Q.19 Deine and explain deflection as applied to beams. (CO3)

Q.20 What is constrained motion? Explain its types. (CO5)

Q.21 Explain in detail the mechanism of rotary I. C. Engines. (CO5)

Q.22 Explain various mechanical properties of common engineering materials (CO1)