



G1003

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Scheme for Valuation/Answer Key

Scheme of evaluation (marks in brackets) and answers of problems/key

SEVENTH SEMESTER B.TECH DEGREE EXAMINATION (S), MAY 2019

Course Code: ME401

Course Name: DESIGN OF MACHINE ELEMENTS - I

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

Marks

- | | | | |
|---|----|--|------|
| 1 | a) | Different steps involved in the design process | (2) |
| | b) | Definition of factor of safety(2)+Factors affecting factor of safety (2) | (4) |
| | c) | Endurance strength modification factors (any 3 factors) | (3) |
| | d) | Effect of stress concentration on ductile and brittle materials under static loading (3)Effect of stress concentration on ductile and brittle materials under variable loading.(3) | (6) |
| 2 | a) | Explaining impact factor | (2) |
| | b) | Determination of mean and variable stresses (2),
Determination of equivalent stress (5)
Finding the allowable stress (2)
Determination of factor of safety using maximum distortion energy theory (4) | (13) |
| 3 | a) | Procedure for designing steel component for finite life | (4) |
| | b) | Determination of mean and alternating stress (2)
Estimation of equivalent stress (6)
Determination of diameter (3) | (11) |

PART B

Answer any two full questions, each carries 15 marks.

- | | | | |
|---|----|---|------|
| 4 | a) | Definition of tensile stress area | (2) |
| | b) | Determination of safe tensile load 1 mark each | (3) |
| | c) | Determination of centre of gravity of bolt group (2)
Estimation of primary shear load (2)
Estimation of secondary shear load (3)
Determination of size of bolt (2)
Selection of standard bolt (1) | (10) |



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- 5 a) Design of screw spindle: Finding core diameter (2) (15)
Torque calculation (2)
Check for stresses: Maximum shear stress (2)
Maximum normal stress (2)
Design of nut: Number of threads, Height/Length of nut, Thickness of screw (3)
Check for stresses in screw and nut (2)
Design for collar dimensions (2)
- 6 a) Sketches (1), Explanation (1) (2)
b) Effect of gaskets on stiffness (2)
c) Determination of tensile force considering stiffness (5) (11)
Determination of bolt diameter (3) Selection of standard bolt (1)
- PART C**
Answer any two full questions, each carries 20 marks.
- 7 a) Sketch of spring (1) (5)
Derivation of stress equation (4)
b) Estimation of load on spring considering energy absorbed (5) (15)
Finding spring wire and mean diameter (4)
Determination of number of coils, free length and pitch (5)
Spring stiffness (1)
- 8 a) Procedure to ensure alignment of shaft (3)
b) Difference between rigid and flexible coupling (3) (5)
Sketches (2)
c) Determination of length based shear failure (6) (12)
Determination of length based crushing failure (6)
- 9 a) Explanation of critical speed of shaft (2)
b) Defining shock and fatigue factor (3)
c) Estimation of torque (2) (15)
Estimation of maximum bending moment (7)
Determination of shaft diameter (4)
Selection of standard diameter (2)