



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, DECEMBER 2018

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) Defining standards (1).Codes (1) | (2) |
| | b) Defining notch sensitivity factor (1),Writing the formula (1) | (2) |
| | c) Rotating beam experiment or other methods for endurance strength (3), SN curve (2) | (5) |
| | d) 2 marks each (2 x3) | (6) |
| 2 | a) Max. Principal stress theory (1) and Max. Shear stress theory (1) | (2) |
| | b) Estimation of principal stresses (3), determination of factor of safety by each method (2) | (13) |
| 3 | a) Defining fatigue stress concentration factor | (2) |
| | b) Estimation of mean and variable stresses in each loading (2+2) | (13) |
| | Finding equivalent stress for axial and bending loads or estimating combined mean and variable stresses for the combined loading (4) | |
| | Determination of diameter (4) | |
| | Selection of standard diameter(1) | |

PART B

Answer any two full questions, each carries 15 marks.

| | | |
|---|--|-----|
| 4 | a) Failure modes of riveted joint | (2) |
| | b) Explanation of thread loosening (1) Influencing factors (2) | (3) |
| | c) Self-locking (1) | (2) |
| | Overhauling (1) | |
| | d) Determination of power (5). Determination of efficiency (3) | (8) |
| 5 | a) Initial tension (1) ,Necessity (1) | (2) |
| | b) Role of washer | (2) |

- c) Steam load calculation (1), Determination of pre load(2), Calculating minimum and maximum load (1) Estimation of mean and variable stresses (3) Determination of standard size of bolt (3) selection of standard bolt(1) (11)
- 6 a) Demerits of welded joints (2)
- b) Explanation of Weld reinforcement (1) purpose (1) (2)
- c) Sketch showing resultant stresses (1) Locating c.g of weld group (2) (11)
 Determination of r and θ (2) Determination of primary and secondary stresses (2)
 Calculation of resultant stress (2) Finding the weld size (2). If a different method is followed, marks may be given accordingly.

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Requirements of spring materials (2)
- b) Explanation of nipping(2), Purpose (1) (3)
- c) Sketch of the springs(2), Determination of effective length(2) Determination of width and thickness (4), Determination of std. size(1), Determination of leaf lengths (4) Determination of deflection (2) (15)
- 8 a) Strength comparison (2), stiffness comparison (3) (5)
- b) Sketch of the loading configuration (2) Estimation of maximum Horizontal and vertical bending moment (4) Determination of Torque(2) Determination of Resultant B.M(2) Determination of diameter (4) Selection of standard diameter of shaft (1) (15)
- 9 a) Sketch (1) providing shearing and crushing stresses (4) (5)
- b) Sketch of coupling (3) Estimation of torque(2) Hub Design (2) Dimensions of Flange and checking induced stresses (2) Design of pin and checking induced stresses(2) Design of bush(2) Design of key (2) (15)
