

Code No: R161205

R16**SET - 1****I B. Tech II Semester Regular/Supplementary Examinations, April/May - 2018****ELEMENTS OF MECHANICAL ENGINEERING**

(Com. to CHEM, PCE, PE)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answering the question in **Part-A** is Compulsory3. Answer any **FOUR** Questions from **Part-B**

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**PART -A**

1. a) Give the relation between E, N, and K. Mention its importance. (2M)
- b) Explain the theory of simple bending. (3M)
- c) Give a brief note on Lamé's equation. (3M)
- d) List out the uses of compressed air. (2M)
- e) Sketch basic engine components and give its nomenclature. (2M)
- f) Define velocity ratio and slip and give the expressions for the same. (2M)

**PART -B**

2. a) Explain the typical stress-strain curve with a neat sketch, obtained from a direct tension test on a mild steel rod and explain the salient points. (7M)
- b) A 500 mm diameter circular reinforced concrete column is having 8 bars of 20 mm diameter. The column is subjected to an axial thrust of 875 kN. Determine the stresses developed in concrete and steel. Assume  $E_{\text{steel}} = 12E_{\text{concrete}}$ . (7M)
3. Define Neutral axis. Sketch the bending stress distribution across the cross section of a rectangular beam section  $230 \times 400$  mm subjected to 60 kNm moment. (14M)
4. Compare the values of maximum and minimum hoop stresses for a cast steel cylindrical shell of 600 mm external dia. and 400 mm internal dia. subjected to a pressure of  $30 \text{ N/mm}^2$  applied. (14M)
  - (a) Internally
  - (b) Externally
5. Discuss boiler mountings and accessories with neat sketches. (14M)
6. a) Illustrate the constructional details of an I.C engines. Explain briefly about important components. (7M)
- b) How do you classify I.C. Engines? Explain in detail. (7M)
7. a) A shaft runs at 80 rpm and drives another shaft at 150rpm through belt drive. The Diameter of the driving pulley is 600mm. Determine the diameter of the driven pulley in the following cases: (9M)
  - i. Neglecting belt thickness.
  - ii. Taking belt thickness as 5mm.
  - iii. Assuming for case (ii) a total slip of 4% and
  - iv. Assuming for case (ii) a slip of 2% on each pulley.
- b) Discuss Epicyclic gear train with a neat sketch. (5M)