Code No: R161232 **R16** SET - 1

I B. Tech II Semester Supplementary Examinations, July/August- 2021
ELEMENTS OF MECHANICAL ENGINEERING
(Civil Engineering)

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 Compulsory
3. Answer any **FOUR** Questions from **Part-B**

~~~~~~

PART –A

1. a) Write the advantages of water tube boiler. (2M)
   b) Explain the principle of extrusion in metal forming. (2M)
   c) What is the function of a refrigerant in a refrigeration system? Name any two refrigerants. (3M)
   d) Define brake thermal efficiency and indicated thermal efficiency. (2M)
   e) What are the advantages of Belt drives? (2M)
   f) Define pitch circle diameter, Addendum circle and dedendum circle of gear. (3M)

PART -B

2. a) Explain the working of Rankine cycle used in steam power plant. (6M)
   b) What are boiler mountings and accessories? Explain the working of any one Boiler mounting with the help of neat sketch. (8M)

3. a) Differentiate between soldering and brazing. Write their applications, advantages and disadvantages. (7M)
   b) Explain the steps involved in making a casting. (7M)

4. a) Explain the working of a reciprocating air compressor and derive the expression for its work done. (7M)
   b) Differentiate between vapour compressions refrigeration system and vapour absorption refrigeration system. (7M)

5. a) Explain the working of four stroke SI engine with relevant sketches. (8M)
   b) Following observations were recorded during a test on a single cylinder A Stroke oil engine. (7M)
   Bore = 300 mm; Stroke = 450 mm; Speed = 300 r.p.m; IMEP = 6 bar; Net brake load = 1.5 kN; Brake drum diameter = 1.8 m; Brake rope diameter = 2 cm;
   Calculate : (i) Indicated Power
   (ii) Brake Power
   (iii) Mechanical efficiency
~~~~~~

6. a) Derive the expression to calculate the length of a cross belt drive. (7M)

   b) A rope drive is required to transmit 230 kW from a pulley of 1 meter diameter running at 450 r.p.m. The safe pull in each rope is 800 N and the mass of the rope is 0.46 kg per meter length. The angle of lap and the groove angle are 160^0 and 45^0 respectively. If the coefficient of friction between the rope and the pulley is 0.3, find the number of ropes required. (7M)

7. a) State and prove the law of gearing. Show that involute profile satisfies the conditions for correct gearing. (7M)

   b) In a reverted gear train, as shown in Fig., two shafts A and B are in the same straight line and are geared together through an intermediate parallel shaft C. The gears connecting the shafts A and C have a module of 2 mm and those connecting the shafts C and B have a module of 4.5 mm. The speed of shaft A is to be about but greater than 12 times the speed of shaft B, and the ratio at each reduction is same. Find suitable number of teeth for gears. The number of teeth of each gear is to be a minimum but not less than 16. Also find the exact velocity ratio and the distance of shaft C from A and B. (7M)