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Code No.: 22312 AS

**VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD**  
**B.E. (E.C.E.) II Year II-Semester Advanced Supplementary Examinations, June/July-2017**

**Elements of Mechanical Engineering**

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

**Part-A (10 × 2 = 20 Marks)**

1. Define entropy and state its units.
2. A single cylinder four stroke diesel engine is rotating with a speed of 1500 rpm. Calculate the number of working strokes and draw the diesel cycle on P-v plane.
3. State Fourier law of conduction along with mathematical expression.
4. List various applications of heat exchangers.
5. Define COP of refrigeration.
6. Write the advantages aqua-ammonia-vapor absorption refrigeration system over vapor compression refrigeration system.
7. Give engineering applications of Welding and Brazing.
8. Specify the operations that can be performed on shaping machine.
9. Name the profiles that are used on gear teeth.
10. Define kinematic pair and link.

**Part-B (5 × 10 = 50 Marks)**

11. a) Calculate the volume of the engine (cc of engine) required to produce a power of 5 kW at 600 r.p.m. with four stroke diesel engine. Take mean effective pressure of the gas as 20bar. [5]  
b) Describe the working of single stage reciprocating air compressor with a neat sketch and draw various processes on P-v plane. [5]
12. a) The temperatures at the ends of a 10 cm thick slab are 100°C and 10°C respectively under Steady state condition. Find i) Heat flux in the slab and ii) The temperature at the mid of the slab if thermal conductivity of slab is 15W/m-°C. [5]  
b) Give the classification of heat exchangers and derive the expression for the LMTD of a counter flow heat exchanger. [5]
13. a) State common properties of refrigerants and list the ecofriendly refrigerants. [4]  
b) Sketch and explain various psychrometric processes with the help of psychrometric chart. [6]
14. a) Classify the welding processes and describe the equipments needed for arc welding. [5]  
b) Explain with sketches working of different rolling mills. [5]
15. a) A driving pulley of 1.5m diameter runs at 200 r.p.m. The tension in the tight and slack sides of the belt are 750 N and 400 N respectively. Determine the power transmitted by belt. [5]  
b) Describe the working of a reverted gear train. [5]

16. a) Apply SFEE (Steady flow energy equation) for an open system and explain various terms in it. [4]
- b) The Engine oil at  $150^{\circ}\text{C}$  is cooled at  $80^{\circ}\text{C}$  in a parallel flow heat exchanger by water entering at  $25^{\circ}\text{C}$  and leaving at  $60^{\circ}\text{C}$ . Determine LMTD of i) Parallel flow mode and ii) Counter flow mode and give your observations on the result. [6]
17. Write short notes on any *two* of the following:
- a) Working of Air refrigeration system. [5]
  - b) Die casting. [5]
  - c) Epicyclic gear train. [5]

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