

USN

--	--	--	--	--	--	--	--	--	--

**CMRIT LIBRARY**  
 BANGALORE - 560 037

10EME14/24

**First/Second Semester B.E. Degree Examination, June/July 2018**  
**Elements of Mechanical Engineering**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, choosing at least two from each part.**

**PART – A**

- 1 a. Choose the correct answers for the following :
- i) The energy coming from the outer space to the earth is  
 A) Income energy B) Internal energy  
 C) Capital energy D) External energy.
- ii) The temperature at which the water starts to boil at the stated pressure is called  
 A) Superheated temperature B) Saturated temperature  
 C) Semi saturated temperate D) None
- iii) Quality of wet steam is decided by  
 A) Its temperature B) Pressure C) Dryness fraction D) None
- iv) The function of mountings in a boiler is  
 A) Operation and safety of boiler B) Safety of boiler  
 C) To increase the efficiency D) All of the above **(04 Marks)**
- b. Determine the density of 1kg of steam initially at a pressure of 10 bar having dryness fraction of 0.78. If 500 kJ of heat is added at constant pressure, determine the condition and internal energy of steam. Assume  $C_{PS} = 2.1$  kJ/kg K.  
 [From steam tables, at  $P = 10\text{bar}$ ,  $t_s = 179.9^\circ\text{C}$ ,  $h_t = 762.6$  kJ/kg,  $h_{tg} = 2013.6$  kJ/kg,  $V_g = 0.194$  m<sup>3</sup>/kg]. **(06 Marks)**
- c. Explain with a neat sketch, the working principle of a Babcock and Wilcox boiler. **(10 Marks)**
- 2 a. Choose the correct answers for the following :
- i) In impulse turbine  
 A) The steam is initially expands in a nozzle from low pressure to high pressure.  
 B) The steam does not initially expand in the nozzle.  
 C) The steam is initially expands in a nozzle from high pressure to low pressure.  
 D) None of the above.
- ii) In a reaction turbine, the high pressure steam continuously expands.  
 A) Successively in both the fixed and moving blades.  
 B) In fixed blades C) In moving blades D) None
- iii) The advantage of gas turbine over steam turbine is  
 A) Capital and running cost is less  
 B) Lubrication system is simple  
 C) For the same output the space required is very less  
 D) All of the above.
- iv) Thermal efficiency of a steam turbine when compared to a heat engine is  
 A) Low B) High C) Same D) None **(04 Marks)**
- b. With a neat sketch, explain the working of a open cycle gas turbine. **(08 Marks)**
- c. With a neat sketch, explain the working of a Kaplan turbine. **(08 Marks)**

1 of 3

**CMRIT LIBRARY**  
 BANGALORE - 560 037

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
 2. Any revealing of identification, appeal to evaluator and/or equations written eg,  $42+8 = 50$ , will be treated as malpractice.

- 3 a. Choose the correct answers for the following :
- The power developed by the combustion of fuel is transmitted to the Crankshaft by the  
A) Valves                      B) Piston                      C) Cylinder                      D) Flywheel
  - The inside diameter of the cylinder is called  
A) Stroke                      B) Clearance                      C) Bore                      D) Pitch
  - Otto cycle is also known as  
A) Constant pressure cycle                      B) Constant temperature cycle  
C) Constant density cycle                      D) Constant volume cycle
  - The power developed inside the engine cylinder  
A) Horse power                      B) Brake power  
C) Indicated power                      D) Frictional power                      (04 Marks)
- b. With a neat sketch, explain the working principle of a tan stroke diesel engine.                      (08 Marks)
- c. A single cylinder 4-stroke IC engine has a bore of 180mm, stroke of 200mm and a rated speed of 300rpm. Torque on the brake drum is 200N-m and mean effective pressure is 6 bar. It consumes 4 kg of fuel in one hour. The calorific value of the fuel is 42000 kJ/kg. Determine: i) Brake power    ii) Indicated power    iii) Brake thermal efficiency  
iv) Mechanical efficiency.                      (08 Marks)

- 4 a. Choose the correct answers for the following :
- The performance of a refrigeration system is expressed by a term known as  
A) Mechanical efficiency                      B) COP  
C) Thermal efficiency                      D) Overall efficiency
  - The most commonly used refrigerant in vapour absorption refrigeration system is  
A) Freon                      B) CO<sub>2</sub>                      C) SO<sub>2</sub>                      D) NH<sub>3</sub>
  - In a vapour compression refrigeration cycle, the lowest temperature occurs in  
A) Compressor                      B) Condenser                      C) Expansion valve                      D) Evaporator
  - The chemical name of Freon-12 refrigerant is  
A) Dichloro Methane                      B) Dichloro difluoro methane  
C) Dichloro Ethane                      D) Difluoro Ethane                      (04 Marks)
- b. Explain with neat sketch, the working of a vapour compression refrigerator.                      (08 Marks)
- c. With a neat sketch, explain the working of room air conditioner.                      (08 Marks)

**PART – B**

- 5 a. Choose the correct answers for the following :
- \_\_\_\_\_ is the mother of all machine tools  
A) Drilling machine                      B) Lathe  
C) Milling machine                      D) Planning machine
  - The operation of producing conical seating at the end of a hole is called  
A) Counter boring                      B) Reaming                      C) Counter sinking                      D) Boring
  - The process of cutting internal threads with a thread cutting tool is called  
A) Reaming                      B) Tapping                      C) Counter sinking                      D) Counter boring
  - \_\_\_\_\_ is not a drilling operation  
A) Taper turning                      B) Tapping                      C) Reaming                      D) Spot facing                      (04 Marks)
- b. With a neat sketch, explain the following machining operations:  
i) Counter boring    ii) Knurling    iii) Taper turning.                      (09 Marks)
- c. With the help of a sketch, indicate the specifications of a lathe.                      (07 Marks)

- 6 a. Choose the correct answers for the following :
- Milling cutter in horizontal milling machine is hold in \_\_\_\_\_  
A) Over arm                      B) Column                      C) Arbor                      D) Knee
  - The milling cutter is  
A) Multi point cutting tool                      B) Single point cutting tool  
C) Abrasive cutting tool                      D) Double point cutting tool
  - Surface grinding machines are employed to finish  
A) Plane surface                      B) Curved surface                      C) Tapered surface                      D) All of these
  - To finish the inside diameter of the circular holes, the grinder used is  
A) Surface grinders                      B) Internal grinders  
C) Cylindrical grinders                      D) Centreless grinders                      (04 Marks)
- b. Draw a neat sketch of horizontal milling machine and explain its working. (08 Marks)
- c. Explain any two milling operations. (02 Marks)
- d. Sketch and explain the following operations: i) Surface grinding ii) Cylindrical grinding. (06 Marks)
- 7 a. Choose correct answers for the following :
- Fusion welding is also known as \_\_\_\_\_  
A) Pressure welding                      B) Resistance welding  
C) Non-pressure welding                      D) Thermit welding
  - Filler material used in welding is  
A) Spelter                      B) Same material that of base metal  
C) Solder                      D) None
  - The function of a lubricant is  
A) To minimize the frictional power loss  
B) To minimize the wear of the rubbing parts  
C) To minimize the corrosion  
D) All of the above
  - The most commonly used semisolid lubricant is  
A) Graphite                      B) Grease                      C) Mica                      D) Soap stone                      (04 Marks)
- b. What are the desirable properties of a good lubricant? (06 Marks)
- c. Distinguish between soldering, brazing and welding. (06 Marks)
- d. Describe the drop dead oil lubrication with neat sketches. (04 Marks)
- 8 a. Choose the correct answers for the following :
- The pulley which is used to increase the arc of contact is  
A) Stepped pulley                      B) Speed cone  
C) Jockey pulley                      D) Fast and loose pulley
  - Speeds and diameter of the pulleys are  
A) Inversely proportional                      B) Directly proportional  
C) Not related                      D) None of the above
  - Which of the following gear is used to obtain high velocity ratio  
A) Spur gear                      B) Helical gear                      C) Bevel gear                      D) Worm gear
  - To convert the rotary motion into linear motion which of the following gear is used?  
A) Spur gear                      B) Bevel gear  
C) Rack and pinion                      D) All of the above                      (04 Marks)
- b. Briefly explain jockey pulley with a neat sketch. (04 Marks)
- c. Explain following gears:  
i) Spur gear    ii) Helical gear    iii) Bevel gear    iv) Rack and pinion. (08 Marks)
- d. Two pulleys are connected by a crossed belt. The velocity ratio is 3, the driving pulley runs at 500rpm and of 2400mm in diameter. Find the speed and the diameter of driven pulley. (04 Marks)