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**P.E.S. College of Engineering, Mandya - 571 401**  
 (An Autonomous Institution affiliated to VTU, Belagavi)  
**Second Sem, B.E. - Semester End Examination; May / June - 2019**  
**Elements of Mechanical Engineering**  
 (Common to All Branches)

Time: 3 hrs

Max. Marks: 100

### Course Outcomes

The Students will be able to:

CO1: Compare different types of milling operations, Internal combustion engines and process of metal joining method related to production and transportation.

CO2: Explain stages of steam formation and working principle of steam turbines.

CO3: Analyze and compile different methods of refrigeration system and belt drives.

CO4: Solve the problems related to effectiveness of IC engine and power transmission system.

**Note:** Answer **FIVE** full questions, selecting **ONE** full question from each **Unit**.

Q. No.	Questions	Marks	COs	BL	POs
<b>UNIT - I</b>					
1 a)	Briefly classify the boilers.	6	CO1	L1	PO1
b)	Define the following terms :				
	i) Dryness fraction      ii) Dry saturated steam	8	CO1	L1	PO1
	iii) Wet steam      iv) Superheated steam				
c)	List the applications of boilers.	6	CO1	L1	PO1
2 a)	Differentiate between impulse steam turbine and reaction steam turbine.	10	CO1	L1	PO1
b)	Sketch and explain working of closed cycle gas turbine.	10	CO2	L2	PO1
<b>UNIT - II</b>					
3 a)	With neat sketches, explain the working of 4 stroke diesel engine with P-V diagram.	12	CO2	L2	PO1
b)	A single cylinder 4-s petrol engine runs at 1000 rpm, having a bore of 115 mm and stroke of 140 mm. The brake load is 6 kg at 600 mm radius and has mechanical efficiency of 80%. Calculate the brake power and the mean effective pressure.	8	CO4	L3	PO2
4 a)	The following observations were recorded during a test on 4-stroke diesel engine: cylinder diameter = 25 cm, stroke of piston = 40 cm, crankshaft speed = 250 rpm, net load on the brake drum = 700 N, brake drum diameter = 2 m, mean effective pressure = 6 bar, diesel oil consumption = 0.0013 kg/s, specific gravity of diesel = 0.78, calorific value of diesel = 43900 kJ/kg. Find brake power, indicated power, mechanical efficiency, brake thermal efficiency and indicated thermal efficiency.	10	CO4	L3	PO2

- b) Differentiate between spark ignition (S.I.) and compression ignition (C.I.) engine. 10 CO1 L1 PO1

### UNIT - III

- 5 a) List the parts of a centrifugal pump. Sketch and explain the working of centrifugal pump. 8 CO2 L2 PO1
- b) Differentiate between centrifugal pump and reciprocating pump. 8 CO1 L1 PO1
- c) Compare positive displacement pump and Roto-dynamic pumps. 4 CO1 L1 PO1
- 6 a) Define the following terms :
- i) Ton of refrigeration      ii) Coefficient of performance 10 CO1 L1 PO1
- iii) Ice making capacity      iv) Refrigerant      v) Refrigerating effect
- b) With a neat sketch, explain the working of room air conditioner. 10 CO2 L2 PO1

### UNIT - IV

- 7 a) Give the specifications of a lathe. 6 CO1 L1 PO1
- b) Sketch and explain the following operations :
- i) Taper turning      ii) Tapping      iii) Boring 6 CO2 L2 PO1
- c) With a neat sketch, explain radial drilling machine, indicating major parts. 8 CO2 L2 PO1
- 8 a) Define grinding. Explain Centerless grinding machine with a neat sketch. 11 CO2 L2 PO1
- b) Explain the following operations with suitable sketches :
- i) Slot milling      ii) End milling      iii) Slab milling 9 CO2 L2 PO1

### UNIT - V

- 9 a) Differentiate between soldering, brazing and welding. 8 CO1 L1 PO1
- b) Sketch and explain electric arc welding process. 8 CO2 L2 PO1
- c) Mention the applications of welding. 4 CO1 L1 PO1
- 10 a) Power is transmitted by an open belt drive from a pulley 300 mm diameter running at 600 rpm to a pulley of 500 mm diameter. The distance between the center lines of the shafts is 1 m and the coefficient of friction in the belt drive is 0.25. If the safe pull in the belt is not to exceed 500 N, determine the power transmitted by the belt drive. Also find the length of belt required. 10 CO4 L3 PO2
- b) Derive an expression for length of open belt drive. 10 CO3 L3 PO2

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