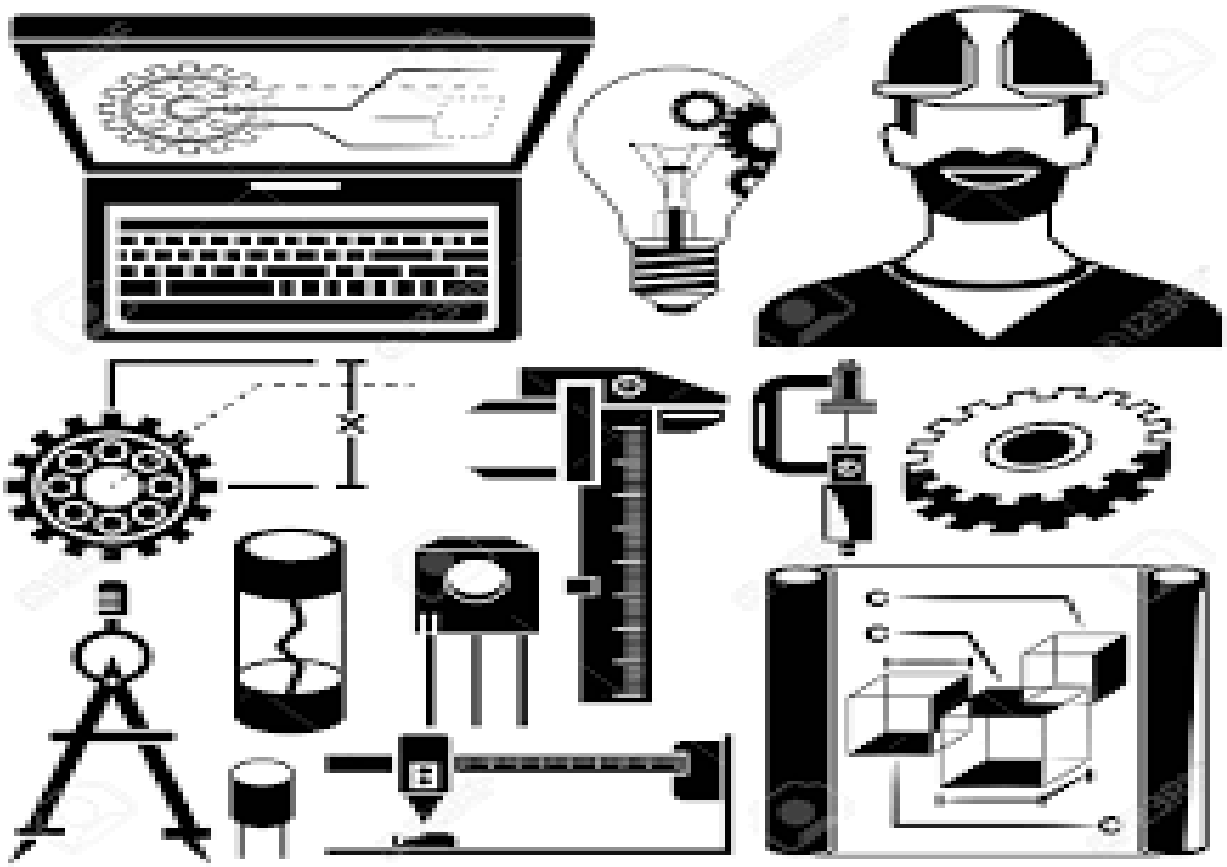
ELEMENT OF MECHANICAL ENGINEERING

TH-3&4



BRANCH-EE/EEENGINEERING

SEMESTER-3RD

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CHAPTER-01

QUESTION FOR 2 MARK

1. What is thermodynamic.

2.Unit of heat.

3.Unit of work.

4.Define 1st law of thermodynamic

5.Define Boyles law.

6.what is Charles law?

QUESTION FOR 10 MARK

1 . Determine relationship of specific heat of gases at constant volume and constant pressure.

2. Q11. Calculate the decrease in temperature (in Celsius) when 2.00 L at 21.0 °C is compressed to 1.00 L.

3. A gas occupies a volume of 600.0 mL at a temperature of 20.0 °C. What will be its volume at 60.0 °C?

4. A gas occupies a volume of 900.0 mL at a temperature of 27.0 °C. What is the volume at 132.0 °C?

5. What change in volume results if 60.0 mL of gas is cooled from 33.0 °C to 5.00 °C?

6. A gas occupies a volume of 300.0 mL at a temperature of 17.0 °C. What is the volume at 10.0 °C?

7. A helium balloon has a volume of 735 mL at ground level. The balloon is transported to an elevation of 5 km, where the pressure is 0.8 atm. At this altitude, the gas occupies a volume of 1286 mL. Assuming that the temperature is constant, what was the ground level pressure?

8. A sample of oxygen gas has a volume of 225 mL when its pressure is 1.12 atm. What will the volume of the gas be at a pressure of 0.98 atm if the temperature remains constant?
9. An ideal gas occupying a 2.0 L flask at 760 torrs is allowed to expand to a volume of 6,000 mL. Calculate the final pressure
10. A gas occupies a volume of 1 L and exerts a pressure of 400 kPa on the walls of its container. What would be the pressure exerted by the gas if it is completely transferred into a new container having a volume of 3 litres (assuming that the temperature and amount of the gas remain the same.)?
11. A gas exerts a pressure of 3 kPa on the walls of container 1. When container one is emptied into a 10 litre container, the pressure exerted by the gas increases to 6 kPa. Find the volume of container 1. Assume that the temperature and amount of the gas remain the same.

CHAPTER-02

QUESTION FOR 2 MARK

1.What is steam?

2.How many types of steam.

3.Define dry steam

4.Define wet steam.

5.Define wet steam.

QUESTION FOR 10 MARK

1.Saturated water at 10 bar is fed to a heat exchanger with a flow rate of 10 kg/min. It is heated isobarically to 300°C.

i. Calculate the final state of the water.

ii. Calculate the change in enthalpy in kW.

2.When water at 10 MPa and 200°C expands through a throttle to a final pressure of 0.5 MPa, the enthalpy does not change because the throttle is assumed to be adiabatic and no shaft work is done. What is the final state of the water?

CHAPTER-03

QUESTION FOR 2&10 MARK

1.What is boiler?

2.State types of boiler.

3. Describe Cochran boiler working and its application.

4.Describe Babcock Wilcox boiler working and its application.

5 . Describe Mountings and accessories working and its application.

CHAPTER-04

1.What is indicator diagram.

2. A two stroke cycle internal combustion engine has a mean effective pressure of 6 bar. The speed of the engine is 1000 r.p.m. If the diameter of piston and stroke are 110 mm and 140 mm respectively, find the indicated power developed.

3. A 4-cylinder four-stroke petrol engine develops 14.7 kW at 1000 r.p.m. The mean effective pressure is 5.5 bar, Calculate the bore and stroke of the engine, if the length of stroke is 1.5 times the bore.

4. A rope brake was used to measure the brake power of a single cylinder, four stroke cycle petrol engine. It was found that the torque due to brake load is 175 N-m and the engine makes 500 r. p.m. Determine the brake power developed by the engine.

5. A single cylinder, four stroke cycle oil engine is fitted with a rope brake. The diameter of the brake wheel is 600 mm and the rope diameter is 26 mm. The dead load on the brake is 200 N and the spring balance reads 30 N. If the engine runs at 450 r.p.m. what will be the brake power of the engine?

CHAPTER-05&7

1.Whar is turbine?

2.State types of turbine

3.Define reaction turbine

4.Define impulse turbine

5. Differentiate between impulse and reaction Turbine.

6. Classify steam turbines based on different criteria.

7. Define an impulse turbine and explain its operation with a neat sketch.
8. Define a reaction turbine and explain its operation with a neat sketch.
9. What are water turbines? How are water turbines classified?
10. Explain the principle of operation of Pelton wheel with the help of a neat sketch and also mention its application, advantages and disadvantages.

11. Explain the principle of operation of Francis turbine with the help of a neat sketch and also mention its application, advantages and disadvantages.

12. Explain the principle of operation of Kaplan turbine with the help of a neat sketch and also mention its application, advantages and disadvantages.

13.Differentiate between impulse turbine and reaction turbines.

14. What is an IC engine? Classify IC engines based on different criteria.

15. Draw the neat labeled sketch of an IC engine and explain the functions of all the parts.

16. With a neat sketch explain the working of 4 stroke petrol engine with the help of a p-v diagram.

17. With a neat sketch explain the working of 4 stroke diesel engine with the help of a p-v diagram.

18. With a neat sketch explain the working of 2 stroke petrol engine with the help of a p-v diagram.

19. Differentiate between 4 stroke and 2 stroke IC engines.

20. Differentiate between petrol and diesel engines.

21. Following data was collected from a 4 stroke single cylinder petrol engineat full load. Bore = 200 mm, Stroke = 280mm, speed = 300rpm, indicated mean effective pressure = 5.6 bar, torque on the brake drum = 250Nm, fuel consumed = 4.2 kg/hour, calorific value of fuel = 41000 kJ/kg. Determine mechanical efficiency, indicated thermal efficiency and brake thermal efficiency.

22. A single cylinder two stroke petrol engine develops 7.5kW at 2500 rpm. The mean effective pressure on the piston is 8 bar and mechanical efficiency is 80% Calculate the diameter and stroke of the cylinder if stroke to bore ratio is 1.5. Also calculate the fuel consumption rate if brake thermal efficiency is 28%. The calorific value of the fuel is 43900 kJ/kg.

23. A four stroke diesel engine has a piston diameter 250mm and stroke 400mm. The mean effective pressure is 4 bar and the speed is 500 rpm. The diameter of the brake drum is 1000mm and the effective brake load is 400N. Find IP, BP and FP.

24. A single cylinder 4-stroke IC engine has bore = 180mm, stroke = 200mm, speed = 300 rpm, torque on the brake drum = 200Nm, mean effective pressure = 6 bar. It consumes 4kgs of fuel every hour. The calorific value of fuel = 42000KJ/kg. Determine BP, IP, brake thermal efficiency and mechanical efficiency.

25.A single cylinder four stroke engine runs at 1000 rpm has a bore of 115mm and a stroke of 140mm. The brake load is 6 kgs at 600mm radius and the mechanical efficiency is 80%. Calculate BP and the mean effective pressure.