

**B.Tech. MECHANICAL ENGINEERING
(COMPUTER INTEGRATED
MANUFACTURING)**

Term-End Examination

00633

June, 2018

BME-031 : ENERGY CONVERSION

Time : 3 hours

Maximum Marks : 70

Note : Attempt any seven questions. All questions carry equal marks. Use of scientific calculator is permitted.

1. (a) What are the drawbacks of hydropower plant due to which its share in total electricity power generation has reduced ?
(b) How do you classify internal combustion engines ? Mention cycles on which these engines work. Why is it necessary to cool an I.C. engine ? 5+5

2. (a) Distinguish between throttling process and adiabatic process.

- (b) Sketch Babcock and Wilcox boiler. Show the position of superheater on it. Why are the tubes in this boiler inclined ? Show the path of hot gases. 5+5
3. (a) Explain a biogas generating system with a neat sketch.
- (b) Describe the working principles of reaction steam turbine with the help of a neat sketch. 5+5
4. (a) Discuss with a neat sketch, the evaporative condenser.
- (b) What are octane number and cetane number ? Also explain knocking and anti-knocking characteristics of fuel. 5+5
5. (a) Describe fluidised bed combustion with a neat sketch.
- (b) Describe the cycle of operation of a two-stroke diesel engine with a neat sketch. 5+5
6. (a) A jet strikes a fixed curved vane at an angle of β and leaves it at an angle of α . The angles are measured between the direction of jet and central line (normal to curve). What force will be acting on the vane along the central line ? If the vane is semi-circular, find the force.

- (b) In a 50% reaction turbine stage, the tangential component of absolute velocity of rotor inlet is 537 m/sec and blade velocity is 454 m/sec. Calculate the power output in kW per kg of steam. 5+5
7. (a) Distinguish between fire-tube boiler and water-tube boiler. Give examples. In which case will the thickness of drum of water be less if two types of same capacity are compared ?
- (b) Define 'indicated' and 'brake power' of an engine. Also define 'mean effective pressure'. Show how you would calculate IP. 5+5
8. (a) Describe the proximate and ultimate analysis of coal. How do you find the water content in coal ? Mention the liquid fuels that are used in boilers.
- (b) A single-stage impulse turbine with a diameter of 120 cm runs at 3000 rpm. If the blade speed ratio is 0.42, then calculate the inlet velocity of steam. 5+5
9. (a) Derive the formula for efficiency of the Otto-cycle.
- (b) The isentropic enthalpy drop in moving blade is two-third of the isentropic enthalpy drop in fixed blades of a turbine. Determine the degree of reaction. 5+5

10. (a) What is the function of spark plug in a petrol engine ? How does combustion occur in diesel engine ? Give simple sketch of a spark plug.

(b) In a gas turbine cycle, the turbine output is 600 kJ/kg, the compressor work is 400 kJ/kg and the heat supplied is 1000 kJ/kg. Determine the efficiency of this cycle.

5+5