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398, Ramkrishnapur Road, Barasat
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BRAINWARE UNIVERSITY

Term End Examination 2025-2026

Programme – Dip.ME-2024

Course Name – Thermal Engineering-II

Course Code - DME40110

(Semester IV)

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

- (i) Select the process of heat rejection in Diesel cycle.
 - a) Constant pressure
 - b) Constant volume
 - c) Isothermal
 - d) Isentropic
- (ii) Classify the assumption simplifying chemical reaction effects in air standard analysis.
 - a) Ideal gas assumption
 - b) Closed cycle
 - c) Heat transfer model
 - d) Neglect of combustion chemistry
- (iii) Find the cycle operating with constant pressure heat addition.
 - a) Otto cycle
 - b) Diesel cycle
 - c) Stirling cycle
 - d) Carnot cycle
- (iv) Identify the component responsible for pressure rise in Brayton cycle.
 - a) Turbine
 - b) Combustion chamber
 - c) Compressor
 - d) Regenerator
- (v) Select the Brayton cycle modification improving thermal efficiency.
 - a) Reheating
 - b) Regeneration
 - c) Simple compression
 - d) Throttling
- (vi) Find the reason for combining intercooling and reheating.
 - a) Reduce heat rejection
 - b) Increase net work output
 - c) Reduce fuel flow
 - d) Reduce pressure losses
- (vii) Identify the phenomenon of uncontrolled combustion in SI engines.
 - a) Pre ignition
 - b) Scavenging
 - c) Supercharging
 - d) Vaporization
- (viii) Identify the device supplying fuel in SI engines.
 - a) Injector
 - b) Carburetor
 - c) Fuel pump
 - d) Nozzle

- (ix) Find the relation between indicated power and brake power.
- IP greater than BP
 - IP equal to BP
 - BP greater than IP
 - Both zero
- (x) Identify the condenser maintaining low exhaust pressure.
- Jet condenser
 - Surface condenser
 - Evaporator
 - Feed heater
- (xi) Find the boiler component reducing moisture content of steam.
- Economiser
 - Superheater
 - Air preheater
 - Feed pump
- (xii) Find the boiler test used to evaluate overall performance.
- Hydraulic test
 - Boiler trial
 - Flue gas analysis
 - Combustion test
- (xiii) Identify the condition for minimum work in multistage compression.
- Unequal pressure ratio
 - Equal pressure ratio
 - Maximum temperature
 - Zero intercooling
- (xiv) Find the turbine compounding method using velocity reduction only.
- Pressure compounding
 - Velocity compounding
 - Pressure velocity compounding
 - Reaction compounding
- (xv) Find the compressor type suitable for large volume and low pressure.
- Reciprocating
 - Centrifugal
 - Piston
 - Diaphragm

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Group-B

(Short Answer Type Questions)

3 x 5=15

- List the thermodynamic processes of Dual cycle and Draw the P-V and T-S diagram of Dual cycle. (3)
- Explain the purpose of reheating in Brayton cycle. (3)
- Distinguish between spark ignition engine and compression ignition engine. (3)
- Explain the phenomenon of pre-ignition in SI engines. (3)
- Classify compressors based on principle of operation. (3)

OR

Describe volumetric efficiency of a compressor. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

- Derive the expression for air standard efficiency of Diesel cycle. (5)
- A single-cylinder, four-stroke petrol engine develops a brake power of 10 kW at 3000 rpm. The fuel consumption is 3 kg/hr and calorific value of fuel is 44,000 kJ/kg. Determine the brake thermal efficiency of the engine. (5)
- Describe the construction and working of a Lancashire boiler. (5)
- A single-stage reciprocating compressor compresses air from 1 bar to 6 bar. The suction temperature is 300 K. Compression follows isothermal law. Find the work of compression per kg of air. ($R = 0.287 \text{ kJ/kg}\cdot\text{K}$) (5)
- In an air-standard Diesel cycle, air enters at 1 bar and 290 K. The compression ratio is 15 and cut-off ratio is 2. Find the heat supplied per kg of air. (5)
- A gas turbine plant operates on an ideal Brayton cycle. Air enters the compressor at 300 K and the turbine inlet temperature is 1400 K. The pressure ratio is 10. Determine (a) compressor work, (b) turbine work, and (c) net work output per kg of air. (5)

OR

In a Brayton cycle, air enters the compressor at 300 K and 1 bar and is compressed to 6 bar. (5)
The maximum temperature of the cycle is 1250 K. Calculate (a) compressor work, (b) turbine work, and (c) net work output.

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