

DEPARTMENT OF MECHANICAL ENGINEERING

Course Code & Name : **23GET102 – Basic Civil & Mechanical Engineering**

Course Faculty : **Mr. C. Subramanian**

Question Bank

Unit IV- IC Engines and Power Plant Engineering – CO4

Part A- Two Mark Questions

Sl.No	Question	Blooms Level	Industry / Company
1.	Define internal combustion engine and state its role as an automobile power plant.	Rem	GATE 2018 (ME)
2.	Explain the basic working principle of a petrol engine.	Und	ISRO 2020
3.	Convert the efficiency of a diesel engine from 40% to its equivalent in terms of fuel consumption rate.	App	BARC 2019
4.	Derive the basic cycle diagram for a four-stroke engine.	Ana	Tata Motors
5.	Explain the difference between four-stroke and two-stroke cycles with a simple example.	Und	GATE 2017 (ME)
6.	Define power plant and distinguish between renewable and non-renewable types.	Rem	ESE 2021 (IES)
7.	Construct a simple diagram to represent the working of a steam power plant.	Cre	BEL 2022
8.	Define the working principle of a gas power plant and describe its cycle nature.	Rem	GATE 2019 (ME)
9.	Illustrate the merits and demerits of a diesel power plant vectorially in a comparison chart.	App	Industry (Automotive Sector)
10.	Define hydroelectric power plant and provide an example from daily life.	Rem	DRDO 2021
11.	State the classification of power plants briefly.	Rem	GATE 2020 (ME)
12.	Explain the working principle of a nuclear power plant.	Und	ISRO 2019
13.	Resolve the components of a solar power plant into basic elements.	App	BARC 2020
14.	Describe the introduction to power plants and state the Brayton cycle for gas plants.	Und	GATE 2016 (ME)

15.	Calculate the thermal efficiency difference between petrol and diesel engines (assume values: 30% and 40%).	App	Industry (Automotive Sector)
16.	State the merits and demerits of hydro-electric power plants.	Rem	ESE 2022
17.	Illustrate the two-stroke cycle with a sketch.	Cre	GATE 2015 (ME)
18.	Explain the purpose of classification in power plants.	Und	HAL 2021
19.	Construct a comparison table for merits and demerits of steam and gas power plants.	Cre	BHEL
20.	Analyze the working principle of a diesel engine and correct any misconception about its ignition.	Ana	GATE 2021 (PI)
21.	State the Otto cycle for petrol engines.	Rem	ONGC 2020
22.	Define solar power plant and give an example of its application.	Rem	BHEL 2019
23.	Explain why nuclear power plants are considered base load stations.	Und	GATE 2014 (ME)
24.	Analyze the demerits of internal combustion engines in automobiles.	Ana	Industry (Aerospace)
25.	Convert the power output of a hydro plant from MW to HP (use 1 MW = 1341 HP) and verify consistency.	App	Industry (Renewable Energy)

Part B 16 Mark Questions

Sl.No	Question	Blooms Level	Industry / Company
1	Case: A petrol engine in a car operates on a four-stroke cycle with compression ratio 8:1. (i) Construct the cycle diagram. (ii) Resolve the working principle into phases. (iii) Analyze efficiency using Otto cycle formula. (iv) Evaluate merits and demerits if switched to two-stroke.	Ana	GATE 2019 (ME)
2	Case: A diesel power plant generates 500 kW with fuel consumption 0.3 kg/kWh (efficiency 35%). (i) Construct vector representation of the diesel cycle. (ii) Resolve working principle and calculate heat input. (iii) Apply classification to compare with gas plant. (iv) Compose merits and demerits.	App	ISRO 2021 - Power Scenario
3	Case: A steam power plant uses Rankine cycle with boiler pressure 100 bar (turbine efficiency 85%). (i) Create the cycle diagram. (ii) Resolve components like boiler and turbine. (iii) Compose thermal efficiency. (iv) Analyze demerits if coal-fired.	Ana	Industry (Power Generation)

4	Case: Three power plants compared: hydro (100 MW), nuclear (500 MW), solar (50 MW). (i) Construct classification diagram. (ii) Apply working principles to check feasibility. (iii) If solar underperforms, calculate resultant output. (iv) Create merits/demerits table and analyze.	App	GATE 2020 (ME)
5	Case: A gas turbine power plant operates on Brayton cycle (compressor ratio 10:1). (i) Construct vector representation of cycle stages. (ii) Resolve and compose efficiencies. (iii) Create comparison with diesel plant. (iv) Analyze merits if fuel changes.	Cre	BARC 2022 - Energy Design
6	Case: A hydroelectric plant with 200 m head generates 300 MW (efficiency 90%). (i) Create working principle diagram. (ii) Resolve flow rate components. (iii) Calculate power if head increases 20%. (iv) Analyze demerits in dry season.	App	ESE 2021 (IES) - Hydro
7	Case: Nuclear power plant with uranium fuel (thermal output 1000 MWth, efficiency 33%). (i) Apply classification for reactor types. (ii) Analyze working principle using fission. (iii) Create merits/demerits for safety. (iv) Evaluate if waste increases.	Ana	Industry (Nuclear Energy Project)
8	Case: A solar power plant with PV panels (capacity 10 MW, insolation 5 kWh/m ² /day). (i) Construct working principle with vectors. (ii) Resolve energy conversion. (iii) Calculate daily output. (iv) Analyze merits and apply if cloudy.	App	GATE 2017 (ME) -
9	Case: Two IC engines compared: petrol (Otto, 30% eff) and diesel (40% eff). (i) Compose cycles vectorially. (ii) Calculate fuel savings for diesel. (iii) Create classification. (iv) Analyze demerits for automobile use.	Ana	DRDO 2020 - Vehicle Mechanics
10	Case: A combined power plant: gas (top) and steam (bottom, overall eff 50%). (i) Construct integrated diagram before/after integration. (ii) Resolve efficiencies pre-integration. (iii) Post-integration: compose outputs and calculate gains. (iv) Apply classification and analyze merits.	App	Industry (Energy/Utility)
11	Case: A two-stroke engine in a motorcycle (displacement 150 cc, power 10 kW). (i) Construct cycle representation. (ii) Resolve phase components. (iii) Create comparison with four-stroke. (iv) Analyze demerits and evaluate pollution effects.	Cre	HAL 2021 - Assembly

12	Case: Classification of power plants under varying loads: base (nuclear), peak (gas). (i) Construct hierarchy diagram. (ii) Resolve and compose working principles. (iii) Analyze subsets using merits/demerits. (iv) Create evaluation if one type fails.	Ana	GATE 2018 (ME) - Adapted
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