



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

InSem Examination - II Summer 2025	
Exam Seat No.:	
Academic Year: 2024-2025	Semester: VI
Class: TY	Program: B.Tech
Branch Code: MEC	Pattern: 2022
Name of Course: Energy Engineering	Course Code: MEC223012
Max. Marks: 30	Duration: 1.15 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains two page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. Assume suitable data wherever required, but justify it. Use of steam tables and Mollier diagram is permitted.
6. The last columns indicates the Course Outcome of the Question/sub-question.

Marks CO

Question No. 1

- 1 a) Discuss the primary energy scenario of India. Also explain sector wise power consumption with pie chart. (7) 1

Question No. 2

- 2 a) What are the methods used to improve the performance of Rankine cycle ? (8) 1

Estimate the mean temperature of heat addition and Rankine cycle efficiency for power plant with the boiler exit conditions as 20 bar, 360° C and condenser pressure as 0.08 bar.

OR

- 2 b) Explain effect regeneration on performance of Rankine cycle. (8) 1

A reheat cycle operating between 30bar and 0.04 bar has a superheat and reheat temperature of 450° C. The first expansion takes place till the steam is dry saturated and then reheat is provided. Neglect feed pump work and determine the ideal cycle efficiency. Also draw the cycle on T-s and h-s plan.

Question No. 3

- 3 a) What are the fixed cost and running cost in power generation? (7) 2

A power plant of 460 MW Capacity has the following particulars

Capital cost = Rs 60,000/kW

Interest and depreciation 18%

Annual load factor = 64%

Annual capacity factor = 56%

Annual running charges = Rs 1.5×10^9

Energy consumed by power plant auxiliaries = 6%

Calculate the reserve capacity and cost of generation in Rs/kWh

Question No. 4

- 4 a) What are the different components of condensing plant? Also write the function of each component. A vacuum of 680 mm of Hg is obtained in condenser when barometer reads 764 mm of Hg. Mean condenser temperature is 36.2°C and cooling water inlet and outlet temperature is 20°C and 32°C respectively. Determine condenser efficiency and vacuum efficiency. Hot well temperature is 30°C (8) 2

OR

- 4 b) The following observations were recorded during a test on a steam condenser. (8) 2

Recorded condenser vacuum = 71 cm of Hg

Barometer reading = 76.5 cm of Hg

Mean condenser temperature = 34°C

Condensate collected = 1800kg/hr

Mass of cooling water = 5700kg/hr

Cooling water temperature rise = 17.5°C

i) Calculate corrected vacuum to standard barometric reading of 76cm of Hg.

ii) Calculate Vacuum Efficiency

iii) Calculate Condenser Efficiency

iv) Write energy balance equation for condenser

v) Calculate dryness fraction of steam at entry of condenser

Assume inlet temperature of cooling water = 8.5°C

..... End of question paper.....