

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/Backlog), Nov.-Dec. 2015

B. Tech in Mechanical Engineering, Semester VII

Roll No.....

ME 728: Power Plant Engineering

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever required are an integral part of the answer.

Q.1A (10 questions @ 1 mark)

10

- i. Enriched uranium is required as a fuel in a nuclear reactor, if light water is used as moderator and coolant, because light water has
 - (A) High neutron absorption cross-section
 - (B) Low moderating efficiency
 - (C) High neutron scatter cross-section
 - (D) Low neutron absorption cross-section
- ii. The efficiency of a nuclear power plant in comparison to conventional and nuclear consideration is
 - (A) Higher cost of nuclear fuel
 - (B) High initial cost
 - (C) High heat rejection in condenser
 - (D) Lower temperature and pressure conditions
- iii. One gram of uranium will produce energy equivalent to approximately
 - (A) 1 tonne of high grade coal
 - (B) 4.5 tonnes of high grade coal
 - (C) 10 tonnes of high grade coal
 - (D) 100 tonnes of high grade coal
- iv. The average ash content in the Indian coal is about
 - (A) 15%
 - (B) 20%
 - (C) 30%
 - (D) 10%
- v. Deaerative heating is done to
 - (A) Heat the water
 - (B) heat the air in the water
 - (C) Remove dissolved gases in the water
 - (D) All of the above
- vi. Device in which the waste heat of the flue gases is utilized for Heating the feed water - _____
- vii. Steam power plant works on _____ cycle.
- viii. In diesel cycle
 - (A) Compression ratio and expansion are equal
 - (B) Compression ratio is greater than expansion ratio
 - (C) Compression ratio is less than expansion ratio
 - (D) Compression ratio = (expansion ratio)²

- ix. Water hammer is developed in.....
 (A) Turbine (B) Surge tank (C) Penstock (D) Dam
- x. The periodic rise and fall of water level of sea is called _____

Q.2 Short answer type questions (4 questions @ 2.5 marks) 10

- What is biofouling?
- Explain how unit energy cost is calculated?
- Draw neat sketch of parabolic trough collector. State its two limitations.
- Describe latent heat and sensible heat recovery in thermal power plant

Q.3A List the four factors to be considered while selecting the site for thermal power plant. Give details of any two factors. 05

Q.3B How the waste heat from nuclear power plant can be used for agriculture and animal shelter? 05

Q.4A Describe with neat sketch the working principle of Magneto Hydrodynamic System (MHD). 05

Q.4B State four system used for generating the power using geothermal energy. Draw labeled diagram of any one system 05

Q.5A Draw open cycle for gas turbine power plant. Write the purpose of combustion chamber in it. 05

Q.5B Calculate the height of chimney required to produce a draught equivalent to 20mm of water if the flue gas temperature is 260°C and the stoichiometric air requirement is 18kg per kg of fuel. Assume 50% excess air for combustion of fuel. 05

Q.6A Write short notes on forced draft and induced draft cooling towers. 05

Q.6B Discuss in detail about the factors which affect the selection of hydraulic turbines. 05

OR

Q.6B Draw the Anderson cycle for OTEC and explain. 05

Q.7A Draw P-V, T-s and H-s diagram of Brayton cycle. 05

Q.7B Draw P-V, T-s and H-s diagram of Rankine cycle. 05

OR

Q.7B Draw P-V, T-s and H-s diagram of Diesel cycle. 05

Q.8A A power station supplies the following loads to the consumer 10

Time in hours	0-6	6-10	10-12	12-16	16-20	20-22	22-24
Loads in MW	20	50	60	40	80	70	40

Find i) Draw the load curve ii) The load factor of power plant iii) What is the load factor of stand by equipment of 20MW capacity if it takes up all loads above 60 MW?

Q.9A Calculate the average binding energy for the following isotopes: 10

- ${}_{92}\text{U}^{235}$
- ${}_{28}\text{Ni}^{59}$
- Heavy Hydrogen

Q.9B Draw liquid metal gas cooled reactor and pressurized water reactor. 10

OR

Q.9B Draw centralized and distributed solar thermal electric power plant. 10