

Code No: 07A7EC11

**R07****Set No. 2**

IV B.Tech I Semester Examinations, MAY 2011

**POWER PLANT ENGINEERING**

Common to Mechanical Engineering, Mechatronics

**Time: 3 hours****Max Marks: 80****Answer any FIVE Questions****All Questions carry equal marks**

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1. (a) What do you understand by thermal pollution? Explain the bad effects of thermal pollution.  
(b) Explain the pollution due to nuclear power plant. [8+8]
2. (a) Classify and compare different gas turbine power plants.  
(b) What is air rate and discuss the factors that affect air rate? [8+8]
3. (a) What do you understand by non - conventional sources of power generation?  
(b) What is the scope of these sources in india and which of them are prominent? [6+10]
4. (a) Write short notes on boiling water reactor.  
(b) How waste is disposed of in a nuclear power station?  
(c) Explain the differences between nuclear and chemical reactors. [5+5+6]
5. (a) Depending on the head at which water is available, how the power plants are classified?  
(b) Explain runoff river plants, storage plants, pumped storage plants in hydraulic power plant. [8+8]
6. A four stroke diesel engine gives the following test results at a speed of 450 rpm.  
Mean effective pressure = 8 bar  
Cylinder bore = 22 cm  
Stroke length = 26 cm  
Specific fuel consumption = 0.4 kg/kw-hr  
Calorific value of fuel = 42000 kJ/kg  
Mechanical efficiency = 38%  
determine  
(a) BP  
(b) IP  
(c) Indicated thermal efficiency  
(d) Brake thermal efficiency. [16]
7. (a) Explain the factors which are responsible for efficient design of boiler.  
(b) What are the major advantages of high pressure boilers in modern thermal power plant? [10+6]

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8. (a) What are the advantages and disadvantages of direct energy conversion systems over conventional power generation systems?
- (b) How is silicon cells fabricated? [8+8]

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FIRSTRANKER

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Time: 3 hours

Max Marks: 80

Answer any FIVE Questions

All Questions carry equal marks

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1. (a) What is meant by auto - ignition? Why is excess air always used in a C.I engine?  
(b) Discuss the wet sump lubrication system pertaining to a diesel engine. [8+8]
2. (a) What is the function of a cooling tower?  
(b) Describe with a neat sketch the working of a mechanical type cooling tower. [6+10]
3. (a) Differentiate open and closed gas turbines.  
(b) What are the different methods used to improve the thermal efficiency of open cycle gas turbine plant? [6+10]
4. (a) Enumerate and explain essential components of a nuclear reactor.  
(b) What is the future of nuclear power in India? [8+8]
5. (a) Briefly explain fossil fuel pollution.  
(b) What are the effects of SO<sub>2</sub>, NO<sub>2</sub> and hydrocarbons on the human and crop lives? [8+8]
6. (a) What are the advantages and disadvantages of direct energy conversion systems over the conventional power generation systems?  
(b) Explain solar cell and solar cell materials. [8+8]
7. Explain cavitations, runaway speed and overall cost of a hydraulic turbine. [16]
8. (a) When the wet type of mechanical dust collector is preferred and why?  
(b) Explain with the neat diagram the working of different types of wet type mechanical dust collectors. [6+10]

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**R07****Set No. 1**

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1. Draw a neat diagram of a power generating system illustrating the use of flat plate collector as a source of energy. [16]
2. What are the factors considered in selecting a prime mover for a hydro electric power plant? [16]
3. (a) What is the function of a coal crusher? What are the three stages of pulverization process?  
(b) Explain the characteristics of ball mill and what are its advantages. [8+8]
4. (a) Classify and explain the working of mechanical dust collectors.  
(b) Explain about pulse - jet dust collector. [8+8]
5. (a) What are the advantages of gas turbine plant over diesel and thermal power plant?  
(b) Discuss various components of gas turbine plant. [8+8]
6. (a) The peak load on a power station is 40MW. The loads having maximum demands of 12MW, 10MW, 5MW and 9MW are connected to the power station. The capacity of the power station is 45MW and annual load factor is 50%. Find  
i. Average load on the power station  
ii. Energy supplied per year  
iii. Demand factor  
iv. Diversity factor.  
(b) Explain the pollution due to nuclear power plant. [10+6]
7. (a) What are the various factors to be considered while selecting the site for diesel engine power plant?  
(b) Compare I.C engines with steam engines and state the advantages of I.C engines over steam engines. [8+8]
8. (a) What is boiling water reactor? How does it differ from pressurized water reactor?  
(b) What do you understand by thermal shielding? [8+8]

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**R07****Set No. 3**

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Common to Mechanical Engineering, Mechatronics

**Time: 3 hours****Max Marks: 80****Answer any FIVE Questions****All Questions carry equal marks**

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1. (a) What are the functions of surge tank and fore bay?  
(b) Explain hydrologic cycle. [8+8]
2. (a) Discuss relative merits and demerits of two stroke and four stroke engine.  
(b) Draw a line diagram of a diesel power plant showing all the systems. [6+10]
3. (a) Explain the components of tidal power plant.  
(b) Compare flat plate collectors and focusing collectors. [8+8]
4. An open cycle gas turbine plant works between the pressure of  $1 \text{ kgf/cm}^2$  and  $6 \text{ kgf/cm}^2$  and temperature of  $300 \text{ K}$  and  $1023 \text{ K}$ . The C.V of the fuel used is  $10,500 \text{ k.cal/kg}$ . Find
  - (a) Air - fuel ratio
  - (b) Thermal efficiency of the plant
  - (c) Generating capacity of the plant if the mechanical and generating efficiency are  $95\%$  and  $96\%$  respectively. Assume air flow rate =  $1.2 \text{ kg/ sec}$ . [16]
5. (a) What are the advantages of fluidised bed combustion system?  
(b) What are the various types of grates used with hand fired furnaces? [6+10]
6. (a) What is the necessity of coal storage?  
(b) Discuss the various methods used for coal storage at plant. [8+8]
7. (a) What do you mean by depreciation? Enumerate and explain briefly various methods used to calculate the depreciation cost.  
(b) What are the basic elements exhausted with flue gases? Which are hazardous to human health. [8+8]
8. (a) What do you understand by breeding. What factors control the breeding?  
(b) Draw a neat diagram of breeder reactor and list out its advantages and disadvantages. Why only sodium is used as coolant in breeder reactors? [6+10]

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