# QUESTION BANK PSP (2018-19)

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## Unit -I : SOURCES OF ELECTRICAL ENERGY & GENERATION

1. What are the different sources of Energy. Explain in detail. 7 w17
2. What are various factors related with power generation sector. Define six important factors from the various factors. 6 s18, 7 s17
3. Enumerate various sources of electrical power. Give three most commenly used sources in India with their approximate share. 6 s17
4. Define & explain:- i) Diversity factor ii) Utilisation factor iii) Load factor 6 w16
5. Even if max. demand & load factor of two systems are same, their bad duration curve may not be same, Justify. 4 s18, 5 s17, 4 s16
6. Explain base load plants and peak load plants. 3 s18, 4 w17, 4 s16
7. Give advantages of interconnected grid system. 4 w17
8. What do you mean by conventional and non-conventional energy sources. Explain with examples. 5 s16
9. Explain any two process of energy conversion for non-conventional sources of energy. 8s16
10. Explain following cycles with the representation of Layout of thermal power plant.
    i) Cooling water cycle. ii) Steam cycle. iii) Flue gas cycle. 6 s18
11. Load variations on power plant on a typical day is as follows:

| Time (Hrs) | 12-5am | 6-9am | 9-6pm | 6-10pm | 10-12pm |
|---|---|---|---|---|---|
| Load (MW) | 20 | 40 | 80 | 100 | 20 |

    i) Plot the load curve and load duration curve.
    ii) Find load factor and energy consumed in 24 hrs.
    iii) If installed capacity is 125MW find capacity factor. 7 s18, 7 s16
12. A generating station has the following daily load cycle.

| Time (Hrs) | 0-6 | 6-10 | 10-12 | 12-16 | 16-20 | 20-24 |
|---|---|---|---|---|---|---|
| Load (MW) | 40 | 50 | 60 | 50 | 70 | 40 |

    Draw the load Curve & find
    i) Maximum demand ii) Units generated per day
    iii) Average Load iv) Load factor 6 w17
13. A Proposed generating station is expected to have a daily load cycle as under:-

| Time (Hrs) | 06-08 | 08-12 | 12-18 | 18-22 | 22-00 | 00-06 |
|---|---|---|---|---|---|---|
| Load (MW) | 30 | 60 | 75 | 90 | 30 | 15 |

    Generating sets having capacity 10MW, 15MW, 30MW, & 60MW, are available from which any suitable combination can be chosen:-
    i) Draw daily load curve
    ii) Find load factor.
    iii) Choose size & number of sets with justification.
    iv) Prepare operation schedule. 8 s17
14. A proposed generating station is expected to have a daily load cycle as under.

| Time in hours | 11pm-6am | 6am-8am | 8am-12noon | 12noon-1pm | 1pm-5pm | 5pm-7pm | 7pm-9pm | 9pm-11pm |
|---|---|---|---|---|---|---|---|---|
| Load in KW | 2000 | 3500 | 8000 | 3000 | 7500 | 8500 | 10,000 | 4500 |

    Generating station has a maximum demand of 10MW.
    i) Draw daily load curve
    ii) Find load factor
    iii) Choose size and number of sets
    iv) Reserve Capacity
    v) Plant Factor
    vi) Plant use factor
    vii) Prepare operation schedule. 10 s16
15. The annual working cost of a power station is represented by the formula Rs (a+bkw+ckwh) where the various terms have their usual meaning. Determine the values of a, b & c for a 60 Mw station operating at annual load factor of 50% from the following data.
    i) Capital cost of building and equipment is Rs 5x10 6
    ii) The annual cost of seed, oil, taxation & wages of operating staff is Rs. 9,00,000.
    iii) The interest & depreciation on building & equipment are 10% per annum.
    iv) Annual cost of Organization and interest on cost of site etc is Rs 5,00,000. 7 w17
16. Find cost of generation per kwh from the following data.
    Capacity of the plant = 110MW.
    Capital Cost = Rs. 8000 / KW installed Interest & Depreciation = 10% on capital fuel

consumption = 0.75 kg/kwhr. Fuel cost = Rs.5000/tonne.
Salaries & maintenance = 20% of annual fuel cost.
Maximum Demand = 100MW. Load Factor = 60%  10 s16

## UNIT – II THERMAL STATIONS

17. Explain in detail the water treatment plant in thermal power station. Also give its importance. 6 s18
18. What parameters Should be considered while site solution for thermal power plant. 6 w17, 7 s17
19. Explain coal handling plant in detail. 7 s18, 7 w17
20. Write short notes.
    i) Electrostatic precipitator. 5 s18, 5 w17
    ii) Advantage and disadvantage of pulverised coal. 3 s18
    iii) Ash handing plant. 5 s18, 6 s17
    iv) Economiser 4 w17
    v) Air preheater 4 w17
21. Show the layout of thermal power plant with following cycles:-
    i) Flue gas cycles.
    ii) Cooling water cycle.
    iii) Steam cycle. 7 s17
22. State advantages and disadvantages of the pulverized coal in power station. 6 s17
23. What are the various requirements for boiler used in Thermal power plant. 6 w16
24. The peak load on a power station is 30 MW. The loads having maximum demands of 15 MW, 10 MW and 7 MW are connected to the power station. The capacity of the power station is 40 MW. and annual load factor is 50%. Find-
    a) Average load on power station
    b) Energy supplied per year
    c) Demand factor
    d) Diversity factor. 8 w16
25. Enlist the main equipments of coal fired station with diagram. 6 w16
26. Determine the generation cost per unit of energy from the following plant data:
    Installed capacity = 120MW
    Capital cost of plant = Rs. 40,000 per KW.
    Interest & depreciation = 15%
    Fuel consumption = 0.64 kg/KWh
    Fuel cost = Rs. 1500 per 1000 kg
    Salaries, wages, repairs and = Rs. 50,000,000 other operating costs/annum
    Peak load = 100 MW.
    Load factor = 60% . 8 w16
27. What is the need of Raw Water Cooling System in Thermal Power Station ? Explain in brief close loop and open loop cooling system. 7 s16
28. Explain the working of two auxiliaries used for increasing the overall efficiency of thermal power station. 6 s16
29. A steam station is installed at a cost of Rs. $2x\ 10^8$ . Assuming a salvage value of 15%, a useful life of 25yrs. and interest rate is 8%. Find the annual depreciation result by sinking fund method and straight line method. 7 s16

## UNIT – III HYDRO STATION

30. Define hydrology, flow duration curve and mass curve. Explain their uses with respect to hydro power plant. 6 s18
31. A hydro power station has a catchment area of 500 square km. The average annual rainfall in the area is 125cm. The average available head in the reservoir is 300 meters. Assuming plant efficiency of 85% and an average run-off of 70%, Calculate the available power. 7 s18
32. Explain the working of pumped storage hydroelectric plant with the help of neat diagram. Explain its utility. 6 s18
33. Explain the following components of hydro electric power plant.
    i) Surge tank.
    ii) Spillway.
    iii) Tail Race 7 s18
34. Explain three different ways of classification of hydroelectric power plants. 7 w17
35. Define and explain the following terms referred to hydropower plants.
    i) Run off.
    ii) Hydrograph.
    iii) Flow duration curve. 7 w17
36. Plot hydro-graph & find the average inflow & the power that can be developed at an effective head of 150m and a turbine – generator efficiency of 0.85. Find storage capacity of reservoir based on data given & neglect losses.
    The average rates of inflow during 12 month for a river are
    Jan 1000 Cu-m/Sec  July 2400 Cu-m/sec

| | |
|---|---|
| Feb 800 Cu-m/sec | Aug 2400 Cu-m/sec |
| March 600 Cu-m/sec | Sept. 1000 Cu-m/sec |
| April 400 Cu-m/sec | Oct. 400 Cu-m/sec |
| May 400 Cu-m/sec | Nov. 400 Cu-m/sec |
| June 1200 Cu-m/sec | Dec. 1000 Cu-m/sec 6 w17 |

37. Write short note on.
    i) Surge tank. 4 w17
    ii) Spillway. 4 w17
    iii) Hydrograph. 2 s17
    iv) Mass curve. 2 s17
    v) Flow duration curve. 2 s17
38. Explain three different ways of classification of hydroelectric plants. 7 s17
39. A proposed hydro power plant with an effective head of 125 m has a catchment area of 600 Sq. Km, in which average rainfall is 150 cm per annum. only 65% of water is available for power generation. Determine the average power that can be generated throughout the year if the efficiency of turbine – generator is 75%. 7 s17
40. Discuss turbines in power plants. 7 s17
41. Explain the working of pumped storage hydroelectric plant with the help of neat diagram. Explain it's utility. 7 w16
42. A proposed hydro station has a catchment area of 500 sq.km. With average rainfall of 200 cm. per year. Effective head of water on turbine is 120 cm. If the overall efficiency of turbine and generator is 50%, determine the electrical power that could be generated from the project. Assume 70% of the collected water is available to power generation. 6 w
43. Discuss the difference between Kaplan, Francis and Pelton turbines and state the types of power plant they are suitable for. 6 w16
44. A hydro-electric station is supplied from a reservoir at ahead of 40 m. If the area of the reservoir is 1.8 km 2 and generating 24 MW power. Determine the rate at which the level will fall in the reservoir. Take overall efficiency as 80%. 7 w16
45. A hydro electric power station has a catchment area of 500sq.km. The average annual rainfall in the area is 125cm. The average available head in the reservoir is 300m. Assuming plant efficiency as 85%, and average run off is 70%. Calculate the available power. 7 s16
46. Explain the working of pumped storage hydroelectric plant with the help of neat diagram. Explain its utility. 6 s16
47. Explain three different ways of classification of hydroelectric plants. 6 s16
48. What is water hammer ? How is it reduced in hydropower plants ? 7 s16

## UNIT – IV NUCLEAR STATION

49. Explain the purpose of the following items with reference to nuclear reactor.
    i) Fuel
    ii) Moderator
    iii) Coolant 6 s18, 7 w17, 6 s17
50. Explain Radioactive waste disposal in Nuclear power plant. 7 s18
51. Give details about.
    i) Half life and radioactive decay rate.
    ii) Binding energy and mass defect. 6 s18, 6 w16
52. What do you mean by breeding? Explain it with suitable example. 2 s18, 2 s17
53. Explain the fast breeder rector with neat diagram 5 s18, 5 s17
54. Explain the process of fission reaction in reactor. 3 w17
55. What is binding energy and mass defect. 4 w17
56. Explain with neat sketch "Boiling Water Reactor" (BWR) 6 w17
57. Explain with advantages and disadvantages of Heavy water cooled Nuclear reactor (CANDU) 7 w17
58. Explain with neat & labelled diagram, the working of nuclear reactor and show different components. 7 s17, 7 s16
59. What is meant by "Atomic Waste" and how is it disposed OFF? 6 s17
60. List out main parts of a nuclear reactor and briefly explain their functions. 6 w16
61. State the factors which influence the choice of the site of the nuclear station. 7 w16
62. Explain the working of pressurised water reactor (PWR) with suitable diagram. 7 w16, 7 s16
63. Describe the method of disposing solid, liquid and gaseous waste in nuclear power plant. 6w16,6 s16

## UNIT- V VOLTAGE CONTROL OF A.C. GENERATOR

64. Enumerate various types of tariff. Explain them in details. 7 s18, 7 w17, 7 s17, 6 w16
65. Explain working of Automatic voltage Regulator with a suitable block diagram. 7 s18
66. Daily load of an industry is 200kw for first one hours, 150kw for next 7 hours, 50kw for next 8 hours and 1 kw for the remaining time. If tariff is Rs. 100 per kw of max. Demand per annum plus 5 paise per kwh. Find the electricity bill for 365 days. 7 s18, 7 s17
67. Explain the working of brushless thyristor (static) excitation system in brief.7s18,7 s17, 7 w16, 7 s16

68. Explain Exciter instability. 6 w17
69. Explain ARV in detail with suitable diagram. 7 w17, 7 s17, 7 w16, 7 s16
70. Maximum demand of a consumer is 30A at 220 V and his total energy consumption is 9750 kWh. If the energy is charge at the rate of Rs. 1 kWh for first 500 hrs, plus Rs. 1.25 per kWh for all additional kWh. Estimate his annual bill & equivalent flat rate. 6 w17
71. An industrial consumer has an annual energy consumption of 201500 KWh at a load factor of 0.35. The tariff is Rs. 4000 + Rs. 1200 per KW of maximum demand + Rs. 2.20 per KWh.
    a) Find his annual bill.
    b) What is the bill if total energy consumption is the same but load factor improved to 0.55.
    c) What is the bill if energy consumption is reduced by 25% and load factor remains at the same initial value of 0.35.
    d) Find average energy cost in each case. 8 w16
72. Starting with a general equation of power tariff, describes its various types. Discuss how can we devise a tariff which will discourage the consumers from maintaining poor power factor ? 7 s16
73. A industrial consumer having a maximum demand of 100KW, maintains a load factor of 60%. The tariff rates are: Rs. 75per KVA of maximum demand per annum plus 15 paise per kwh of energy consumed. If the average p.f. is 0.8 lag, calculate the total energy consumed per annum and the annual electricity bill. 7 s16

**UNIT-VI: COGENERATION, CAPTIVE POWER GENERATION & SUSTAINABLE DEVELOPMENT**

74. Explain captive power generation. What are the constraints of it. 7 s18
75. Explain advantages and constraints of captive generation. 6 s17, 6 w17, 6 w16, 6 s16
76. Explain different types of captive power plants. 6 s17, 7 w16, 7 s16
77. Explain Gas turbine system of co-generation technologies. 7 s18, 7 s17
78. Explain co-generation with its advantages and disadvantages in detail. 7 s18
79. Define Co-generation. Also explain benefits of co-generation in brief. 6 w16, 7 s16
80. Explain co-generation in detail. 7 s17
81. What do you mean by co-generation Describe in brief about rejected heat utilisation system 6 s16
82. What are the prospects of change in energy supply in India? 6 w17
83. What are different cogeneration technologies? 7 w17, 7 w16
84. Find the generation cost of a captive power plant installed in a sugar mill from the following data: size of the plant 25 Mw, total capital cost Rs. 800 million, interest' rate 10% life of plant 20 years. The plant will use bagasse as fuel which is free of cost. Annual operation and maintenance costs 5% of capital cost, load factor 60%, subsidy 30%.7 w17
85. Find the generation cost of a captive power plant installed in a sugar mill from the following data: size of plant 25MW, total capital cost Rs. 800 million, interest rate 10%, life of plant is 20 years. The fuel which is used by plant is free of cost. Annual operation and maintenance costs 5% of capital cost, load factor 60% subsidy 30%. 7 s18