Mark scored:

KATHMANDU UNIVERSITY
End Semester Examination
June/July, 2019

Level : B.E.
Year : IV
Course : EPEG 411
Semester : II
Exam Roll No. :
Time: 30 mins.
F. M. : 10

Registration No.:
Date :

SECTION "A"
[20 Q × 0.5 = 10 marks]

Encircle the most appropriate answer.

1. Load factor of a power station is defined as
   a. maximum demand / average load.
   b. average load * maximum demand.
   c. average load /maximum demand.
   d. (average load * maximum demand) $^{1/2}$.

2. Demand factor of a power station is generally
   a. equal to unity.
   b. greater than unity.
   c. less than unity.
   d. always equal to zero.

3. Domestic consumers in Nepal are charged
   a. Flat demand tariff.
   b. Block rate tariff.
   c. Flat rate tariff.
   d. Off peak tariff.

4. A connected load is basically
   a. Installed electrical load in the premises of the consumer.
   b. Maximum load a consumer draws.
   c. Load drawn by a consumer at any instant.
   d. Future electrical load yet to be connected in the premises of the consumer.

5. The maximum demand on the power system is 100 MW. If the annual load factor is 40%. The total energy generated in a year is
   a. 3761 * 105 kWh.
   b. 4174 * 105 kWh.
   c. 3504 * 105 kWh.
   d. 3500 * 105 kWh.

6. A consumer consumes 400 kWh per day at a load factor of 0.3. If he increases the load factor to 0.6 without any increase in maximum demand. The consumption of energy in kWh is
   a. 800 kWh.
   b. 650 kWh.
   c. 1125 kWh.
   d. 425 kWh.

7. Which among the following plants have the least operating cost?
   a. Steam plants.
   b. Hydro plants.
   c. Nuclear plants.
   d. Diesel plants.

8. What are the essential requirements for power plants to be operated as peak load plants?
   a. Capability of quick start, synchronization and taking up of system load.
   b. Quick response to load variations.
   c. Low capital cost.
   d. All of these.

9. What happens in a load shedding?
   a. System voltage is reduced.
   b. System frequency is reduced.
   c. System loads are switched off.
   d. System power factor is changed.

10. Capacity factor will be very low when the power plant .....
a. is operated as base load plant.
b. is operated for supplying base load as well as the peak loads.
c. is operated in emergency only.
d. is under maintenance.

11. A power system planning generally involves
a. Demand forecasting, generation planning, transmission planning and distribution planning.
b. Demand forecasting and generation planning only.
c. Demand forecasting, generation planning and transmission planning only.
d. Generation planning, transmission planning, distribution planning and demand forecasting in sequence.

12. Short run elasticity refers to demand to be ..... and value of elasticity to be .....
a. elastic, less than one.
b. inelastic, greater than one.
c. elastic, greater than one.
d. inelastic, less than one.

13. The cross price elasticity is ..... for two energy sources if the two goods are .....
a. positive, substitute.
b. positive, complement.
c. negative, substitute.
d. zero, independent.

14. In valley filling, the incremental costs during peak hours are
a. Less than the average costs of electricity.
b. More than the average costs of electricity.
c. Equal to the average cost of electricity.
d. is independent of the average cost of electricity.

15. The reduction of utility load primarily during peak demand is known as
a. Peak clipping. b. Load shifting. c. Valley filling. d. Strategic load growth.

16. For economy in generation power
a. diversity factor should be high
b. plant utilization factor should be high.
c. load factor should be high
d. load factor and diversity factor should be low.

17. Screening curve is a curve with capacity factor in the x-axis and _____ in the y-axis.
a. fixed cost b. variable cost c. total cost d. average cost

18. If two generators have an individual rating of 10 MW each, a load of 16 MW should be shared as
a. 10 MW on generator A and 6 MW on B generator respectively.
b. 6 MW on generator A and 10 MW on B generator respectively.
c. 8 MW on each generator.
d. 9 MW on generator A and 7 MW on B generator respectively.

19. What is the advantage of sectionalizing of power plant?
a. High reliability. b. Low capital cost. c. Low maintenance. d. Easy operation.

20. Which of the following is called as cold reserve?
a. Reserve capacity available and ready for use.
b. Generating capacity connected to bus and ready to take load.
c. Reserve capacity available but not ready for use.
d. Capacity in service in excess of peak load.

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| | | | |
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| Time | : 2 hrs. 30 mins. | F. M. | : 40 |

SECTION "B"
[5 Q × 8 = 40 marks]

Attempt *ANY FIVE* questions. Missing parameters can be assumed suitably.

1.

a. What do you mean by power system planning? Explain the difference between static and dynamic planning. [2+2]

b. Describe the various categories of electricity planning. [4]

2.

a. Describe about the stakeholders involved in Nepal's electricity sector. [3]

b. Why there is a need for electricity demand forecast? What are the effects of error in forecast? [2.5+2.5]

3.

a. The load under a power plant on a typical day is given as follows:

| **Time** | 12-5 AM | 5-9AM | 9-6PM | 6-10PM | 10-12 Midnight |
|---|---|---|---|---|---|
| **Load (MW)** | 20 | 40 | 80 | 100 | 20 |

i. Plot the chronological load curve and load duration curve.
ii. Find the load factor of the plant and energy supplied by the plant in 24 hours. [2+2]

b. The peak load on a 50 MW power station is 39 MW. It supplies power through four transformers whose connected loads are 17, 12, 9 AND 10 MW, the maximum demands on these transformers are 15, 10, 8 and 9 MW respectively. If the annual load factor is 50% and the plant is operating for 65% of the period in a year, determine, [1+1+1+1]
i. Average load on the station.
ii. Demand factor.
iii. Diversity factor and,
iv. Use factor of the power station.

4.

a. Discuss the importance of DSM in a developing country. Explain the criteria to be used to test whether an efficient appliance would be cost effective from national, utility and user perspectives. [2+3]

b. Explain about the different issue in a generation expansion planning. [3]

5.

a. State the assumptions of the screening curve method. Discuss the strengths and limitations of the method. Explain how demand-side options could be analyzed along with the supply-side options using the method. [5]

b. Discuss how screening curve method differs from the production cost analysis in dealing with (a) forced outage rate, (b) discrete unit size (c) existing capacity and (d) system reliability. [3]

6.

a. The table below shows demand on the electric light unit for a particular company for 12 months. Determine demand based on the 3 month moving average forecast for the month of April to December. [5]

| Month | Demand (MW) | 3 month moving average forecast (MW) |
|---|---|---|
| Jan | 35 | |
| Feb | 40 | |
| Mar | 42 | |
| Apr | 50 | |
| May | 58 | |
| June | 68 | |
| Jul | 75 | |
| Aug | 85 | |
| Sep | 80 | |
| Oct | 65 | |
| Nov | 50 | |
| Dec | 45 | |

b. For each of the following demand curves, calculate the price elasticity of demand and the income elasticity of demand. [1+1+1]

i. $\ln Q = 2.5 - 0.65 \ln P + 0.95 I$

ii. $Q = 3.6 - 2.1 P^3 + 6.7 \ln I$

iii. $Q = 800 - 4P + 2I$