KATHMANDU UNIVERSITY
End Semester Examination
February/March, 2018

Marks Scored:

Level : B.E.
Year : IV

Course : EPEG 411
Semester: I

Exam Roll No.:

Time: 30 mins.

F.M. : 10

Registration No.:

Date : MAR 15 2018

SECTION "A"
[20 Q. × 0.5 = 10 marks]

Choose and encircle the most appropriate option:

1. _____ is the systematic assembly and analysis of information about electricity demand and supply and presentation of this to decision makers.
a. Plan b. Planning c. Data collection d. Policies

2. It is important for energy planners to arrive at a statement of objective _____ proceeding into extensive analysis.
a. after b. during c. before d. while

3. Generation planning involves capacity expansion planning and _____.
a. operation planning b. transmission planning
c. demand side planning d. demand forecasting

4. Under hierarchy of electricity planning, unit commitment planning comes _____ short term economic dispatch planning
a. after b. during c. before d. irrespective of

5. Reciprocal of diversity factor is
a. load factor b. demand factor c. coincidence factor d. capacity factor

6. Average load = load factor x _____
a. average energy consumed b. maximum demand
c. installed capacity * 8760 d. total connected load

7. Area under the chronological load curve gives
a. average demand b. energy consumed during the period
c. load factor d. installed capacity

8. A load duration curve is a graph between load and time in which the loads are plotted in the order of _____ magnitude
a. ascending b. descending c. equal d. uneven

9. Best forecast horizon for econometric method of demand forecast is _____
a. 20 years b. 40 years c. 5 years d. 3 months

10. Proportionate change in demand with proportionate change in price of substitute is
a. own price elasticity b. output elasticity
c. income elasticity d. cross price elasticity

11. Electrification is one of the demand side activities with the objective of
a. load shifting
b. strategic load growth
c. strategic conservation
d. valley filling

12. NEA's peak load is 1200 MW with on-peak power factor of 0.91. If power factor is raised to 0.97 using enough distribution capacitor banks, reduction in needed generation would be
a. 33 MVA b. 81 MVA c. 67 MVA d. 123 MVA

13. Power plants are designed for particular design cycle (base load, intermediate load or peak load). For best load response, which of the following is the best choice?
a. base load plants
b. intermediate load plants
c. peak load plants
d. newly constructed plants

14. If capital recovery factor is 0.05, interest rate 10% and present value (P) of the amount is $100 million. What would be annuity (A)?
a. $ 5 million b. $ 10 million c. $ 15 million d. $ 20 millions

15. 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

16. Underlying theory of _____ is the principle of optimality which states that "the optimal solution is built by optimal sub-solutions".
a. Linear programming
b. non-linear programming
c. mixed integer programming
d. dynamic programming

17. Which of the following is NOT a probabilistic reliability index?
a. LOLP b. EENS c. LLU d. XLOL

18. In unit commitment planning, the objective is to select economic subset of generators meeting _____ of demand.
a. 2 - 4 hours b. 1- 7 days c. 3 – 6 months d. 6 months -1 year

19. Merit order dispatch is to dispatch
a. cheaper plants first
b. cheaper plants last
c. thermal plants first
d. hydropower plants first

20. Which of the following is not a demand side management activity?
a. Labeling and standardization
b. Power factor correction
c. Intelligent motor control
d. Governor control

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SECTION "B"

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

1.

a. Discuss the importance of accurate load forecasting. What are the strengths and weaknesses of different techniques of load forecasting? [6]

b. Discuss the use of load duration curve for power system planning. [2]

2.

a. The load on a power station on a typical day is as follows:

Time	**Load (MW)**
12 midnight to 6 am	40
6 am to 10 am	60
10 am to 6 pm	120
6 pm to 10 pm	180
10 pm to 12 midnight	40

Determine the load factor of the power station and the energy supplied by the power station in 24 hours. If the installed capacity of the plant is 200 MW, determine the capacity factor and the utilization factor. [4]

b. What are the different load shape objectives of demand side management program? Discuss *any two* of them with practical examples of each of them. [4]

3. [8]

In an electric power system, the annual load duration curve is given as follows:

Load (x) MW	Fraction of Time when Load ≥ x
0	1.00
100	1.00
200	0.80
300	0.40
400	0.00

There are two generating units A and B in the system with the following characteristics:

	Unit A	Unit B
Capacity, MW	300	300
Operating cost, $/MWh	27.5	7.5
Forced outage rate	0.10	0.20

Calculate the following:

(a) LOLP and LOLE
(b) Expected loss of load
(c) Expected energy not served
(d) Expected demand not served
(e) Expected energy generated by Units A and B

Assume merit order dispatch of units and draw rough ELDC curves showing all relevant values.

4.

a. State major types of technology and price based DSM options. Give practical example of each of them. [6]

b. Describe the effective load carrying capacity of a power system. [2]

5.

a. Describe the different steps in the electric planning approach. [5]

b. Explain the components of objective function and any two constraints of an investment planning model (*without using mathematical expressions*) [3]

6.

a. State different assumptions for screening curve analysis. Discuss the strength and limitations of screening curve analysis. [5]

b. What are the barriers to demand side management? Explain. [3]