Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester B.Tech (minor) Degree Examination December 2020

Course Code: EET283

Course Name: INTRODUCTION TO POWER ENGINEERING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions. Each question carries 3 marks Marks

01	What are the factors to be considered for the selection of site for nuclear power plant?	(3)
02	Enlist any 3 disadvantages of a diesel power station?	(3)
03	Discuss the disadvantages of having a low power factor?	(3)
04	Explain about baseload and peak load of a power station ?	(3)
05	Briefly explain about the main components of an overhead line.	(3)
06	In overhead transmission lines, ACSR conductors are commonly used. Why?	(3)
07	Explain 'skin effect' when referred to overhead lines.	(3)
08	What is transposition of lines? Comment on its necessity in the system.	(3)
09	Explain the requirements of a good distribution system?	(3)
10	What are the disadvantages of radial distribution system?	(3)

PART B

Answer any one full question from each module. Each question carries 14 marks

Module 1

11	Draw the schematic diagram of a thermal power plant. Describe the function of the following components: (i) Coal and Ash handling unit (ii) Steam generating unit (iii) Steam turbine (iv) Feed water circuit (v) Cooling water circuit.	(14)
12	Draw the typical layout of a gas turbine power plant and explain the functions of its main components.	(14)

Module 2

13a Explain the terms load factor and diversity factor. How do these factors influence the cost of generation? (7)

13b A 3-phase, 6 kW induction motor has a p.f. of 0·7 lagging. A bank of capacitors is connected in delta across the supply terminals and p.f. raised to 0·95 lagging. Determine the kVAR rating of the capacitors connected in each phase. Also calculate the current supplied by the mains before and after installing the capacitor bank. (7)

14a A power station has the following daily load cycle : (7)

Time (hrs)	06—08	08—12	12—16	16—20	20—24	24—06
Load (MW)	20	40	60	20	50	20

Plot the load curve and the load duration curve. Find (i) maximum demand (ii) units generated per day (iii) average load and (iv) load factor.

14b Explain the method of improving power factor by using static capacitor. Discuss the merits and demerits of the above method. (7)

Module 3

15a Derive an expression for sag in a power conductor strung between two supports at equal heights. Consider the effect of ice loadings and wind also. (6)

15b A string of four insulators has a self-capacitance equal to 5 times pin to earth capacitance. Find, (i)the voltage distribution across various units as a percentage of total voltage across the string and (ii) string efficiency. (8)

16a Each line of a 3-phase system is suspended by a string of 3 similar insulators. If the voltage across the bottom unit (i.e., disc nearest to the line conductor) is 18·5 kV, calculate the line to neutral voltage. Assume that the shunt capacitance between each insulator and earth is 1/8th of the capacitance of the insulator itself. Compute the string efficiency. (8)

16b With the help of equations, describe the advantages associated with high voltage transmission. (6)

Module 4

17a Derive an expression for the inductance per phase for a 3-phase overhead transmission line when conductors are unsymmetrically placed, and the line is completely transposed. (10)

17b A 3-phase overhead transmission line has its conductors arranged at the corners of an equilateral triangle of 4 m side. Calculate the capacitance of each line conductor per km. Given that diameter of each conductor is 1·75 cm. (4)

18a Derive an expression for the line-to-line capacitance and line-to-neutral capacitance of a 1-phase overhead transmission line. The effect of earth can be neglected. (10)

18b The three conductors of a 3-phase line are arranged at the corners of a triangle of sides 4 m, 6 m, and 9 m. The diameter of each conductor is 1·8 cm. The loads are balanced, and the line is transposed. Calculate the inductance of the line per km per phase. (4)

Module 5

19a A 2-wire d.c. street mains AB, 600 m long is fed from both ends at 220 V. Loads of 20 A, 40 A, 50 A and 30 A are tapped at distances of 100m, 250m, 400m and 500 m from the end A respectively. If the area of cross section of distributor conductor is $1cm^2$, find the minimum consumer voltage. Take ρ = 1·7 $\mu\Omega$ cm. (10)

19b Define smart grid. Explain its necessity. (4)

20a A 2-wire d.c. distributor cable AB is 500 m long, and supplies loads of 60A, 80A and 40A situated 500 m, 300 m and 100 m from the feeding point A. Total resistance of the distributor (both wires) is 0·02 Ω. Calculate the p.d. at feeding point A and at each load point, if a p.d. of 220 V is maintained at point B. (10)

20b What are the important design considerations in a distribution system. (4)

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