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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2017

Program: B Tech Electrical Engineering **Semester – VII**
Subject (Course): Distribution Management **Max. Marks : 100**
Course Code: ELEG-481 **Duration : 3 Hrs**
No. of page/s: 3

Attempt all questions **Section A** **(5*4)**

Q1. (CO3) Discuss various methods for power factor improvement. **(4)**

Q2. (CO4) Explain the function of National Load Dispatch Centre. **(4)**

Q3. (CO6) Discuss various tariff structures offered by Indian Utilities for energy accounting. **(4)**

Q4. (CO7) Differentiate between conventional motors and energy efficient motors. **(4)**

Q5. (CO2) Explain the concept of reactive power flow in power distribution network by giving suitable example. **(4)**

Attempt all questions **Section B** **(4*10)**

Q6. (CO1) Discuss in detail how power system communication works by explaining the role of all the components required in the communication system. **(10)**

Q7. (CO7) Explain the concept of Blackout and discuss the reasons of blackout that occurred in India in year 2001 by elaborating series of chain reaction occurred. **(10)**

Q8. (CO2) A load of (66 + j60) MVA at the receiving end is being transmitted via a single circuit 220KV line having a resistance of 21 ohm and reactance of 34 ohm. The sending end voltage is maintained at 220kV. The operating conditions of power consumers require that at this load voltage drop across the line should not exceed 5%. In order to reduce voltage drop standard single phase 660V, 40 kVAR capacitors are to be switched in series in each phase of the line. Determine the required number of capacitors, and rated voltage neglect the losses. **(10)**

Q9. (CO7) A 4 pole, 415V, 3-Phase, 50 Hz induction motor runs at 1440 RPM at 0.88 lagging and delivers 10.817 kW. The stator loss is 1060 W, friction and windage losses are 375W. Calculate

(a) Slip
(b) Rotor copper losses
(c) Line Current
(d) Efficiency **(10)**

Attempt all questions **Section C** **(2*20)**

Q10.(a) (CO3) An industrial load consist of (i) synchronous motor of 100 metric hp (ii) induction motors aggregating 200 metric hp, 0.707 pf lagging and 82% efficiency and (iii) lighting load aggregating 30kW. The tariff is Rs. 100 per annum per kVA maximum demand plus 6 paise per kWh. Find the annual savings in cost if the synchronous motor operates at 0.8 pf leading, 93% efficiency instead of 0.8 pf lagging at 93% efficiency **(10)**

(b) (CO5) Explain 5 important features of Electricity Act 2001 and also discuss the pros and cons of this act. **(10)**

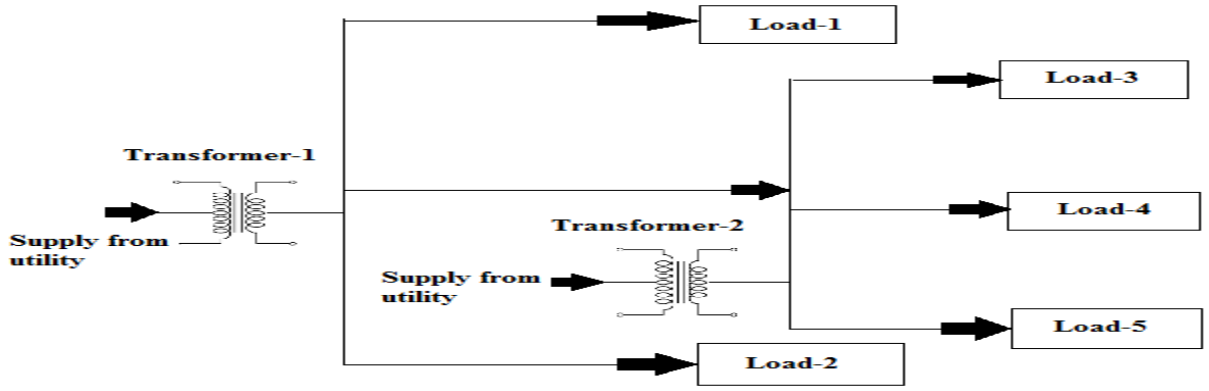
Q11. (CO5, CO7) Write short notes on the following

(i) NLDC (ii) Deregulation of Indian Power Sector

(iii) Demand Side Management (iv) Electricity Supply Act-1948 **(20)**

OR

Q12. (CO3, CO4) Consider the distribution system as shown below, two transformers are catering the loads,



Specifications of transformers are

	Rating	**Line Current HV:**	**Line Current LV**	**Guaranteed Losses (no load + load losses at 75 °C) (watts) @ 50 % rated load**	**Guaranteed Losses (no load + load losses at 75 °C) (watts) @ 100 % rated load**
Transformer-1	63kVA, 11kV/433V	3.306A	84A	380 W	1250 W
Transformer-2	25 KVA, 11kV/433V	1.31A	33.33A	210 W	695 W

Load Profile is given below:

Load	**KVA**	**Power Factor**
Load-1	**20**	**0.56**
Load-2	**20**	**0.87**
Load-3	**27**	**0.98**
Load-4	**10**	**0.59**
Load-5	**10**	**0.69**

All loads are supplied by the distributor each segment is of 20m length with **0.0145Ω/KM**.

Calculate the total losses in the system. **(20)**

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Attempt all questions **Section A** **(5*4)**

Q1. (CO5) Discuss in details about the wheeling power banking concept. **(4)**

Q2. (CO2) Explain in detail about the Power System Blackout with its impact on economics and environment. **(4)**

Q3. (CO7) Explain in detail the TOD (Time of Day) method for reducing maximum demand on the system **(4)**

Q4. (CO5) Explain four important aspects of Indian Electricity Act-2003 **(4)**

Q5. (CO3) An industrial consumer having a maximum demand of 100 kW maintains a load factor of 60%. The tariff rates are Rs. 900 per kVA of Maximum Demand per annum plus Rs. 1.8 per kWh of energy consumed. If the average power factor is 0.8 lagging, calculate the total energy consumed per annum and annual electricity bill. Also workout the overall cost per kWh consumed. **(4)**

Attempt all questions **Section B** **(4*10)**

Q6. (CO5) Explain the important features of Indian Electricity Act-1910. **(10)**

Q7. (CO4) A 4 Pole 415V 3Phase, 50Hz induction motor runs at 1440 rpm at 0.88 lag and delivers 10.817kW. The stator loss is 1060W, and friction and windage losses are 375W. **Calculate (i)** Slip**(ii)** Rotor Copper Loss **(iii)** Line Current **(iv)** Efficiency of motor. **(10)**

Q8. (CO1) Discuss in detail various methods of voltage control in transmission and distribution networks of Power System. **(10)**

Q9. (CO6) Find (i) the maximum demand (ii) daily energy consumption (iii) load factor of a supply system having following loads.

Type of Load	**Maximum Demand (kW)**	**Load Factor (%)**	**Diversity Factor**	**Overall Diversity Factor**
Domestic	2000	25	1.2	1.3
Commercial	3000	30	1.1	
Industrial	8000	70	1.25	

(10)

Attempt all questions **SECTION C** **(2*20)**

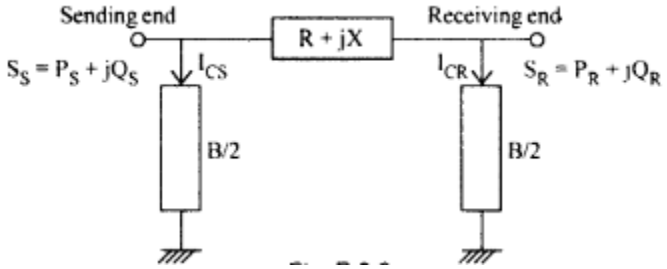
Q10. (CO4) A 35 kW induction motor has pf 0.9 and efficiency 0.9 at full load, power factor 0.6 and efficiency 0.7 at half load. At no load the current is 25% of full load current and power factor 0.1 Capacitors are supplied to make the line power factor 0.8 at half load. With these capacitors in circuit, find the line power factor at (i) full load and (ii) no load. **(20)**

Q11. Discuss in detail

a. **(CO1)** Demand Response Communication network.
b. **(CO7)** Energy Conservation
c. **(CO5)** Indian Electricity Act-1948
d. **(CO6)** Trends of Indian Tariff structure **(20)**

OR

Q12. (CO1) A load of 15+j10 MVA is supplied with power from a generating station from a line at 110kV, 3 Phase 50Hz. The line is 100km long. The line is represented by π model with the parameters R = 26.4 ohms, X = 33.9ohm and B= $219*10^{-6}$. Voltage at generating station is 116kV. Determine the power supplied by the generating station.



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