

Roll No: -----

**UNIVERSITY OF PETROLEUM
AND ENERGY STUDIES**



End Semester Examination – May 2018

Program/course: B. Tech ET+IPR

Subject: Power System

Code : GNEG 371

No. of page/s: 2

Semester – IV

Max. Marks : 100

Duration : 3 Hrs

Section A

All questions are mandatory: (Each question: 5 marks)

Q.no.	COs	Question
1.	CO1	Explain Corona and skin effect.
2.	CO2	Explain the working of air preheater with a neat diagram.
3.	CO3	Explain the factors, which influence the depreciation of capital investment of thermal power plant.
4.	CO4	Explain in detail about D.C. distribution system.

Section B

All questions are mandatory: (Each question: 10 marks)

Q.no.	COs	Question
6.	CO1	Explain in detail about AC power supply scheme with neat diagram.
7.	CO2	Two stations share a common load; one being a base load plant with 20MW installed capacity and other being a standby with 25MW capacity. The yearly output of the standby is 12.5×10^6 kWh and that of the base load plant is 115×10^6 kWh. The peak load taken by the standby is 15 MW working for 2570 hours during the year. The base load station takes a peak of 20.5 MW. Find the following: i. Annual load factors for both the stations [3M] ii. Plant use factors for both [4M] iii. Capacity factors for both [3M]
8.	CO3	Explain various methods for determining depreciation of power plant.
9.	CO4	Explain various elements of distribution system with neat diagram.

Section C

All questions are mandatory: (Each question: 20 marks)

Q.no.	COs	Question
10.	CO2	Explain the working of the following plants in detail with neat diagram. a. Pumped storage plant [10M] b. Nuclear power plant [10M]
11.	CO3	<p>a. A single phase motor connected to 400V, 50Hz supply takes 32.8A at a power factor of 0.6 lagging. Calculate the capacitance required in parallel with the motor to raise the power factor to unity and 0.9 lagging. Also, draw the phasor diagram, which reflects the compensation level. [10M]</p> <p>b. A single phase ac generator supplies the following loads: i. Lighting load of 20kW at unity power factor. ii. Induction motor load of 100kW at p.f. 0.707 lagging. iii. Synchronous motor load of 50kW at p.f. 0.9 leading. Calculate the total kW and kVA delivered by the generator and the power factor at which it works. [10M]</p> <p style="text-align: center;">(OR)</p> <p>a. A single phase A.C. system supplies a load of 200 kW and if this system is converted to 3-phase, 3-wire a.c. system by running a third similar conductor, calculate the 3-phase load that can now be supplied if the voltage between the conductors is the same. Assume the power factor and transmission efficiency to be the same in the two cases. [10M]</p> <p>b. Calculate the percentage saving in copper feeder if the line voltage in a 2-wire D.C. system is raised from 220 V to 500 V for the same power transmitted over the same distance and having the same power loss.[10M]</p>

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Section A

All questions are mandatory: (Each question: 5 marks)

Q.no.	COs	Question
1.	CO1	Explain why alternating current is used for transmission.
2.	CO2	Explain the concept of regeneration in gas power plant.
3.	CO3	Explain the importance of power factor in the supply system.
4.	CO4	Explain in detail about A.C. distribution system.

Section B

All questions are mandatory: (Each question: 10 marks)

Q.no.	COs	Question
6.	CO1	Explain why the transmission of electric power is carried at high voltages.
7.	CO2	Explain the working of open cycle and closed cycle gas power plant with neat diagram.
8.	CO3	Discuss various equipments to improve power factor and explain any one in detail with neat diagram.
9.	CO4	Discuss the factors required for satisfactory electrical supply.

Section C

All questions are mandatory: (Each question: 20 marks)

Q.no.	COs	Question
10.	CO2	Explain the working of the following plants in detail with neat diagram. a. Hydro power plant b. Thermal power plant

11.	CO3	<p>a. A 50 km long transmission line supplies a load of 5 MVA at 0.8 p.f. lagging at 33 kV. The efficiency of transmission is 90%. Calculate the volume of aluminium conductor required for the line when (i) single phase, 2-wire system is used (ii) 3-phase, 3-wire system is used. The specific resistance of aluminum is $2.85 \times 10^{-8} \Omega\text{m}$.</p> <p>b. A sub-station supplies power at 11 kV, 0.8 p.f. lagging to a consumer through a single phase transmission line having total resistance (both go and return) of 0.15Ω. The voltage drop in the line is 15%. If the same power is to be supplied to the same consumer by two wire d.c. system by a new line having a total resistance of 0.05Ω and if the allowable voltage drop is 25%, calculate the d.c. supply voltage.</p> <p style="text-align: center;">(OR)</p> <p>A three phase, 50Hz, 400V motor develops 100hp (73.6kW), the power factor being 0.75 lagging and efficiency 93%. A bank of capacitors is connected in delta across the supply terminals and power factor raised to 0.95 lagging. Each of the capacitance units is built of 4 similar 100V capacitors. Draw the phasor diagram and determine the capacitance of each capacitor.</p>
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