Student Enrollment No._____

GANPAT UNIVERSITY

B.TECH SEM-III ELECTRICAL ENGINEERING

CBCS REGULAR EXAMINATION November- 2014

2EE303 : Electrical Power System-I

TIME:-3 HOURS TOTAL MARKS- 70

INSTRUCTIONS:-
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Answer to two sections must be written in separate answer books.
3. Figures to the right indicate full marks.

SECTION I

Que-1 (a) A single phase transmission line has two parallel conductors, each of 1.2 cm diameter, and 2.5 meters apart. Calculate the loop inductance per km length of the line if the material of the conductor is (i) copper (ii) steel with relative permeability of 200. **(04)**

(b) Discuss the Ferranti effect by using the phasor diagram. **(03)**

(c) Deduce an expression of capacitance of a 3-phase overhead transmission. **(05)**

OR

Que-1 (a) Derive an expression for the loop inductance of single phase two wire system from the fundamentals. **(04)**

(b) A medium single phase transmission line 110 km long has the following constants; Resistance/km = 0.2Ω/km; Reactance /km=0.64 Ω/km; Susceptance/km=$15*10^{-6}$ mho; Receiving end voltage = 66kV. Assume localized capacitance method and calculate following when line is delivering 16 MW at 0.8 power factor lagging.(i) Sending end voltage and current (ii) % regulation (iii) line losses and transmission efficiency. **(05)**

(c) Distinguish between AC and DC resistances of conductor. Explain why this two differ by using skin effect. **(03)**

Que-2 (a) Compare Maximum demand tariff and two part tariff. **(03)**

(b) A generating plant has a maximum capacity of 100 KW and costs Rs 1,60,000. The annual fixed charges are 12% consisting of 5% interest, 5% depreciation and 2% taxes. Find the fixed charges per kWh if the load factor is (i) 100% and (ii) 50 %. **(04)**

(c) Prove that most economical power factor for any power system Cos $\Phi_2=\sqrt{1-(y/x)^2}$, where y is expenditure on power factor correcting equipment and x is kVA maximum demand charges. **(04)**

OR

Que-2 (a) Explain the disadvantages of low power factor. **(03)**

(b) A power station has to supply load as follows: **(04)**

Time(hrs)	0-6	6-12	12-14	14-18	18-24
Load(MW)	45	135	90	150	75

(i) Draw the load curve,(ii) Draw the load duration curve (iii) Calculate the load factor.

(c) Why is depreciation accounted in economics of power generation? Explain Diminishing value method of depreciation calculation using the curve. **(04)**

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Que-3 **Attempt any three.** (12)

(a) Analyze long transmission line by using the rigorous method.

(b) Define : (i) Proximity Effect (ii) Surge Impedance loading
(iii) Transmission Efficiency (iv) Transposition

(c) Write a short note on receiving end power circle diagram.

(d) Compare the load curve and load duration curve by considering way to plot and significance of them.

SECTION II

Que.4 (a) Explain the advantages and disadvantages of Nuclear power station. (04)

(b) Make a comparative study of Ring main and Radial distribution scheme. (04)

(c) Calculate the height above ground at which the conductor should be supported for a 132 kV transmission line with weight of conductor 680kg/km, length of span 260 meter, Ultimate strength 3100 kg and safety factor of 2. Assume ground clearance required as 10 meter. (04)

OR

Que.4 (a) Discuss the basic functions of main components of Thermal power station with neat schematic diagram. (06)

(b) The self-capacitance of each unit in a string of three suspension insulators is C. The shunting capacitance of the connecting metal work of each insulator to earth is 0.15C, while for line it is 0.1C. Calculate (i) the voltage across each insulator as a percentage of the line voltage to earth (ii) string efficiency. (06)

Que.5 (a) What is Sag in overhead transmission line? Derive an equation of sag between two supports at equal level. (05)

(b) Define following terms. (i) Stringing chart (ii) Lightning arrester. (02)

(c) A d.c. 2-wire system is to be converted into a.c. 3-phase, 3-wire system by the addition of a third conductor of the same cross section as the two existing conductors. Calculate the percentage additional load which can now be supplied if the voltage between wires and the percentage loss in the line remain unchanged. Assume a balanced load of unity power factor. (04)

OR

Que.5 (a) List the different types of insulators. Explain any two in details. (05)

(b) Develop the single line diagram for 400KV/220KV transmission system. (03)

(c) Calculate the reactance of Peterson coil suitable for a 33kV, 3-phase transmission line having a capacitance to earth of each conductor as 4.5 μF. Assume supply frequency to be 50Hz. (03)

Que.6 **Attempt Any Three.** (12)

(a) Explain Kelvin's law for economic choice of conductor size.

(b) Compare underground distribution system versus overhead distribution system.

(c) Discuss in brief: Factors affecting the site selection of Hydro-electric power station. Also draw the layout of Hydro-electric power station.

(d) What is neutral grounding? What are the advantages of solid grounding?

END OF THE PAPER

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