

GANPAT UNIVERSITY
B.TECH SEM-III (ELECTRICAL)
REGULAR EXAMINATION NOV-DEC 2013
2EE 303 - ELECTRICAL POWER SYSTEM –I

TIME:-3 HOURS

TOTAL MARKS-70

- INSTRUCTION:-
1. Attempt all questions.
 2. Make suitable assumptions wherever necessary.
 3. Figures to the right indicate full marks.

Section-I

- Que-1**
- (a) Draw the vector diagram of unloaded long transmission line and illustrate Ferranti Effect from it. (04)
 - (b) What do you mean by Isolated Neutral? Discuss the Arc suppression coil Earthling. (04)
 - (c) Illustrate Load Duration curve and explain its importance in power system. (04)

OR

- Que-1**
- (a) Why Interest and depreciations are consider in economics of power generation. Explain any method used for Depreciation calculation for it. (05)
 - (b) A 3-phase, 50 Hz, 132 KV overhead transmission line has conductors placed in a horizontal plane 4.56 m apart. Conductor diameter is 22.4 mm. If the line length is 100 km. Calculate the charging current per phase. Assuming complete transposition. (04)
 - (c) Prove for transmission system $AD-BC=1$. (03)

- Que-2**
- (a) Discuss the effect of poor power factor on Interconnected power system. (03)
 - (b) Deduce an expression of inductance for 3 phase unsymmetrically placed but transposed line conductors. (05)
 - (c) A balanced load of 30 MW is supplied at 132 kV, 50 Hz and 0.85 p.f. lagging by means of a transmission line. The series impedance of a single conductor is $(20 + j52)$ ohms and the total phases-neutral admittance is 315 micro Siemens. Shunt leakage may be neglected. Using the nominal T approximation, calculate the line voltage at the sending end of the line. If the load is removed and the sending end voltage remains constant, find the percentage rise in voltage at the receiving end. (03)

OR

- Que-2**
- (a) Draw the Equivalent line diagram and phasor diagram for Medium transmission Line with End condenser configuration. (04)
 - (b) 300 MW generating station has annual load factor of 60% and plant Capacity factor of 50% with total capital cost = Rs 10^9 . Annual cost of fuel, oil etc. = Rs 9×10^7 ; annual interest and depreciation = 10%. Calculate (i) the cost per kWh generated. (ii) the minimum reserve capacity of the station. (04)
 - (c) What do you mean by Bundled conductor? Why are they used? (03)

- Que-3**
- Attempt any three.** (12)
- (a) Obtain an equation of most economical power factor of system with Inductive load.
 - (b) What are the important characteristics of Tariff? List the Various kinds of Tariff structures used in power system market.

- (c) Discuss the effect of earth on value of Capacitance of line.
- (d) Discuss the factors effecting skin effect also discuss why it is absent in DC system?

Section-II

- Que-4** (a) Draw and explain nuclear power plant. (06)
 (b) Compare the AC and DC transmission system. (06)

OR

- Que-4** (a) Compare the steam and hydro electric power plant. (06)
 (b) What is Sag? Derive an equation for sag calculation when supports are at unequal end? Derive an equation for sag with effect of wind and ice loading. (06)

- Que-5** (a) Explain the advantages of Power transmission at a High Voltage. (05)
 (b) List out the properties of conductor which are using in power transmission and distribution purpose? Explain steel cored aluminum conductor. (04)
 (c) Explain guard ring method for improving string efficiency. (02)

OR

- Que-5** (a) A transmission line has a span of 150 m between level supports. The conductor has a cross-sectional area of 2 cm^2 . The tension in the conductor is 2000 kg. If the specific gravity of the conductor material is 9.9 gm/cm^3 and wind pressure is 1.5 kg/m length, calculate the sag. What is the vertical sag? (05)
 (b) Explain function of following: (02)
 I. Supports
 II. Insulator
 (c) Explain primary and secondary distribution system with necessary diagram. (04)

- Que-6** **Attempt any three.** (12)
 (a) Explain steel towers with necessary diagram.
 (b) Explain following:
 I. Feeder
 II. Distributor
 III. String Efficiency
 IV. Service Mains
 (c) Explain suspension type insulators with their advantages.
 (d) Each line of a 3-phase system is suspended by a string of 3 similar insulators. If the voltage across the line unit is 17.5 kV, calculate the line to neutral voltage. Assume that the shunt capacitance between each insulator and earth is $1/8$ th of the capacitance of the insulator itself. Also find the string efficiency.

-----**END OF PAPER**-----

Best of Luck