

Date: 12/05/2019

New

Student Exam No:- _____

GANPAT UNIVERSITY
B. TECH SEM-IV (ELECTRICAL)
REGULAR EXAMINATION APRIL-JUNE-2017
2EE404: - ELECTRICAL POWER SYSTEM- I

Time: 3 Hours

Total Marks: 60

- Instructions:** (1) This Question paper has two sections. Attempt each section in separate answer book.
(2) Figures on right indicate marks.
(3) Be precise and to the point in answering the descriptive questions.
(4) Make suitable assumptions wherever necessary

SECTION-I

- Que-1 (A)** Draw and explain layout of a typical ac power supply scheme. [03]
(B) Define load curve .What are its importance? [03]
(C) What is the percentage saving in feeder copper if the line voltage in a 2-wire d.c. system is raised from 200 volts to 400 volts for the same power transmitted over the same distance and having the same power loss?. [04]

OR

- Que-1 (A)** Discuss the advantages of interconnected grid system. [03]
(B) A diesel station supplies the following loads to various consumers : Industrial consumer = 1500 kW ; Commercial establishment = 750 kW Domestic power = 100 kW; Domestic light = 450 kW. If the maximum demand on the station is 2500 kW and the number of kWh generated per year is 45×10^5 . Determine (i) the diversity factor and (ii) annual load factor [04]
(C) Discuss the important points to be taken into consideration while selecting the size and number of units. [03]

- Que-2 (A)** Compare the volume of conductor materiel required in d.c. two wire and three-phase a.c. system. [05]
(B) 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 aluminum 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 $2.85 \times 10^{-8} \Omega \text{ m}$. [05]

OR

- Que-2 (A)** Explain the economic choice of conductor size and transmission voltage. [05]
(B) The equipment in a power station costs Rs 15,60,000 and has a salvage value of Rs 60,000 at the end of 25 years. Determine the depreciated value of the equipment at the end of 20 years on the following methods:(i) Straight line method ; (ii) Diminishing value method ; (iii) Sinking fund method at 5% compound interest annually. [05]

Que-3 Attempt the following questions.

- (A)** Write short notes on the following: (i) Advantages of high load factor. (ii) Three-part form of cost of electrical energy. [03]
(B) Discuss the Comparison of D.C. and A.C. Transmission. [03]
(C) Discuss the sinking fund method of determining the depreciation of the equipment. [04]

SECTION-II

Que-4 (A) What are the different types of insulators? Write a short note on pin type insulator and suspension insulator with neat sketch. [05]

(B) A factory takes a load of 800 kW at 0.8 p.f. (lagging) for 3000 hours per annum and buys energy on tariff of Rs 100 per kVA plus 10 paise per kWh. If the power factor is improved to 0.9 lagging by means of capacitors costing Rs 60 per kVAR and having a power loss of 100 W per kVA, calculate the annual saving effected by their use. Allow 10% per annum for interest and depreciation on the capacitors. [05]

OR

Que-4 (A) What is string efficiency? Explain various methods of improving string efficiency. [05]

(B) 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]

Que-5 (A) Using rigorous method. Derive expression for sending end voltage & current for long transmission line. [05]

(B) A 3-phase, 50 Hz transmission line 200 km long delivers 30 MW at 0.92 p.f. lagging and at 120 kV. The resistance and reactance of the line per phase per km are 0.4Ω and 0.8Ω respectively, while capacitance admittance is 2.5×10^{-6} siemen/km/phase. Calculate: (i) the current and voltage at the sending end (ii) efficiency of transmission. Use nominal T method. [05]

OR

Que-5 (A) Derive an expression for the loop inductance of a single phase two wire line. [04]

(B) A 3-phase, 50 Hz, 132 kV overhead line has conductors placed in a horizontal plane 4 m apart. Conductor diameter is 2 cm. If the line length is 100 km, calculate the capacitance per phase and charging current per phase assuming complete transposition. [04]

(C) Discuss the surge impedance loading of transmission line. [02]

Que-6 Attempt the following questions.

(A) Write short notes on the following: (i) Power factor improvement by synchronous condenser (ii) Importance of p.f. improvement (iii) Economics of p.f. improvement [05]

(B) Classify and discuss the different types of transmission line. [02]

(C) Explain the effect of load power factor on transmission efficiency and voltage regulation of transmission line. [03]

END OF PAPER