C 47571 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION
JUNE 2008

EE 2K 604—POWER SYSTEMS—I

Time : Three Hours Maximum : 100 Marks

I. (a) Explain the factors in the choice of site for hydroelectric plant.

(b) A 100 MW power station delivers 100 MW for 2 hours, 50 MW for 6 hours and is shut down for the rest of each day. It is also shut down for maintenance for 45 days each year. Calculate annual load factor.

(c) What are the advantages and disadvantages of corona formation ?

(d) Write a short note on sag template.

(e) Explain Kelvins law with graphical representation.

(f) What are the different types of distribution systems ?

(g) Differentiate between a 3-phase 3 wire and 3-phase 4 wire system.

(h) Draw the phaser diagram of a nominal-π representation of a medium transmission systems.

(8 × 5 = 40 marks)

Unit I

II. (a) Explain the different types of tariff used mentioning the advantages and disadvantages of each type.

Or

(b) Explain in detail the equipments used for power factor improvement.

(15 marks)

Unit II

III. (a) With a suitable diagram, explain the construction of a 3-core cable.

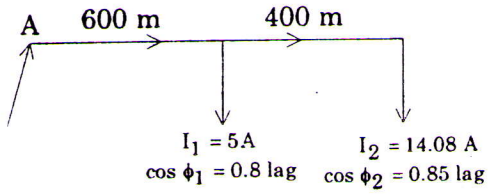
Or

(b) What are the different methods of laying of cables ? Explain each one of them with their advantages and disadvantages.

(15 marks)

Unit III

IV. (a) A 3-phase 400 V distributor AB is loaded as shown in Fig. (1). The 3-phase load at point C takes 5 A per phase at a pf of 0.8 lagging. At point B, a 3-phase, 400 V induction motor is connected which has an output of 10 hp with an efficiency of 90 % and pf 0.85 lagging. If voltage at point B is to be maintained at 400 V what should be the voltage at point A ? The resistance and reactance of the line are 1 Ω and 0.5 Ω per phase km respectively.



(15 marks)

Or

Turn over

(b) A 3-phase ring main ABCD fed at A at 11 kV supplies balanced loads of 50 A at 0.8 pf lagging at B, 120 A at unity pf at unity pf at C and 70 A at 0.866 lagging at D, the load currents being referred to the supply voltage at A. The impedances of the various sections are :

Section A B : $(1 + j\,0.6)\ \Omega$, section BC : $(1.2 + j\,0.9)\ \Omega$.

Section CD : $(0.8 + j\,0.5)\ \Omega$, section DA : $(3 + j2)\ \Omega$.

Calculate the currents in various sections and station bus bar voltages at B, C and D.

(15 marks)

Unit IV

V. (a) A 3-phase line is 500 km long. The line constants are $Z = 0.105 + j\ 0.3768$ ohms/km. $y = 0 + j\ 2.822 \times 10^{-6}$ siemens per km. The line delivers 40 MVA at 0.9 pf lagging at 220 kV. Find the sending and voltage, current, power factor, MVA and power angle.

Or

(b) A 3-phase 300 km long line has a total series impedance of $200\ \angle 80°$ ohms per phase and a total shunt admittance of $0.0013\ \angle 90°\ \mu$ phase to neutral. The sending end voltage is 220 kV. The line supplies 60 MW at 0.8 pf lagging. Find the receiving end voltage and current.

(15 marks)

[4 × 15 = 60 marks]