

FACULTY OF ENGINEERING
B.E. 2/4 (EEE) II – Semester (Main) Examination, June 2014

Subject: Power Systems – I

Time: 3 Hours

Max.Marks: 75

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A

- 1 Define the terms thermal efficiency and over all efficiency of steam power station. (2)
- 2 A Hydro electric generating station is supplied from a reservoir of capacity 5×10^6 cubic meters at a head of 200 meters. Find total energy available in kwh, if the overall efficiency is 75% (Mass of 1 m^3 of water is 1000 kg). (3)
- 3 Explain the main components of overhead lines. (2)
- 4 Write the properties of line supports. (2)
- 5 Classify the types of insulators and define safety factor of an insulator, string efficiency of an insulator. (3)
- 6 Explain the terms skin effect and proximity effect. (2)
- 7 Explain about self-GMD and mutual-GMD. (3)
- 8 Explain the term Sag, working tension, stringing charts. (3)
- 9 Mention types of dc distributors. (2)
- 10 Define the terms load factor, diversity factor, plant capacity factor. (3)

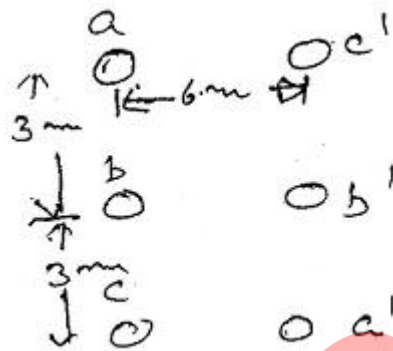
PART – B

- 11 (a) A power station has the following daily load cycle:

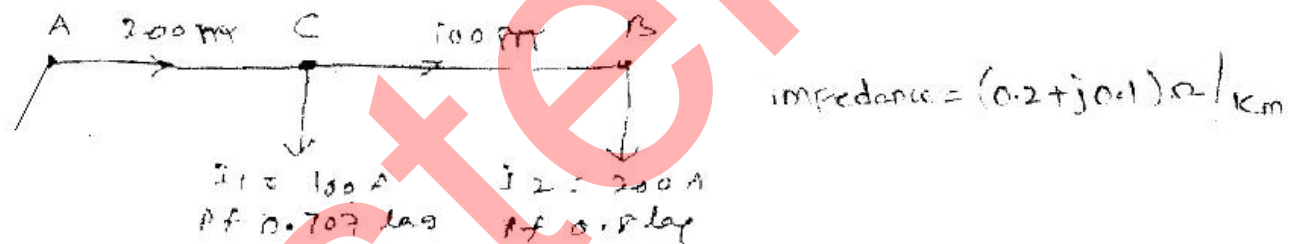
Time in hours	6 - 8	8 - 12	12 - 16	16 - 20	20 - 24	24 - 6
Load in MW	20	40	60	20	50	20

Plot load curve, load duration curve. Find energy generated per day. (6)

- (b) A power-station has a maximum demand of 15,000 kw. Annual load factor 50%. Plant capacity factor 40%. Find reserve capacity. (4)
- 12 (a) A overhead line is supported on two poles 200 m apart having a difference in level of 10 m. The conductor dia is 2 cm and weighs 2.3 kg/m. Find sag at lower support. Wind pressure is 57.5 kg/m^2 of projected area. Factor of safety. $T = 4, 220 \text{ kg/cm}^2$. (5)
- (b) A string of 5 suspension insulators is to be fitted with a grading ring. Pin to earth capacitances are equal to C. Find the values of line to pin capacitances that would give a uniform voltage distribution along the string. Take capacitance of each string as C. (5)
- 13 (a) Consider a double ckt 3-phase overhead line phase sequence is ABC and ten line is completely transposed. Conductor radius is 1.3 cm. Find inductance / phase / km. (5)
- (b) Derive the formulae for capacitance to neutral of 3 - phase, symmetrical spacing overhead line (Assume A, B, C are 3-conductors, Q_A, Q_B, Q_C are charge in length respectively). (5)



- 14 (a) Two tram cars (A & B) 2 km and 6 km away from a substation return 40A and 20A respectively to rails sub-station voltage 600v dc. Resistance of trolley wire is $0.25\Omega/\text{km}$ and that of track is $0.03\Omega/\text{km}$. Calculate voltage across each tram car draw single line diagram of the arrangement. (5)
- (b) A 1- ϕ ac distributor in bed form end A with details as shown (5)



Load pf refers to voltage at far end. Find total voltage drop in the distributor. (5)

- 15 (a) Draw the schematic diagram of a thermal plant and explain main components briefly. (5)
- (b) Draw the schematic arrangement of nuclear power station and explain main components briefly. (5)
- 16 (a) Describe flat plate, focusing type of collectors. (3)
- (b) Describe photo voltaic solar energy conversion and explain limitation. (4)
- (c) Describe briefly types of windmills. (3)
- 17 Write short notes on the following:
- a) Grading of capacitors (4)
- b) OTEC conversion (3)
- c) Types of Tariff (3)
