

**FACULTY OF ENGINEERING****B.E. 2/4 (EEE) II – Semester (Main) Examination, April / May 2013****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 (25 Marks)**

1. Classify hydroelectric power plants. 3
2. What are the needs for the combined working of the power plants? 2
3. List out the problems in operating the wind power generators. 2
4. Draw the hot spring system structure and name the parts. 3
5. List out the advantages and disadvantages of oil-filled cables. 3
6. Name the various materials that are used for overhead line insulators. Why glass insulators cannot be used above 50kV? 2
7. List out the advantages of bundled conductors. 2
8. Explain about self-GMD and mutual-GMD. 3
9. Define and explain the significance of the diversity factor. 2
10. Explain about ring main distributor. 3

**PART – B (50 Marks)**

- 11.a) Draw the typical diagram of pressurized water reactor and explain along with its advantages and disadvantages. 6
- b) Draw the typical layout of a gas turbine power plant and explain the main components. 4
- 12.a) Compare flat plate and focusing type of collectors. 4
- b) What are the limitations of photovoltaic solar energy conversion systems? 3
- c) Explain the working principle of OTEC systems. 3
- 13.a) A string insulator has three units. The capacitance from each joint is 12.5% of the capacitance of each unit. The voltage across any unit should not exceed 11 kV. Find the maximum voltage for the string application. 6
- b) Show that the insulation resistance of a cable is inversely proportional to its length. 4
- 14.a) What are the factors governing the capacitance of a transmission line? Derive an expression for the capacitance of an unsymmetrical transposed 3-phase transmission line. 7
- b) Calculate the GMR of 6/3 mm A1, 1/3 mm steel ACSR conductor. 3

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15. A 1.5 km long single phase 2-wire feeder supplies the loads as under : 10

60 A at 0.80 pf (lagging), 600 m from the feed point  
 40 A at 0.85 pf (lagging), 1200 m from the feed point  
 50 A at 0.88 pf (lagging), 1500 from the feed point.

The resistance and reactance of the feeder per km length (go and return) are 0.12 ohms and 0.2 ohms respectively. If the voltage at the far end is to be maintained at 220 V, calculate the voltage of the sending end, and its phase angle with respect to the receiving end voltage.

16. A generating station has a maximum demand of 5000 kW, and the daily load on the station is as follows :

Load (MW)	1000	1750	4000	1500
Time	11 pm to 6 am	6 am to 8 am	8am to 12.00 noon	12pm to 1 pm
Load (MW)	3750	4250	5000	2500
Time (hours)	1 pm to 5 pm	5 pm to 7 pm	7 pm to 9 pm	9 pm to 11 pm

Draw the load curve and load duration curve  
 Select the size and number of generating units  
 What reserve plant would be necessary?  
 Load and plant capacity factors.

10

- 17.a) Explain in detail how grading of capacitors done with necessary diagrams. 5

- b) Derive the expression for most economic power factor when demand is constant. 5

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