

II B.Tech II Semester Supplementary Examinations, Nov/Dec 2005**POWER SYSTEMS-I****(Electrical & Electronic Engineering)****Time: 3 hours****Max Marks: 80****Answer any FIVE Questions
All Questions carry equal marks**

1. Explain hydrograph and flow duration curve and mention their use. The mean monthly discharge at a particular site is given below.

Month	DischargeIn m ³ /sec	Month	DischargeIn m ³ /sec
January	200	July	1,600
February	400	August	1,200
March	600	September	2,000
April	2,400	October	1,200
May	1,200	November	800
June	1,800	December	400

Draw the hydro graph, and flow-duration curve. [16]

2. Describe the schematic arrangement of a thermal power station and explain the function of each briefly. [16]
3. State and explain the different nuclear reactors [16]
4. Explain the following with neat diagrams: [8+8=16]
- (a) AC 3 phase 3 wire distribution system
- (b) AC 3 phase 4 wire system
5. (a) List out the differences between sectionalized single bus bar and sectionalized double bus bar. [8]
- (b) What is group switching? Explain its operation in detail with a help of suitable diagram. [8]
6. (a) Discuss the important points to be taken into consideration while selecting the size and number of units. [8]
- (b) Give the basis for expressing the cost of electrical energy as $(a + b \cdot \text{kW} + c \cdot \text{kWh})$ and explain the factors on which a, b and c depend. [8]
7. (a) Explain briefly the skin effect in a transmission line. On what factors does it depend? [6]
- (b) A single-phase line has conductors 2.0cm in diameter spaced 3 metre apart. Calculate the inductance per km of the loop if the material of the conductor is [10]
- i. copper and

- ii. steel of relative permeability 50
- 8. (a) Derive an expression for the capacitance of a single phase overhead transmission line. [10]
- (b) Determine the capacitance of a $3-\phi$ symmetrical line whose conductors are placed at the corners of an equilateral triangle of sides 1 meter. The diameter of each conductor is 20 mm. [6]

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1. (a) With the neat diagrams discuss the following: [4+4=8]
 - i. Penstocks
 - ii. Water Hammer(b) Write short notes on: - [4+4=8]
 - i. Choice of size and No of Generating Units.
 - ii. Classification of Hydro Electric Plants
2. Describe the schematic arrangement of a thermal power station and explain the function of each briefly. [16]
3. (a) Define Half life period. Derive the expression for half life period. Mention the significance of it. [10]
(b) Discuss various factors which affect the selection of site for a nuclear power plant. [6]
4. Explain the following with neat diagrams: [8+8=16]
 - (a) AC 3 phase 3 wire distribution system
 - (b) AC 3 phase 4 wire system
5. (a) List out the differences between sectionalized single bus bar and sectionalized double bus bar. [8]
(b) What is group switching? Explain its operation in detail with a help of suitable diagram. [8]
6. Explain about the following: [5+5+6=16]
 - (a) Load curves
 - (b) Load factor
 - (c) Plant capacity factorMention their practical significance.
7. (a) Explain presence of resistance, inductance and capacitance in a transmission line and state the effects of diameter of conductor, distance between conductors and length of line on these parameters. [8]
(b) A 3 phase 3 wire, 110Kv transmission system consisting of 2.5cm diameter conductors spaced 3 meters apart in a horizontal plane, supplies a balanced load. Calculate the inductance per km of each conductor (line to neutral). [8]

8. (a) A 3 phase 50km long single circuit 66Kv, 50 Hz transposed overhead line has horizontal spacing with 3 meters between adjacent conductors and 6 meters between outer conductor. The conductor diameter is 2 cm. Find the capacitive admittance and the charging current per phase when the line is energized at 66 KV. [8]
- (b) Explain the method of images for finding the capacitance of transmission line with ground. [8]

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1. (a) Explain hydrograph and flow duration curve and mention their uses. [8]
(b) A hydro-electric station operates under a mean head of 30 metres. The reservoir employed has a catchment area of $4 \times 10^8 \text{ m}^2$. The average rainfall is 125cm per annum. Determine the capacity of the station for which it should be designed. Assume that 30% of the rainfall is lost due to evaporation etc., 5% of the head is lost in penstock, turbine efficiency is 85%, alternator efficiency is 85% and the load factor is 50%. [8]
2. (a) What are the methods for arresting ash from flue gasses? Explain any one method in detail. [8]
(b) Discuss the natural and forced draughts and list out the difference between them. [8]
3. Write the short note on: [4x4=16]
 - (a) Moderators
 - (b) Control rods
 - (c) Reflectors
 - (d) Coolants
4. Explain the following with neat diagrams: [8+8=16]
 - (a) AC 3 phase 3 wire distribution system
 - (b) AC 3 phase 4 wire system
5. (a) Explain the classification of sub-stations. [8]
(b) Explain the advantages of outdoor sub-station as compared to the indoor sub-station [8]
6. Explain about the following: [5+5+6=16]
 - (a) Load curves
 - (b) Load factor
 - (c) Plant capacity factorMention their practical significance.

7. (a) Prove that the inductance of a groups of parallel wires carrying current can be represented in terms of their geometric distances. Explain the meaning of the term self G.M.D and mutual G.M.D. [10]
- (b) A conductor is composed of seven identical copper strands each having a radius r . Find the GMR of the conductor. [6]
8. (a) Derive from basic considerations an expression for the capacitance and charging current per km length of a single phase line made up of two solid round conductors of radius r meters and spaced at D meters. Neglect the effect of ground. [10]
- (b) Determine the capacitance per km of a pair of parallel conductors 1.5cm in dia and spaced informing 65 cm apart in air. Also find charging current per km 1cm if line is working at 110KV. [6]

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1. (a) What do you understand by run-off river plant? Describe how a run-off river plant is operated under different flow conditions? [8]
(b) Discuss the difference between Kaplan, Francis and Pelton turbines and state the type of power plants to which they are suitable for. [8]
2. (a) What are the methods for arresting ash from flue gasses? Explain any one method in detail. [8]
(b) Discuss the natural and forced draughts and list out the difference between them. [8]
3. Describe the construction and uses of nuclear reactor core. [16]
4. Explain the following with neat diagrams: [8+8=16]
(a) AC 3 phase 3 wire distribution system
(b) AC 3 phase 4 wire system
5. (a) List out the differences between sectionalized single bus bar and sectionalized double bus bar. [8]
(b) What is group switching? Explain its operation in detail with a help of suitable diagram. [8]
6. (a) What do you understand by the load curve? What information is conveyed by a load curve? [8]
(b) Describe the desirable characteristics of a tariff. [8]
7. The three conductors of a 3-phase line are arranged in a horizontal plane and 4 meters apart. The diameter of each conductor is 2 cm. Determine the inductance per km of each line. What will be inductance per km of each line if the lines are transposed? Why it is necessary to transpose lines? [16]
8. (a) Derive from basic considerations an expression for the capacitance and charging current per km length of a single phase line made up of two solid round conductors of radius r meters and spaced at D meters. Neglect the effect of ground. [10]
(b) Determine the capacitance per km of a pair of parallel conductors 1.5cm in dia and spaced informing 65 cm apart in air. Also find charging current per km 1cm if line is working at 110KV. [6]
