



**PRESIDENCY UNIVERSITY
BENGALURU
SCHOOL OF ENGINEERING**

MAKE UP EXAMINATION- JAN 2023

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Course Code: EEE 2008

Course Name: Electrical Power Generation, Transmission & Distribution.

Program : B. Tech (EEE)

Date of Exam: 23-Jan-2023

Time: 01.0 to 04.00 PM

Max Marks: 100

Weightage: 50 %

Instructions:

- (i) *Read the question properly and answer accordingly.*
- (ii) *Question paper consists of 3 parts.*
- (iii) *Scientific and Non-programmable calculators are permitted.*

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks.

(10Qx2M=20 M)

1 Select the appropriate answer from the given option for the following questions

- i. The design of a power plant should incorporate two important aspects. Firstly, the selection and placing of necessary power-generating equipment should be such so that a maximum of return will result from a minimum of expenditure over the working life of the plant. Secondly, the operation of the plant should be such so as to provide cheap, reliable and continuous service. The cost of fuel transportation is minimum inplant.

(C.O. No. 1) [Knowledge]

- a. Steam power
- b. Hydro-electric
- c. Nuclear power
- d. Tidal

- ii. Potential energy of large quantity of stored water is used by hydroelectric power plant to generate electrical energy. Head of water is important to get kinetic energy from that potential energy. Efficiency of alternator represents that what percentage of input mechanical power it can convert into electrical power. The amount of that can be generated by a hydroelectric power plant depends upon _____

(C.O. No. 1) [Knowledge]

- a. Mechanical Energy & Head of water
- b. Electrical energy & Quantity of water
- c. Electrical energy & Specific weight of water
- d. Mechanical Energy & Efficiency of Alternator

- iii. A power station is required to deliver power to a large number of consumers to meet their requirements. While designing and building a power station, efforts should be made to achieve overall economy so that the per unit cost of production is as low as possible. The art of determining the per unit (i.e., one kWh) cost of production of electrical energy is known as.....

(C.O. No. 2) [Knowledge]

- a. Economics of power generation
- b. Tariff
- c. Power Factor
- d. power System

iv. The total cost of electrical energy generated can be divided into three parts, namely (i) Fixed cost (ii) Semi-fixed cost and (iii) Running or operating cost. The cost which depends upon maximum demand but is independent of units generated is called

(C.O. No. 2) [Knowledge]

- a. Fixed cost
- b. Semi-fixed cost
- c. Running cost
- d. Operating cost

v. When a transmission line is carrying current, there is a voltage drop in the line due to resistance and inductance of the line. The result is that receiving end voltage (VR) of the line is generally less than the sending end voltage (VS). This voltage drop (VS – VR) in the line is expressed as a percentage of receiving end voltage VR and is called.....

(C.O. No. 3) [Knowledge]

- a. Voltage Gain
- b. Efficiency
- c. Voltage regulation
- d. Voltage Losses

vi. & material is used in manufacturing of ACSR Dog Conductor. ACSR dog conductor is the British standards, and it belongs to ACSR cable, which is having Approx. Current Carrying Capacity Amp at 450C amb. temp is 300 Amps.

(C.O. No. 3) [Knowledge]

- a. Aluminum & Steel
- b. Aluminum & Aluminum
- c. Aluminum & Alloy
- d. Aluminum & Copper

vii. It has been seen that potential distribution in a string of suspension insulators is not uniform. The maximum voltage appears across the insulator nearest to the line conductor and decreases progressively as the cross arm is approached. If the insulation of the highest stressed insulator (i.e. nearest to conductor) breaks down or flash over takes place, the breakdown of other units will take place in succession. This necessitates to equalize the potential across the various units of the string i.e. to improve the.....

(C.O. No. 4) [Knowledge]

- a. String efficiency
- b. Efficiency
- c. Voltage regulation
- d. All of the above

viii. In actual practice, a conductor may have ice coating and simultaneously subjected to wind pressure. The weight of ice acts vertically downwards i.e., in the same direction as the weight of conductor. The force due to the wind is assumed to act horizontally i.e., at right angle to the projected surface of the conductor. Hence, the total force on the conductor is the vector sum of horizontal and vertical forces. When the conductor has wind and ice loading the following points may be noted;

(C.O. No. 4) [Knowledge]

- a. The conductor sets itself in a plane at an angle θ to the vertical is given by $\tan \theta = \frac{W_w}{(W_w + W_i)}$
- b. The sag in the conductor is given by $S = \frac{W_t l^2}{2T}$
- c. The vertical sag = $S \cos \theta$
- d. All of the above

ix. The power system is a network which is consists of Generation, Transmission and Distribution System. It uses energy like (Coal, Diesel etc) and converts into the electrical energy. The Power system includes the devices connected to the system such as.....

(C.O. No. 5) [Knowledge]

- a. Synchronous Generator
- b. Transformer, Motors
- c. Switchgear Components
- d. All of the above

- x. The satisfactory operation of a cable depends to a great extent upon the characteristics of insulation used. In general, the insulating materials used in cables should have the following properties; (C.O. No. 5) [Knowledge]
- High insulation resistance to avoid leakage current
 - High dielectric strength to avoid electrical breakdown of the cable
 - Low cost so as to make the underground system a viable proposition
 - All of the above

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries TEN marks.

(5Qx10M=50 M)

- 2 A hydro-electric power station simply involves the conversion of hydraulic energy into electrical energy, yet it embraces many arrangements for proper working and efficiency. Draw the Schematic arrangement of Medium Head Hydro Electric Power Plant and list all the parts. (C.O No. 1) [Comprehension]

- 3 The curve showing the variation of load on the power station with respect to (w.r.t) time is known as a load curve. The load on a power station is never constant; it varies from time to time. These load variations during the whole day (i.e., 24 hours) are recorded half-hourly or hourly and are plotted against time on the graph. Explain the importance of Load Curve, also construct the load curve and load duration curve for the given data sets.

Time (Hours)	0—6	6—10	10—12	12—16	16—20	20—24
Load (MW)	80	90	120	70	80	90

(C.O No. 2) [Comprehension]

- 4 The overhead line conductors should be supported on the poles or towers in such a way that currents from conductors do not flow to earth through supports i.e., line conductors must be properly insulated from supports. A string of suspension insulators consists of a number of porcelain discs connected in series through metallic links, show with relevant notation and expression how to compute the potential distribution over a string of suspension insulators. (C.O No. 4) [Comprehension]

- 5 The electrical energy produced at the generating station is conveyed to the consumers through a network of transmission and distribution systems. The part of power system which distributes electric power for local use is known as distribution system. In general, the distribution system is the electrical system between the sub-station fed by the transmission system and the consumer's meters. It generally consists of feeders, distributors and the service mains. List out and explain in brief the various requirements of distribution. (C.O No. 5) [Comprehension]

- 6 The cable generally comprises of the conductor, insulation material, bedding, beading/ armoring, and outer sheath etc. Although, the armoring and outer sheath takes care of the physical safety of cable, adequate care has to be taken by cable manufacturers during manufacturing of the cable. With neat diagram explain the construction details of 3 core underground cable. (C.O No. 5) [Comprehension]

Part C [Problem Solving Questions]

(3Qx10M=30M)

Answer all the Questions. Each question carries TEN marks.

- 7 A gas power station supplies the following loads to various consumers : Industrial consumer = 1000 kW ; Commercial establishment = 650 kW Domestic power = 80 kW; Domestic light = 550 kW If the maximum demand on the station is 2000 kW and the number of kWh generated per year is 40×10^5 . List all the unknown parameters that could be compute from the given data and compute the same. (C.O No. 2) [Comprehension]
- 8 Two wires of 1-phase transmission line are separated by 3 mt. the radius of each conductor is 0.02 mt. Identify the unknown parameters that could be found from the given data and compute the same. (C.O No. 3) [Comprehension]
- 9 The towers of height 40 m and 100 m respectively support a transmission line conductor at water crossing. The horizontal distance between the towers is 500 m. If the tension in the conductor is 1500 kg, find the minimum clearance of the conductor and water and clearance mid-way between the supports. Weight of conductor is 1.3 kg/m. Bases of the towers can be considered to be at water level. (C.O No. 4) [Comprehension]