

Total No. of printed pages = 7

19/5th Sem/DEE511

2021

**GENERATION, TRANSMISSION AND
DISTRIBUTION OF POWER**

Full Marks –100

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Question No.1 is compulsory and
answer any *four* from the rest.

- I. A. Fill in the blanks : $1 \times 10 = 10$
- (a) The standard operating frequency of AC voltage in India is _____.
 - (b) A thermal power plant works on _____ cycle.
 - (c) In hydroelectric power station, _____ energy of stored water is finally converted to electrical energy.

[Turn over



- (d) Hydel power generations have _____ running cost.
- (e) Surge tank is provided for the protection of _____.
- (f) The most commonly used material for insulators of overhead lines is _____.
- (g) In diesel engine driven power house, the fuel used is _____.
- (h) The charge associated with an electron is _____.
- (i) ACSR conductors are used in overhead transmission lines. The full form of ACSR is _____.
- (j) A certain system has some output of 120 units and losses are 30% of the output. The efficiency of this system will be _____.

B. Write true/false : 1×10=10

(a) Distribution of AC power is done by 3-phase, 4-wire system.

(b) 1 kWh is equivalent to 360000J.

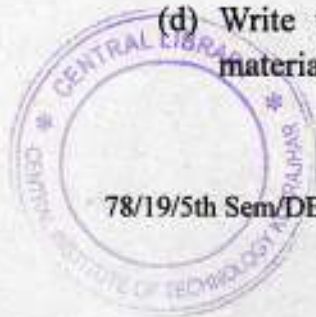
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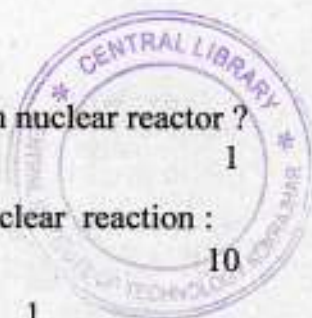


- (c) In a hydroelectric plant, spillways are used to discharge surplus water on the downstream side of dam.
- (d) Thermal power plants are the cleanest plant with low running cost.
- (e) The active power loss in an overhead transmission line is mainly due to the ground conductor.
- (f) In chemical reactions, the nuclei donot change and only the valence electrons are shared or exchanged.
- (g) The service mains connect the distributor and the consumer's terminal.
- (h) Solar power generation is a renewable generation system.
- (i) Control rods used in a nuclear reactor are made of copper.
- (j) Alpha particles are negatively charged particles.



2. (a) Write some important criteria for site selection of hydroelectric power plants. 7
- (b) How hydroelectric power plants are classified? 5
- (c) A hydroelectric power station has a reservoir of area 2.4 square kilometres and capacity $5 \times 10^6 \text{ m}^3$. The effective head of water is 100 meters. The penstock, turbine and generation efficiencies are respectively 95%, 90% and 85%. If a load of 15000 kW has been supplied for three hours, find the fall in reservoir level. 8
3. (a) What is the energy equivalent of 1 a.m.u? 1
- (b) Why control rods are used in nuclear reactors? 1
- (c) What are nuclear fission and nuclear fusion reactions? Explain with examples. 2.5+2.5=5
- (d) Write the names of two good moderating materials used in nuclear reactors. 2



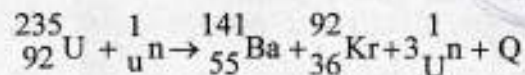


(e) What is the source of heat in nuclear reactor ?

1

(f) Consider the following nuclear reaction :

10



Using this reaction, estimate the energy released by 1kg of uranium.

Given, mass of U-235 = 235.045733u

Mass of one neutron = 1.008665u

Mass of Barium atom = 140.9177u

Mass of Krypton atom = 91.8854u

1 a.m.u = 931 MeV.

4. (a) How will you define one unit of electrical energy ? What is B.O.T. ?

2

(b) What do you mean by calorific value of fuel ?

1

(c) A steam power station spends Rs. 30 lakhs per annum for coal used in the station. The coal has a calorific value of 5000 kcal/kg and costs Rs. 300 per ton. If the station has thermal efficiency of 33% and electrical efficiency of 90%, find the average load on the station.

6

- (d) Write some important criteria for site selection of thermal power plants. 6
- (e) What are the main equipments used in thermal power plant ? 5
5. (a) Draw neat diagrams of three phase star and delta connected systems properly showing the line voltage, line current, phase voltage and phase currents. 5+5=10
- (b) An overhead 3-phase transmission line delivers 5000kW at 22kV at 0.8 p.f. lagging. The resistance and reactance of each conductor is 4Ω and 6Ω respectively.
- Determine : 10
- (i) sending end voltage
- (ii) percentage regulation
- (iii) transmission efficiency.
6. (a) What do you mean by an electric power distribution system? What are feeders, distributors and service mains? How distribution systems are classified ? 5+5=10



(b) Now-a-days electrical energy is generated, transmitted and distributed in the form of AC all over the world. With a neat diagram, show how electrical energy is transmitted from generating station and finally distributed to consumers. 10

7. Write short notes on any *two* : 10×2=20

- (a) India's present power scenario
- (b) Overhead versus underground distribution
- (c) Renewable energy utilization in India.

