

Total No. of printed pages = 7

**END SEMESTER/RETEST EXAMINATION-2021**

Semester : 5th (New/Old)

Subject Code : CAI-502

**GENERATION, TRANSMISSION AND  
DISTRIBUTION OF POWER**

Full Marks – 70

Time – Three hours

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

**Instructions :**

- (i) *All* questions of PART-A are compulsory.
- (ii) Answer any *five* questions from PART-B.

**PART - A**

Marks – 25

1. Fill in the blanks : 1×10=10
  - (i) A thermal power plant works on \_\_\_\_\_ cycle.
  - (ii) The overall efficiency of a coal-fired power plant is approximately \_\_\_\_\_ %.

[Turn over

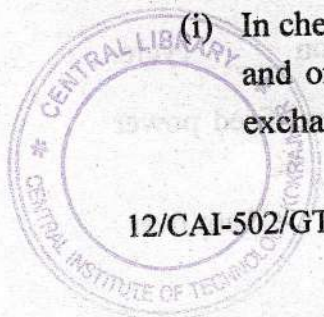
- (iii) In nuclear power plant, heat is generated by nuclear \_\_\_\_\_ reaction of U-235 isotope.
- (iv) 1 MeV is equivalent to \_\_\_\_\_ Joules.
- (v) Medium head hydropower plants operate under heads varying from \_\_\_\_\_.
- (vi) The unit of reactive power is \_\_\_\_\_.
- (vii) The nature of charge of an electron is \_\_\_\_\_.
- (viii) Kaplan turbine belongs to the category of \_\_\_\_\_ turbine. (Impulse/Reaction)
- (ix) Due to skin effect in the AC system, the effective resistance of the line \_\_\_\_\_.  
(increases/decreases)
- (x) The distribution of electric power into the populated area is done by \_\_\_\_\_ system. (3-phase, 3-wire/3-phase, 4-wire).

2. Write true/false :

1×10=10

- (i) In chemical reactions, the nuclei don't change and only the valence electrons are shared or exchanged.

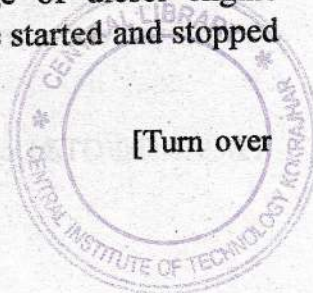
12/CAI-502/GT&DoP(O&N) (2)



- (ii) Diversity factor is the ratio of average load to the maximum demand on power station.
- (iii) The amount of one unit of electrical energy is equivalent to 1 kWh.
- (iv) In surface condenser, the exhaust steam and cooling water come in direct contact with the condenser surface and come out as a single stream.
- (v) In electric power distribution, underground system has less initial cost than the overhead system.
- (vi) In a delta connected balanced 3-phase system, line voltage is equal to phase voltage.
- (vii) Due to technical reasons, generated voltage is not more than 11 -15kV. This voltage is stepped upto 132kV or even more for transmission purposes.
- (viii) Hydropower is renewable and non-polluting source of energy.
- (ix) An  $\alpha$ -particle possesses negative charge.
- (x) One important advantage of diesel engine power station is, it can be started and stopped quickly.

12/CAI-502/GT&DoP(O&N) (3)

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3. Match each number of 'Column A' with the most appropriate number of 'Column B'.  $1 \times 5 = 5$

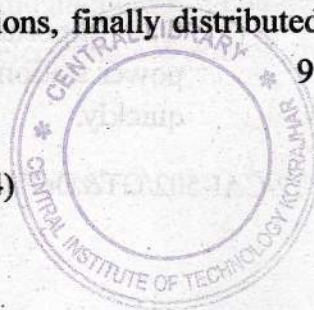
Column-A	Column-B
(i) There is no ash disposal problems, does not produce any greenhouse effect	(a) Is a non-conventional energy source
(ii) Heavy water	(b) Is a moderating material
(iii) Wind power	(c) Natural draft and mechanical induced draft type
(iv) Economizer	(d) Hydropower plants
(v) Cooling towers	(e) Coal-fired power plant

PART-B

Marks-45

1. With a neat diagram, briefly write how electrical energy is generated in generating stations, stepped up for transmission and after changing voltage levels at different sub-stations, finally distributed to the end consumers. 9

12/CAI-502/GT&DoP(O&N) (4)



2. The following are the details of load on a circuit connected through a supply meter :

Six lamps of 40 watts each working for 4 hours per day

Two fluorescent tubes 125 watts each working for two hours per day

One 1000 watts heater load working for 3 hours per day

If each unit of energy cost 60 paise, what will be the electricity bill for the month of June ? 9

3. (a) 'Running cost of a thermal power station is high and required a large amount of water for its operation' — Explain. 3

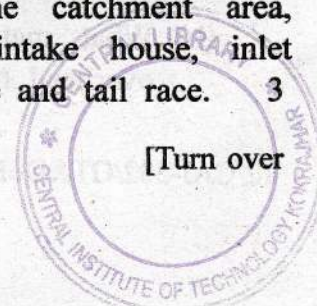
(b) A 80MW coal-fired power station uses coal of calorific value 6400 Kcal/kg. Thermal efficiency of the station is 28% and electrical efficiency is 89%. Calculate the coal consumption per hour when the station is delivering its full rated output. 6

4. (a) How hydroelectric power plants are classified ? 6

(b) Draw a top view of hydroelectric power plant and clearly show the catchment area, reservoir, dam and intake house, inlet waterway, power house and tail race. 3

12/CAI-502/GT&DoF(O&N) (5)

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5. (a) What is the source of heat in nuclear reactors ?

1

(b) Why moderators are used in reactors ?

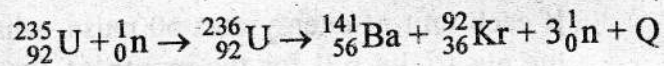
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(c) Define nuclear fission and fusion reactions.

2+2=4

(d) In the following fission reaction, estimate the energy released in MeV.

3



Given, mass of  ${}_{92}^{235}\text{U} = 235.045733$  amu

${}_{56}^{141}\text{Ba} = 140.9177$  amu

${}_{36}^{92}\text{Kr} = 91.8854$  amu

${}_0^1\text{n} = 1.008665$  amu

6. With neat diagrams, briefly write about primary and secondary AC power distribution system. 9

7 (a) What are daily and monthly load curves ? Write some importance of load curves.

2+3=5

(b) What material is used as insulator for overhead line conductors ?

1

12/CAI-502/GT&DoP(O&N) (6)



- (c) What are the three different classifications of overhead transmission lines ? 3
8. (a) Differentiate between Open Cycle and Closed Cycle Gas Turbine Power Plants. 5
- (b) What is the function of starting motor in Gas Turbine Power Plants ? 2
- (c) Write two advantages of Gas Turbine Power Plants. 2

