

Total No. of printed pages = 8

**RETEST EXAMINATION-2022**

Semester : 5th

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 :**

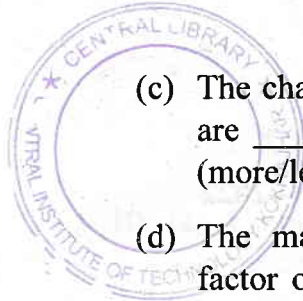
- (i) *All* questions of PART-A are compulsory.
- (ii) Answer any *five* questions from PART-B.

**PART-A**

Marks-25

1. Fill in the blanks : 1×10=10
- (a) The most commonly used material for insulators of overhead lines is \_\_\_\_\_.
  - (b) In hydroelectric power stations, surge tanks are constructed to protect \_\_\_\_\_.  
(Penstocks/Generators).

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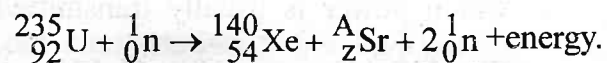


- (c) The chances of faults in underground system are \_\_\_\_\_ as compared to overhead system. (more/less)
- (d) The major reason for low lagging power factor of supply system is due to the use of \_\_\_\_\_ motors. (Induction/DC series)
- (e) The unit of real power is \_\_\_\_\_.
- (f) 1 kWh is equivalent to \_\_\_\_\_ Kcal.
- (g) In diesel engine driven power house, the fuel used is \_\_\_\_\_.
- (h) The knowledge of diversity factor helps in determining \_\_\_\_\_.
- (i) In medium transmission lines, effect of \_\_\_\_\_ is taken into account.
- (j) The economic size of conductor is determined by \_\_\_\_\_ law.
2. Write true or false : 1×10=10
- (a) Primary transmission is done by 3-phase, 3-wire AC system.
- (b) A diesel power station is generally used as a base load station.
- (c) The load factor is the ratio of average load to the maximum demand.

- (d) Francis turbine is a reaction turbine.
- (e) 1 kWh is equivalent to 360000 J.
- (f) In a hydroelectric plant, spillways are used to discharge surplus water on the downstream side of dam.
- (g) Thermal power plants are the cleanest plant with low running cost.
- (h) The service mains connect the distributor and the consumer's terminal.
- (i) Control rods used in a nuclear reactor are made of copper.
- (j) The active power loss in an overhead transmission line is mainly due to the ground conductor.

3. Choose the most appropriate option :  $1 \times 5 = 5$

(a) Consider the nuclear equation



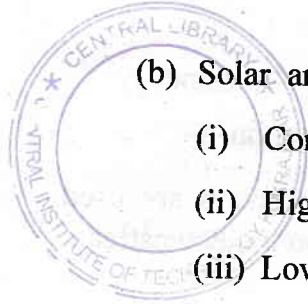
The value of Z and A are

- (i)  $Z=39, A=92$
- (ii)  $Z=37, A=93$
- (iii)  $Z=38, A=95$
- (iv)  $Z=38, A=94$

102/CAI-502/GT&DP (3)

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(b) Solar and wind power plants are called

- (i) Conventional power generating plants
- (ii) High efficient power generating plants
- (iii) Low efficient power generating plants
- (iv) Renewable energy power plants

(c) An electric transformer is a machine

- (i) which changes the voltage and frequency
- (ii) which changes voltage, power and current levels
- (iii) which changes voltage level only keeping power and frequency unchanged
- (iv) which changes current level only keeping voltage, power and frequency unchanged

(d) Which of the following is not the voltage at which power is usually transmitted ?

- (i) 132 kV                      (ii) 66 kV
- (iii) 33 kV                      (iv) 20 kV

(e) In a star-connected 3-phase system

- (i) Line voltages are equal to Phase voltages

- (ii) Line voltages are equal to Neutral voltages
- (iii) Magnitude of line voltages are 230V.
- (iv) Line currents are equal to phase currents.

**PART – B**

Marks – 45

4. (a) What are the uses of cooling towers in thermal power stations? 2
- (b) Why water treatment is required in thermal power plants? Briefly explain. 3
- (c) A thermal station has the following data: 4

Maximum demand = 20,000 kW

Load factor = 40%

Boiler efficiency = 85%

Coal consumption = 0.9 kg/kWh

Turbine efficiency = 90%

Cost of 1 ton of coal = Rs. 300

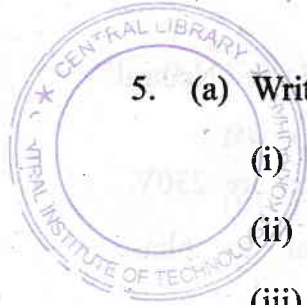
Determine thermal efficiency and coal bill per annum.

(1 ton is equivalent to 1000 kg).

102/CAI-502/GT&DP (5)

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5. (a) Write in brief about the following : 3

- (i) Feeder
- (ii) Distributor
- (iii) Service mains.

(b) 'Proper voltage, availability of power on demand and reliability are the three essential requirements of a good distribution system'. Briefly explain in your own words. 6

6. (a) What do you mean by load frequency control in power generating stations? 4

(b) A hydroelectric power station has a reservoir of area 2.4 square kilometers 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. 5

7. (a) Write three important criteria for the site selection of nuclear power plant. 3

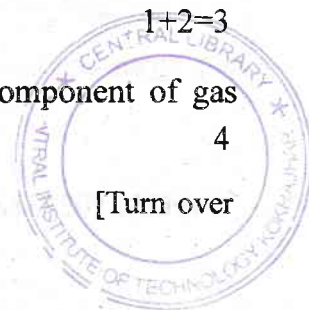
(b) In a nuclear reactor, fission is produced in 1 gm of U-235 (235.0439 amu) in 24 hours by a slow neutron (1.0087 amu). Assuming that  ${}_{36}^{92}\text{Kr}$  (91.8973 amu) and  ${}_{56}^{141}\text{Ba}$  (140.9139 amu) are produced in all reactions and no energy is lost. Write the complete reaction and calculate the total energy produced in MeV and in kilowatt-hours. Given 1 amu = 931.5 MeV. 6

8. (a) Define voltage regulation and transmission efficiency in the study of performance of transmission lines.  $1\frac{1}{2}+1\frac{1}{2}=3$

(b) A short 3-phase transmission line with an impedance of  $(6+j.8)\Omega$  per phase has sending and receiving end voltages of 120kV and 110kV respectively for some receiving end load at a p.f. of 0.9 lagging. Determine the power output and sending end power factor. 6

9. (a) What do you mean by power factor improvement? Draw power triangles for lagging and leading loads.  $1+2=3$

(b) Write the names of main component of gas turbine plant. 4





(c) What is the function of starting motor in gas turbine plant ? 2

10. (a) Compare the volume of conductor material needed for 3-phase, 3-wire system with two wire DC system with one conductor earthed. 5

(b) What do you mean by base load and peak load power stations ? 2+2=4

