GENERATION, TRANSMISSION AND DISTRIBUTION OF POWER

Full Marks – 70

Time – Three hours

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

PART – A

Question Nos. 1-14, fill up the blanks with proper word
or sentence given in the bracket. (One mark each)

$$1 \times 14 = 14$$

1. The unit of mechanical energy is _____. (watt /
   joule / calorie)

2. Kaplan turbine is a _____ turbine. (impulse/
   reaction)

3. In hydro-electric power stations, surge tanks are
   constructed to protect _____ (penstocks/
   generators).

4. Primary transmission is done by _____.
   system. (3-phase,3-wire/3-phase,4-wire)

[Turn over

5. The major reason for low lagging power factor of supply system is due to the use of _____ motors. (induction/DC series motors)

6. Power factor can be improved by installing such a device in parallel with load which takes _____ power. (apparent power/real power/ leading reactive power)

7. In hydro-electric plant, spillways are used _____ (to control the flow of water to the turbine/ to discharge surplus water on the down-stream side of Dam)

8. The nature of charge of an electron is _____. (negative/positive/neutral)

9. The most simple and clean plant is _____. (steam plant/hydro-plant/nuclear plant)

10. Diesel power plants are used as _____ plants. (base load/standby)

11. The underground system has _____ initial cost than the overhead system. (less/more)

12. A ring main system of distribution is _____ reliable than the radial system. (more/less)

13. The service mains connect the _____ and _____. (distributor's and consumer's terminal / primary and secondary systems)

14. The chances of faults in underground system are _____ as compared to overhead system. (more/less)

Question Nos. 15-17, fill up the blanks (One mark each)

$1 \times 3 = 3$

15. 1 kWh = _____ joule.

16. The unit of inductive reactance is _____.

17. The unit of real power is _____.

Question Nos. 18-25, choose the most appropriate option. (One mark each) $1 \times 8 = 8$

18. The active power loss in an overhead transmission line is mainly due to

  (i) Line inductance

  (ii) Line capacitance

  (iii) Line resistance

  (iv) Ground conductor

19. A thermal power plant works on which of the following cycles ?

  (i) Brayton cycle

  (ii) Rankine cycle

  (iii) Otto cycle

  (iv) Carnot cycle

20. In the Einstein's mass-energy relationship $E = mC^2$, 'C' is

    (i) An energy constant

    (ii) Einstein's constant

    (iii) Velocity of light

    (iv) Atomic constant

21. An α-particle can be compared with a

    (i) Helium nucleus

    (ii) Proton

    (iii) Any negatively charged particle

    (iv) None of the above

22. 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

23. The major heat loss in a steam power station occurs in

    (i) Turbine

    (ii) Economisers

    (iii) Condenser

    (iv) None of the above

24. Mechanical energy is supplied to a DC generator at the rate of 4200 J/s. The generator delivers 32.2A at 120 Volt. The energy lost per minute of operation is

    (a) 20160 J   (b) 20154 J

    (c) 92 J   (d) 336 J

25. 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

Answer any *three* questions.   15×3=45

1. (a) Write two advantages and two disadvantages of a nuclear power plant.   2+2=4

   (b) What do you mean by radiation shielding in Nuclear reactors ?   3

   (c) What is the source of heat in Nuclear power station ?   1

   (d) Describe nuclear fission and nuclear fusion reactions with examples.   3.5+3.5=7

2. (a) Why a coal fired power plant is called dirtiest plant with high running and maintenance cost ?   3

   (b) Write some important criteria for site selection of a thermal power plant.   9

   (c) Derive a relation between electrical and mechanical energy.   3

3. (a) In generating stations, how electrical energy is produced, stepped up and transmitted and finally distributed to the consumers ? Explain it with a neat diagram.   8

(b) Derive an expression for sending end voltage and % transmission efficiency for single phase short transmission line. 4+4=8

(c) A single phase overhead transmission line delivers 1100 kW at 33kV at 0.8 pf lagging. The total resistance and inductive reactance of the line are 10Ω and 15Ω respectively. Determine the sending end voltage. 5