Total No. of printed pages = 8

CAI-502/GT&DOP/5th Sem/2017/N

GENERATION, TRANSMISION 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. 1-10, choose the most appropriate option. (One Mark each)

1. The standard frequency for AC voltage in India is

   (i) 50 Hz (ii) 60 Hz

   (iii) 50 to 60 Hz (iv) 50 to 55 Hz.

2. India's first nuclear power plant was installed at

   (i) Tarapur (ii) Kota

   (iii) Kalpakkam (iv) None of the above

[Turn over

3. 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.

4. What percentage of original radioactive atoms is left after five half-lives ?

(i) 20% (ii) 10%

(iii) 5% (iv) 3%

5. Consider the nuclear equation

$$^{253}_{92}U + {}^{1}_{0}n \rightarrow {}^{140}_{54}Xe + {}^{A}_{Z}Sr + 2\,{}^{1}_{0}n + \text{energy}.$$

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

6. Control rods used in a nuclear reactor are made of

(i) Cadmium (ii) Steel

(iii) Beryllium (iv) Copper

7. A large percentage of India's total power generation is shared by

(i) Hydroelectric power generation

(ii) Nuclear power generation

(iii) Renewable energy sources

(iv) Thermal power generation

8. The length and line voltage of a short transmission line is upto about

(i) 90 km and less than 20 kV

(ii) 50 km and less than 50 kV

(iii) 50 km and less than 20 kV

(iv) 20 km and less than 50 kV

9. 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

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

    (i) Brayton cycle

    (ii) Rankine cycle

    (iii) Otto cycle

    (iv) Carnot cycle

Question Nos. 11-17, fill up the blank. (One Mark each)

11. Surge tank is provided for the protection of _____.

12. 1 kWh is equivalent to _____ Kcal.

13. An electric generator is a machine which converts _____ energy to _____ energy.

14. The calorific value of a solid fuel is expressed in _____.

15. The power factor of an AC circuit is given by _____ power divided by _____ power.

16. The most commonly used material for insulators of overhead lines is _____.

17. The full form of ACSR is _____.

Question Nos. 18-25, fill up the blank with the proper word given in the bracket. (One Mark each)

18. The connected load is generally _____ than the maximum demand. (less / greater)

19. In short transmission lines, the effects of _____ are neglected. (resistance / capacitance / inductance)

20. The main consideration in the design of a feeder is the _____. (current carrying capacity / voltage drop)

21. Diesel power plants are used as _____ plants. (Base load / stand by)

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

23. In AC system, addition and subtraction of currents and voltages are done _____. (arithmetical / vector)

24. The interconnected system _____ the reserve capacity of the system. (increases / decreases)

25. The basic unit of energy is _____. (Joule / Watt)

PART – B

Answer any *five* questions.

1. Compare the volume of conductor material required for 3-phase, 3-wire system with two wire DC system with one conductor earthed. 9

2. Now-a-days AC system has been adopted all over the world for generation transmission and distribution of electric power instead of DC. Mention two important points in support of the AC system. Briefly describe about AC distribution system with necessary diagrams. 2+7=9

3. (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 ? Also define one calorie of heat. 2

   (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. 5

4. (a) What do you mean by water hammer effect in hydroelectric power plant ? 4

   (b) Draw a top view of hydro plant and show the different parts. 2

   (c) Write briefly about three advantages of hydro power plant. 3

5. (a) What is the energy equivalent of 1 a.m.u ? 1

   (b) For what purpose moderators are used in the nuclear reactors ? 1

   (c) Why control rods are used in nuclear reactors? 2

   (d) Calculate the fission rate of U-235 required to produce 2 watts and the amount of energy that is released in the complete fission of 0.5 kg of U-235. The energy released per fission of U-235 is 200 MeV. 5

6. (a) Mention two advantages and two disadvantages of diesel power station. 2+2=4

(b) A diesel power station has fuel consumption of 0.28 kg/kWh. The calorific value of the fuel is 10,000 kcal/kg. Determine

(i) the overall efficiency

(ii) efficiency of the engine if alternator efficiency is 90%. 5

7. Write short notes on any *two* : 4.5+4.5=9

(a) Cooling tower

(b) Overhead versus underground system

(c) Connection schemes of distribution system.