END SEMESTER/ RETEST EXAMINATION, 2020

Semester: 5th

Subject code: CAI-502

Subject: Generation, transmission and distribution of power

Full marks: 70 (Part A-25 + Part B-45)

Duration: 3 hours

Instructions:

1. Questions on Part A are compulsory

2. Answer any five questions from Part B

PART-A

MARKS-25

1. **Fill up the blanks-** **[1×10=10]**

(a) 1kWh is equivalent to _____ Kcal.
(b) The calorific value of a solid fuel is expressed in _____.
(c) The unit of real power is _____.
(d) The most commonly used material for insulators of overhead line is _____.
(e) An over-excited synchronous motor running at no load is known as _____.
(f) The higher the transmission voltage, the _____ is the conductor material required. (lesser /more)
(g) The underground system has _____ initial cost than the overhead system (less/more)
(h) A ring main system of distribution is _____ reliable than the radial system. (less/more)
(i) Primary transmission is done by _____ system. (3-phase,3-wire/3-phase,4-wire)
(j) The major reason for low lagging power factor of supply system is due to the use of _____ motors. (induction/DC series)

2. **Write true or false.** **[1×10 =10]**

(a) The nature of charge associated with anelectron is positive.
(b) An α-particle consists of one proton and two electrons.
(c) One advantage of diesel power station is it can be started and stopped quickly and one disadvantage is its running cost is high.
(d) The cosine ratio of the angle between voltage vector and current vector of an AC circuit is called power factor.
(e) Generally, the more efficient power station is used to supply the base load and is known as base load power station.
(f) The overall efficiency of a thermal power plant in India is approximately 28% - 32%.
(g) The ratio of sending end power to the receiving end power of a transmission line is known as transmission efficiency.
(h) The interconnected power system increases the reserve capacity of the system.

(i) Francis and Kaplan turbines are reaction turbines.
(j) The capacity of medium capacity hydel plants is in between 5MW and 100MW.

3. Choose the correct answer **[1×5 =5]**

(a) A thermal power plant works on which of the following cycles-

(i) Brayton cycle
(ii) Rankine cycle
(iii) Otto cycle
(iv) Carnot cycle

(b) The length and line voltage of a short transmission line is upto about-

(i) 90 km and less than 20KV
(ii) 50km and less than 50KV
(iii) 50km and less than 20KV
(iv) 20km and less than 50KV

(c) The major heat loss in a steam power station occurs in

(i) Turbine
(ii) Economizers
(iii) Condenser
(iv) None of the above

(d) India's first nuclear power plant was installed at

(i) Tarapur
(ii) Kota
(iii) Kalpakkam
(iv) None of the above

(e) 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

PART- B
MARKS – 45
(Answer any five questions from PART B)

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? Also define one calorie of heat. **[2]**

(c) Write five important criteria for the site selection of thermal power plants. [5]

5.

(a) What is the energy equivalent of 1 a.m.u? [1]
(b) Why control rods are used in nuclear reactors? [2]
(c) What is the atomic and mass number of $^{235}_{92}U$ isotope ? [1]
(d) What do you mean by nuclear fission and fusion reactions ? [2.5+2.5=5]

6.

(a) Write some important criteria for the site selection of hydroelectric power plant. [4]
(b) Write briefly how electricity is generated in hydroelectric power plant ? [3]
(c) Draw a top view of hydroelectric power plant. [2]

7.

(a) 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, (i) sending end voltage (ii) percentage regulation. [2.5+2.5=5]
(b) How overhead transmission lines are classified? Write briefly about each classification. [3]
(c) ACSR conductors are mostly used in transmission lines. What is the full form of ACSR ? [1]

8.

(a) Draw a neat diagram of 3-phase delta and star connected system and show the line and phase voltages and line and phase currents for each system. [2.5+2.5=5]
(b) What do you mean by power factor improvement? [4]

9.

(a) Compare the volume of conductor material required for 3-phase, 3-wire AC system with two wire DC system with one conductor earthed. [5]
(b) What do you mean by variable load on power station? What is a load curve? Also define average load and load factor. [1+1+2=4]

10. Write short note on: [3×3=9]

(a) Cooling tower in thermal power plant
(b) Surface condenser
(c) Boiler

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