MODEL TEST PAPER AND ANSWERS
SUBJECT-POWER SYSTEM – I
(EE-207)

TEST PAPER- III Test

Date: 12/04/18	III Class Test	EE-207	MM 15	Duration : 1Hr

Note-Attempt Any Three

Q1. सौर ऊर्जा क्या होती है ? इसके विभिन्न अनुप्रयोग लिखिए।

Q2. नाभिकीय शक्ति संयंत्रों का वर्गीकरण लिखिए।

Q3. नाभिकीय शक्ति संयंत्र में शीतक (Coolant) और मंदक (Moderator) से क्या अभिप्राय है। किन्हीं दो-दो शीतक और मंदक के नाम भी लिखिए

Q4. निम्न पर लघु टिप्पणियां लिखो -

(a) नाभिकीय अपशिष्ट का निस्तारण (Disposal of Nuclear Waste)

(b)राजस्थान में सौर ऊर्जा की संभावना (Potential of Solar Energy in Rajasthan)

Answer 1 –

सौर ऊर्जा – सूर्य के आंतरिक भाग (Core) में लगातार चलने वाली रासायनिक प्रक्रिया Thermo Nuclear Fusion के कारण ऊर्जा उत्पन्न होती है जो कि Hydrogen Bomb के सामान होती है। इस प्रक्रिया में हाइड्रोजन परमाणु , हीलियम के परमाणु के साथ Fuse होकर बहुत बड़ी मात्रा में ऊर्जा उत्पन्न करता है तथा इस ऊर्जा का कुछ अंश सूर्य से बहुत दूरी पर स्थित अपने ग्रह पृथ्वी तक पहुंचता है जिसे सौर ऊर्जा कहते हैं। Temperature approx-25 x 106 ° Celsius

Output of Sun = 3.8 × 1023 kW ,

Solar energy received by earth & atmosphere = 1.7 × 1014 kW .

सौर ऊर्जा के उपयोग –

1.**Electrical Power Generation Uses**

2. **Industrial/Agricultural Uses**
   - Water Pumping
   - Dryers
   - Green Houses
   - Desalination
   - Chilling
   - Process Steam Production
   - Furnaces

3. **Domestic Uses**
   - Water Heating Space Heating
   - Cooking
   - Refrigeration and air-conditioning

Answer 2- नाभिकीय शक्ति संयंत्रों का वर्गीकरण- On following Basis

1. Purpose-
(a)Research & Development Reactors
(b)Production-For converting fertile material into fissile material
(c) Power- For Electricity Generation

2. Type of Fission-
(a)Slow- KE of Neutron less than 0.1eV
(b)Intermediate- KE of Neutron between 0.1eV to 0.1 MeV
(c) Fast- KE of Neutron more than 1.0 MeV

3. Fuel Used-
(a) Uses Natural Uranium
(b) Uses Enriched Uranium ie adding something to it to improve its quality
(c) Uses Plutonium

4. State Of fuel- (a) solid (b)Liquid

5. Fuel cycle -
(a) Burner – (Thermal) – Designed for producing heat only without any recovery of converted fertile material.
(b) Converter- Converts fertile material into fissile material different from the one initially fed into the reactor.
(c) Breeder- Converts fertile material into fissile material which is same as that initially fed into the reactor.

6. Arrangement of Fissile and Fertile Material-
(a) One Region- Fissile and Fertile Material mixed
(b)Two Region- Fissile and Fertile material separate

7. Arrangement of Fuel and Moderator
(a) Homogeneous- Fuel and Moderator mixed
(b) Heterogeneous- Fuel in discrete lumps in moderator

8.Moderator Material- (a) Heavy Water (b) Graphite (c) Ordinary Water (d) Beryllium (e) Organic

9. Cooling system-
(a) Direct- The liquid fuel circulated from the reactor to the reactor to the heat exchanger where steam is generated.
(b) Indirect- Coolant passed through the reactor and then through the heat exchanger for steam generation.

10. Coolant Used- (a) Gas (b)Water (c) Heavy Water (d) Liquid Metal

Answer 3-

(a) Coolant – Removes Heat from the fuel elements and transfers it to water which is converted into steam .

Properties- (i) Should not absorb Neutrons
(ii) Non Oxidising
(iii) Non Toxic and Non Corrosive
(iv) High Chemical and Radiation stability.
(v) Good heat transfer capability.

Example: (1)Liquid Metals(Na ,K) (2) Heavy Water

(b) Moderator – Materials used to slowdown the fast moving Neutrons are called as Moderators. Fast Neutrons collides with the nuclei of moderator material, Loose energy and get slowed down .

Properties- (i)Should not react with neutrons
(ii)Should be inexpensive
(iii) Chemically Inert and Non corrosive
(iv) No physical or chemical changes due to bombardment of neutrons.
(v) Energy loss of neutrons should takes place

Example: a) Beryllium (b) Graphite

Answer 4- लघु टिप्पणियां-

(a) नाभिकीय अपशिष्ट का निस्तारण (Disposal of Nuclear Waste)-

Nuclear Waste निम्न form में हो सकता है –
(a)Solid (b) Liquid (c) Gas

Regular monitoring of radioactivity is done by measurement and record is kept for study and corrective measures.

Gaseous Effluents- Filtered- discharged high in atmosphere

Clean up plants- to remove radioactive iodine which is major hazard.

Monitoring is done for loss of carbon dioxide from the reactor and it should not be more than 1 Ton / day .

Liquid Effluents are discharged after filtering , pH adjustment and dilution by mixing with the discharged cooling water. Radioactivity is removed by Ion Exchange Method.

Solid waste in the form of rejected control rods and pieces of fuel used have to be stored in concrete vaults and stored under water or aircooled shielded area for about 100 days so that radioactivity decays or Disposed in underground places like vacated coal mines or under deep water in seas.

(b) राजस्थान में सौर ऊर्जा की संभावना (Potential of Solar Energy in Rajasthan)

Rajasthan shines on the solar map of India with 300-330 clear sunny days comparable to deserts of California, Nevada, Colorado and Arizona. Within the state the districts such as Barmer, Bikaner, Jaisalmer, and Jodhpur are the key regions with best solar radiation. Rajasthan is endowed with two critical resources that are essential to solar power production: high level of solar radiation (6-7 kWh/ km2/ day) and large tracts of relatively flat, undeveloped land. These factors were key contributors to the state receiving maximum share of 873 MW out of 1,100 MW allocations (79.36%) in phase-I of Jawaharlal Lal Nehru National Solar Mission (JNNSM). Under the second phase of JNNSM 355 MW has been allotted to Rajasthan out of 750 MW. The total installed capacity of **2022.72MW** has been established in the State as on **31/7/2017**

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