Duration: 03 Hours. Total marks assigned to the paper: 80

Instructions to the candidates if any:-

N. B. (1) Question No. **1** is **compulsory**.
(2) Answer any **Three** out of remaining **Five** questions.
(3) Assumptions made should be **clearly** stated.

Q. 1 Explain any **Four** **20**

a) Define Project and discuss the Project structure with the help of success triangle.
b) Explain the role of Designer and constructor.
c) Explain the formats of FAT, SAT and CAT.
d) Discuss advantages of using software packages for documentation.
e).Explain the loop testing check list.

Q.2 a) Explain the project scheduling techniques. **10**

b) Explain the importance of specification sheet. Explain the specification sheet for RTD. **10**

Q.3 a) Draw and explain the hook up diagram for DP transmitter & Prepare the BOM for it. **10**

b) Explain the steps involved in the Purchasing and discuss in detail the Purchase Order (P.O) format. **10**

Q. 4 a) Explain the check out procedure for the Control valve and DP transmitter. **10**

b) Draw and explain Electronic loop wiring diagram for Level control loop. **10**

Q.5 a) Explain different standards used in Instrumentation projects. **10**

b) Draw junction box wiring diagram and prepare JB schedule from the same. **10**

Q.6 write a short note on (**ANY TWO**) **20**

a) Need and importance of Process Flow Diagram (PFD)
b) Draw and explain instrument location plan with example.
c) Explain the need and importance of Instrument Punch List.

(3 hours)

[Total marks 80]

N.B.: (1) Question no. 1 is compulsory

(2) Write any 3 questions from remaining

(3) Figures to the right indicates full marks

1. Answer the following **(20)**

a. What are the different laws of radioactivity?

b. Give any five medical applications of Nuclear Instrumentation

c. What do you understand by Lithium ion drifted solid state detector?

d. Explain pre-amplifier and amplifier with respect to N.I.

2. a. Explain in details the principle of and architecture of multichannel analyser. **(10)**

b. Explain industrial use of radioactivity. **(10)**

3. Explain Gamma Camera. Explain its block diagram and working. **(20)**

4. a. Explain the factors affecting resolution of gamma- energy for nuclear instruments. **(10)**

b. Explain Scintillation detector in detail. **(10)**

5. a. Nuclear Instrumentation for under-ground pipe-leak detection. **(10)**

b. Explain in detail the phenomenon of gas multiplication in proportional counter. **(10)**

6. Write short note. (Attempt any four) **(20)**

a. Nuclear Reactor

b. Nuclear instrumentation in toxic level detection system

c. Amplifiers & Pre-amplifiers in context with Nuclear Instrumentation

d. 'RAD and REM'

e. MCA

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(3 Hours) [Total Marks: 80]

N.B: (1) Question No. **1** is compulsory.
(2) Attempt any **Three** questions from remaining.
(3) Figures to the right indicate full marks.

1. Answer the following: - [20]
   (a) Explain the importance of non-conventional energy sources.
   (b) With neat sketch, explain pneumatic ash handling system.
   (c) Explain the term multiplication factor with respect to nuclear reactor.
   (d) Give the detailed classification of hydroelectric power plants.

2. (a) What are the accessories of Boiler. Explain their significance in detail. [10]
   (b) Explain the boiler combustion control. [10]

3. (a) Explain the working of Gas turbine power plant with neat sketch. [10]
   (b) Explain the working of Pelton turbine with neat diagram. [10]

4. (a) Draw the schematic of a Nuclear power station and explain. [10]
   (b) With neat block diagram, explain wind energy conversion system. [10]

5. (a) With neat diagram, explain solar thermal power plant. [10]
   (b) Explain with suitable diagram, the working of the solar PV power plant. [10]

6. Write Short note on: - **(Any Two)** [20]
   (a) Geothermal energy.
   (b) Comparison of various power plants.
   (c) HAWT.

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(3 Hours) Total Marks: 80

Note:

1. Question No.1 is compulsory
2. Solve any THREE questions out of remaining FIVE questions.
3. Figure to the right indicate full marks.
4. Assume suitable data if required.

Q1. Solve any 4 [20marks]

a) Explain Aerodynamic and Hydrodynamic valve noise.

b) Define control valve coefficient. Give the factors that affect this coefficient.

c) Discuss the following terms related to reliability: MTTR and MTBF

d) What is ergonomics? Give example of ergonomics applied to a product.

e) What are the design considerations of an RTD?

Q2.

a) Explain phases of Electronic product design. [10marks]

b) A 3" Butterfly valve is to operate at the following conditions- [10marks]

Fluid- Water at flow rate 330gpm

P_v = 0.4 psia, P_1= 24psia, P_2= 15psia d=3.068"

State whether the valve will cavitate or not, and if it cavitates, to what extent?

Q3.

a) Water at 15° C is flowing through 12 inch standard weight pipe (D= 12) at a rate that will not exceed 2800gpm. It is proposed that a standard 60° opening Butterfly valve be used for control. Find size required, if p_1 is computed to be 72.2psia and p_2 is 64.1psia. [10marks]

b) What is absolute calibration? Explain Thermocouple calibration using absolute method [10marks]

Q4.

a) Explain choked flow condition and expansion factor for gases. [10marks]

b) Find valve size for the following conditions [10marks]

Fluid - Benzene with fine non abrasive solids

G = 0.88

q = 450 gpm

p_1 = 80 psia

p_2 = 71 psia

T_1 = 528˚ R

D = 6 inch schedule 40

Valve is characterized ball with C_d=25.

Q5. Write short note on

a) Control room design layout [10marks]

b) Protection standards for electrical enclosures. [10marks]

Q6.

a) Explain the general selection criteria for transducers. [10marks]

b) Explain with diagram methods of control valve noise reduction. [10marks]

END