BE | Sem-VIII | INST | C-2019 | Dec. 2023.

[Time: Three Hours] [Marks:80]

N.B:
1. Question.No.1 is compulsory.
2. Attempt any three questions from remaining five questions.
3. Assume suitable data wherever necessary.

1 Attempt the following.

a Draw and explain control room layout. 20

b Explain the control valve with the following: -

i) Inherent & installed characteristics

ii) Cavitation

c Examine the phases involved in electronic product design.

d Describe selection criterion and Characteristics of transducers.

2 a Draw and explain the power wiring and distribution for control panel. 10

b Design the control valve for following specifications: 10

Service: Water, Q = 1600 gpm, D = 8", P_1 = 42.6 Psia, P_2 = 20 Psig, C_d = 17

3 a Explain RTD installations and its calibration. 10

b Find expected sound pressure level for the following given data: 10

P_1= 99.56 Psia, ΔP=28 Psia, C_d= 17, X_T= 0.38,

D= 10-inch, t = 0.365 inch, r_0 = 3 feet, r = 50 feet location.

4 a Explain Selection and sizing considerations for Actuators. 10

b Design packing & enclosure guidelines for any electronic product. 10

5 a Size a control valve for following data. 10

Service= Mixed flow of air and water. P_1=100psia, ΔP=36 psia, D= 3" sch 40, C_d = 17, K=1.31, X_T = 0.75, T=540^0 R, V_f= 0.016, Wg = 460 lb/hr, W_f=20000 lb/hr

b What are the different methods used to increase the reliability of the system? 10

6 Write a short note on

a System Engineering. 10

b Bath Tub Curve w.r.to Reliability. 10

P code.

0009

****

IMST

Paper / Subject Code: 53276 / Advanced Biomedical Instrumentation (DLOC - IV)

B.E/Sem-VIII/IMST/C-2019/Dec.2023

[Time: Three Hours] Marks 80

N.B: 1 Question 1 is compulsory

2 Attempt any three questions from remaining five questions

3 Assume suitable data wherever necessary

Q. 1		Solve any four questions out of the six questions given below:	
	a	Draw Action potential and explain how it propagates.	5
	b	Comment on PIN diode as photo detector.	5
	c	Explain in brief, the Gamma Camera.	5
	d	Compare visual aid and retinal implant.	5
	e	What is PET. Draw its circuit.	5
	f	Why is radiation safety important? Explain what is the allowed level of minimum radiation dose?	5
Q. 2	a	Explain the different types of LASER used in biomedical.	10
	b	Classify pacemakers. Explain asynchronous pacemaker.	10
Q. 3	a	Explain the basic endoscopy system, with diagram.	10
	b	Sketch the block diagram of wearable kidney and explain how it performs the work of kidney.	10
Q. 4	a	Design an ECG amplifier for Gain of 1000 and bandwidth of (5-100) Hz.	10
	b	Sketch and explain the block diagram for Bed side monitor.	10
Q. 5	a	Explain Functional Electrical Stimulator and its applications	10
	b	Which drug is used in Nuclear imaging. Explain it working, in detail.	10
Q. 6		Write short notes on the following:	
	i	Skin electrolyte and electrode interface	05
	ii	Micro shock and Macro shock	05
	iii	Compare PET and SPECT	05
	iv	Telemetry system	05

****

Paper / Subject Code: 53279 / Functional Safety

B.E | Sem-VIII | INST | C-2019 | Dec-2023

(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.**

Q 1 Answer the following:

a) What do you mean by safety instrumented system? (05)

b) Compare BPCS and safety control system. (05)

c) Discuss the need of SLC. (05)

d) What are different types of events encountered in Probability analysis? (05)

Q 2 a) Explain the following terms : i) PFDavg ii) SIL iii)RRF (10)

b) Draw and explain the safety life cycle of IEC-61508. (10)

Q 3 a) Compare SIS Technology based on relay system and solid state device system. (10)

b) Explain any two SIL determination methods in detail. (10)

Q 4 a) Consider a system composed of a transmitter, controller and valve. The probability of failure over the next five year period for each of the components is as follows (10)

$P_{f,\ transmitter} = 0.15$ $P_{f,\ controller} = 0.008$ $P_{f,\ valves} = 0.19$

Over the next five years, what is the probability of success of this system?

b) What is the procedure to carry out Likelihood Analysis? Explain different methods for same. (10)

Q 5 a) Discuss in detail layers of protection. (10)

b) What are different tools used in consequence analysis? (10)

Q 6 Write short Notes:

a) Risk Graph Method (10)

b) Demand mode vs Continuous Mode (10)

G · P. code

BE/ Sem-VIII / INST/ C-2019/ Dec-2023

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.**

1 **Attempt any 04 of the following.** *20*

A. Give sector-wise energy consumption in India.
B. Explain briefly the following boiler accessories:
   a) Economizer b) air preheater.
C. What are the various devices connected to penstock for protecting? how do they protect
D. Explain the properties of moderator used in nuclear reactor.
E. Define pitch and yaw control for wind power generation.

2 (a) Explain following different loops/circuits involved in thermal power plant *10*
   1. Feedwater and steam flow
   2. Fuel circuit
   3. Air and gas circuit
   4. Cooling water circuit

(b) Give classification of hydro turbines & explain Pelton turbine in detail *10*

3 (a) With suitable schematic diagram explain working of nuclear power plant *10*

(b) Derive expression for energy extraction from the wind using Betz model. *10*

4 (a) With the help of block diagrams explain the operations of standalone & grid interactive solar photovoltaic systems *10*

(b) Explain hybrid power plant with example. *10*

5 (a) Explain generation of electricity from biofuels. *10*

(b) Explain Tidal Energy production with advantages and disadvantages. *10*

6 (a) Compare various power plants based on operating cost, efficiency, maintenance cost & availability of source of power *10*

(b) Explain Gas turbine power plant with diagram. *10*

Pcode