

Total No. of Questions: 6

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Enrollment No.....



Faculty of Engineering

End Sem Examination May-2023

FT3CO18 Nuclear Safety & Radioactive Materials

Programme: B.Tech.

Branch/Specialisation: FT

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

- Q.1 i. RAD stands for- 1  
(a) Radiation after dose (b) Radiation automatic dose  
(c) Radon after dose (d) None of these
- ii. 1 gray is equal to how many rads? 1  
(a) 150 rads (b) 100 rads (c) 120 rads (d) 110 rads
- iii. Size of covered glass in thimble chamber- 1  
(a) 6 mm (b) 4 mm (c) 5 mm (d) 7 mm
- iv. Half-life of carbon – 14 isotope in- 1  
(a) Days (b) Weeks (c) Months (d) Years
- v. DWL stands for- 1  
(a) Derived working limit (b) Dose working limit  
(c) Deliver working limit (d) None of these
- vi. MPL stands for- 1  
(a) Maximum Permanent Limit  
(b) Minimum Permissible Unit  
(c) Minimum Precaution Limit  
(d) Maximum Permissible Limit
- vii. RBE stands for- 1  
(a) Relative Biological Effectiveness  
(b) Relation Bio Effect  
(c) Radon Burning Effect  
(d) Rate Burning Effect

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- viii. Roentgen is the physical unit of- 1  
(a) Exposure dose (b) Examine dose  
(c) Effective dose (d) None of these
- ix. Beta particles are - 1  
(a) Negative charge (b) Positive charge  
(c) Neutral (d) None of these
- x. Alpha particles are discovered by- 1  
(a) Ernest Rutherford (b) Ernesto Valverde  
(c) Ernest Hemingway (d) Henry Becquerel
- Q.2 i. What is half life? 2  
ii. What are the units of radiations? Explain the rate of disintegration. 3  
iii. Explain EMS with frequency diagram. 5
- OR iv. Explain biological effects of instant & long-time exposure. What are alpha, beta & gamma rays? 5
- Q.3 i. What are the methods of measurement? Write any two examples. 2  
ii. Explain the role of dosimeter & film badge with a neat sketch. 8
- OR iii. Explain GM counter with sketch & lithium fluoride powder. 8
- Q.4 i. What are effects of radiation on human body? 3  
ii. What are the precautions to be followed to minimize contamination? 7
- OR iii. Explain dose equivalent method and DWL in detail. 7
- Q.5 i. Explain working principle of nuclear power plant with neat flow diagram. 4  
ii. Explain radioactive waste disposal method with a sketch. 6
- OR iii. Explain any one case study related to nuclear power plant. 6
- Q.6 Attempt any two:   
i. Write a note on setting up zones. 5  
ii. Write a note on protection from external & internal radiation. 5  
iii. What are thermistor & radiation detectors? 5

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## Marking Scheme

### FT3CO18 (T) Nuclear Safety & Radioactive Material

Q1 (i) RAD stands for?	
(a) Radiation after dose	1
(ii) 1 gray is equal to how many rads	
(b) 100 rads	1
(iii) Size of covered glass in thimble chamber	
(c) 5 mm	1
(iv) Half life of carbon – 14 isotopes in	
(d) Years	
(v) DWL stands for	
(a) Derived working limit	1
(vi) MPL stands for	1
(d) Maximum permissible limit	
(vii) RBE stands for	
(a) Relative biological effectiveness	1
(viii) Roentgen is the physical unit of	
(a) Exposure dose	1
(ix) Beta particles are	
(a) negative charge	1
(x) Alpha particles are discovered by	
(a) Ernest Rutherford	1

Q2 (i) definition of half life	2 Marks
(ii) 6 units	0.5 Marks for each = 3 marks
(iii) EMS explanation	4 Marks
Diagram	1 mark
OR (iv) biological effects	2 Marks
Alpha, beta, gamma	3 marks
Q3 (i) measurement methods	2 Marks
(ii) Role of dosimeter	4 Marks
Role of film badge	4 Marks
OR (iii) GMC working	4 Marks

GMC diagram	1 Marks
LFD working	3 Marks

Q4 (i) radiations effects	3 Marks
(ii) 8 points precautions 0.5 marks each = 4 Marks	
Decontamination method	3 Marks
OR (iii) dose method	4 Marks
DWL method	3 Marks
Q5. (i) Working of power plant	3 Marks
Diagram	1 Mark
(ii) Disposal method	5 Marks
Diagram	1 Mark
OR (iii) deep case study	6 Marks
Q6 Any Two (i) note on different zones	5 Marks
(ii) Precautions for external	3 Marks
Precautions for internal	2 marks
(iii) Working Thermistor detector	2.5 Marks
Working Radiation detector	2.5