UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2017

Program: **M Tech NST**	Semester – **III**
Subject (Course): Radiation Shielding, Dosimetry and radiation Protection	Max. Marks : **100**
Course Code : NSAT 8003	Duration : **3 Hrs**
No. of page/s: 2	

SECTION A

Note: Attempt all questions each question is of equal marks and to be answered in 60 words

4 x 5 = 20

Q.1 Writ short notes on

   a) Exposure   b) Absorbed dose   [2.5 + 2.5]

Q.2 Distinguish between stochastic effect and deterministic effects of radiations.   [5]

Q.3. Describe the Atomic energy act and discuss different national and international regulatory bodies.   [5]

Q.4. Explain Bragg Gray Principle for measurement of absorbed dose.   [5]

SECTION B

Note: Attempt all questions in upto 200 words, each carry equal marks.   10 x 4 = 40

Q.5 a). Explain different half lives in context to radio-isotopes also obtain a relationship between them.   [4]

   b) A chamber satisfying the Bragg- Gray conditions contains 0.15 g of gas with a W value of 33 eV/ip . The ratio of the mass stopping power of the wall and the gas is 1.03. What is the current when the absorbed dose rate in the wall is 10 mGy/h.   [6]

Q.6 Discuss the air wall chamber method for measurement of exposure of radiation.   [10]

Q.7. Describe briefly Internal and External radiation dosimetry.   [10]

Q.8. Give short notes on LD 50/60, doubling dose and Radiation toxicity.   [10]

OR

Describe the different types of personal dosimeters and hence differentiate between Dosimeter of Legal record and (DLR) and Self reading Dosimeter (SRD).　　[10]

SECTION C

Note : Answer the following questions　　　　　　　　　　　20 x 2 = 40

Q.10 a) Describe briefly the respiratory track model for internal radiation dosimetry.　　[10]

　　　b) The radiation protection department takes a reading on an isolated pump and finds reading of 1000 mR/h. How thick should a lead shield be to reduce this level to 50 mR/h. Given TVT (Tenth value thickness) of lead for 1 MeV gamma rays in lead = 1.5 inches and HVT (Half Value Thickness) = 0.5 inches.　　[5]

　　　c) Describe the terms Streaming and Shine which are taken into account for shielding gamma and neutrons.　　[5]

Q.11. a) Discuss the advantages of using concrete over water for gamma and neutron shielding.

　　　[10]

　　b) Explain Build up factor in context to shielding of gamma radiations.　　[5]

　　c) A radiation worker needs to limit the dose he receives to 50 mrem. How long can he stay in a radiation field with a dose rate of 0.5rem/hrs.　　[5]

OR

　　a) The exposure rate is 100 R/Hr due to a Cs-137 source. What would the exposure rate be if the source is shielded with 2 cm of lead. Given HVL = 0.65 cm.　　[5]

　　b) Describe the different criteria which must be taken into account for shielding of neutrons.　　[5]

　　c) Explain the Philosophy of radiation protection and the different radiation protection criterion and standards　　[10]