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**Reg. No. :**

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**Question Paper Code: U2P09**

B.E./B.Tech. DEGREE EXAMINATION, NOV 2023

Second Semester

Biomedical Engineering

21UPH209- Medical Physics

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The velocity of sound in tissue CO1-U  
(a) 340 m/s                      (b) 1500 m/s                      (c)  $3 \times 10^8$  m/s                      (d) 6500 m/s
2. -----is the use of high frequency alternate polarity radio-wave electrical current to cut or coagulate tissue during surgery CO1-U  
(a) Neural effects      (b) Cardiac stimulation      (c) Fibrillation                      (d) Diathermy
3. An average energy loss per ion pair produced by photons in air CO2-U  
(a) 15 keV                      (b) 15 eV                      (c) 35 keV                      (d) 35 eV
4. An average energy loss per ion pair produced by electrons in air CO2-U  
(a) 15 keV                      (b) 15 eV                      (c) 35 keV                      (d) 35 eV
5. The LET value of alpha particle with specific ionization energy of 5 MeV is CO3-U  
(a) 0.5 eV                      (b) 100 eV                      (c) 20 eV                      (d) 0.25 eV
6. In the case of annihilation radiation, the  $\beta$  particle collides with orbital electron and produce -----energy. CO3-U  
(a) 511 keV                      (b) two 511keV                      (c) three 511keV                      (d) four 511keV
7. GM counter is an cylindrical metal envelope was not filled with ----- CO4-U  
(a) helium                      (b) neon                      (c) argon                      (d) hydrogen
8. Free air ionization chambers are not used above ----- CO4-U  
(a) 5 MeV                      (b) 100 eV                      (c) 200 eV                      (d) 3 MeV

9. The SI unit of exposure is \_\_\_\_\_ CO5-U  
 (a) C/Kg (b) Roentgen (c) keV (d) radian
10. \_\_\_\_\_ converts the amount of exposure in roentgen to the amount of absorbed dose in radian. CO5-U  
 (a) Q factor (b) F factor (c) R factor (d) H factor

PART – B (5 x 2= 10Marks)

11. Mention the properties of biological tissues. CO1-U
12. Mention few examples for natural and artificial radioactive materials. CO2-U
13. Compare Bragg ionization with Specific ionization. CO3-Ana
14. Mention the different types of radiation detectors. CO4-U
15. Define Roentgen. CO5-U

PART – C (5 x 16= 80Marks)

16. (a) Explain the different types of ultrasonic transducer arrays? CO1-U (16)  
 Or  
 (b) Describe the different mode of ultrasound scanning systems. CO1-U (16)
17. (a) Distinguish between the different radioactive decay process in radio nuclides. CO3-Ana (16)  
 Or  
 (b) Correlating the advancement of technetium generator over radionuclide generator. CO3-Ana (16)
18. (a) Describe the various process involved during charged particle can interact with matter. CO3-U (16)  
 Or  
 (b) Explain in detail about the photoelectric effect, Compton scattering and pair production CO3-U (16)
19. (a) Describe the principle, construction and working of gas filled detectors? CO4-U (16)  
 Or  
 (b) Discuss the properties and application of dosimeters. CO4-U (16)

20. (a) Explain in detail about Exposure, KERMA and absorbed dose. CO5-U (16)
- Or
- (b) Discuss briefly about the concept of LD 50 and stochastic effects. CO5-U (16)

