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Question Paper Code: U2P09

B.E./B.Tech. DEGREE EXAMINATION, MAY 2022

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 air medium is CO1-U
(a) 340 m/s (b) 1500 m/s (c) 3×10^8 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 β 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. The unit of absorbed dose is ----- CO5-U
 (a) Curie (b)Roentgen (c)Becquerel (d) Gray

PART – B (5 x 2= 10Marks)

11. What is Doppler Effect? Mention few clinical applications. CO1-U
12. Mention few examples for natural and artificial radioactive materials. CO2-U
13. If two radionuclide decays occurs at a rate of 50%/hr and 40%/hr, compare its half-life? CO3-App
14. Mention the different types of radiation detectors. CO4-U
15. Define the term “KERMA”. CO5-U

PART – C (5 x 16= 80Marks)

16. (a) Explain the dielectric properties of tissue depend upon the frequency of electromagnetic radiation? CO1-U (16)
 Or
 (b) Describe the different mode of ultrasound scanning systems. CO1-U (16)
17. (a) Explain in detail about the different decay modes of radio nuclides with suitable examples. CO2-U (16)
 Or
 (b) Describe the different methods of production of radio nuclides. CO2-U (16)
 Which method gives relatively more proton-rich and neutron-rich radio nuclides?
18. (a) Explain in detail about the Bremsstrahlung, annihilation and LET. 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) Discuss briefly about the stopping power and bremsstrahlung radiation. CO5-U (16)

Or

(b) Discuss briefly about the concept of LD 50 and stochastic effects. CO5-U (16)

