A   **Reg. No. :** ☐☐☐☐☐☐☐☐☐☐☐☐

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Question Paper Code: U2P09

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B.E./B.Tech. DEGREE EXAMINATION, MAY 2024

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   CO1-U
    electrical current to cut or coagulate tissue during surgery

    (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   CO3-U
    electron and produce ---------energy.

    (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 is   CO3-App
its half-life?

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 CO1-U   (16)
of electromagnetic radiation?

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   CO2-U   (16)
with suitable examples.

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   CO3-U   (16)
and pair production

19. (a) Describe the principle, construction and working of gas filled CO4-U   (16)
detectors?

Or

(b) Discuss the properties and application of dosimeters.   CO4-U   (16)

20. (a) Discuss briefly about the stopping power and bremsstrahlung CO5-U (16) radiation.

Or

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

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