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**Question Paper Code: R2P06**

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

Second Semester

Bio Medical Engineering

R21UPH206- MEDICAL PHYSICS

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer All Questions

PART A - (10 x 1 = 10 Marks)

- \_\_\_\_\_ is a device which is used for both transmission and reception of sound and light waves. CO1- U  
(a) transmitter                      (b) receiver                      (c) transducer                      (d) amplifier
- 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
- 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
- \_\_\_\_\_ has a high probability of absorbing a thermal neutron. CO2- U  
(a) Cadmium                      (b) Graphite                      (c) Technetium                      (d) Uranium
- The LET value of alpha particle with specific ionization energy of 5 MeV? CO2- U  
(a) 0.5 eV                      (b) 100 eV                      (c) 20 eV                      (d) 0.25 eV
- Number of photons emitted in positron emission tomography during annihilation radiation. CO2- U  
(a) One                      (b) Two                      (c) Three                      (d) Four
- Free air ionization chambers are not used above \_\_\_\_\_. CO1- U  
(a) 5 MeV                      (b) 100 eV                      (c) 200 eV                      (d) 3 MeV
- GM counter is an cylindrical metal envelope that was filled with ----- . CO1- U  
(a) Tungsten                      (b)  $D_2O$                       (c) Argon                      (d) Graphite

9. The SI unit of equivalent dose is ----- CO1- U  
 (a) Sievert (b) Roentgen (c) Becquerel (d) Gray
10. The Specific unit of exposure is ----- CO1- U  
 (a) C/Kg (b) Roentgen (c) keV (d) radian

PART – B (5 x 2= 10 Marks)

11. What is Doppler Effect? Mention few clinical applications. CO1 U
12. Define Isomeric transition. CO2 U
13. Define Specific ionization. CO1 U
14. Compare TLD and OSLD. CO1 U
15. What is meant by stopping power? CO1 U

PART – C (5 x 16= 80 Marks)

16. (a) Describe the different mode of ultrasound scanning systems. CO1- U (16)  
 Or  
 (b) Describe the theory, construction and working of thermography camera. Discuss its clinical applications. CO1- U (16)
17. (a) Categorize the various production methods of radionuclides. Which method gives relatively more proton-rich and neutron-rich radionuclides? CO1- U (16)  
 Or  
 (b) Distinguish between the different radioactive decay processes in radionuclides. CO1- U (16)
18. (a) Discuss briefly about the interaction of gamma radiation with matter in human body? CO2- U (16)  
 Or  
 (b) (i) Differentiate specific and Bragg's ionization. CO1- U (8)  
 (ii) Differentiate mean range and straggling range. CO1- U (8)
19. (a) Describe the principle, construction and working of ionization chamber and GM counter? CO1- U (16)  
 Or  
 (b) Describe the principle, construction and working of gas filled detectors? CO1- U (16)

20. (a) Discuss briefly about the relationship among the various dosimetric quantities? CO1- U (16)

Or

(b) Compare the radiation units Roentgen, Gray and Sievert. CO1- U (16)

