

B.Sc. 5th Semester (Honours) Examination, 2019 (CBCS)**Subject : Physics****(Medical Physics)****Paper : DSE-2(2) (OR)****Time: 2 Hours****Full Marks: 40***The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words
as far as practicable.***Group-A****1. Answer any five questions:**

2×5=10

- (a) What is "superior" and "inferior" directions, in case of human body?
- (b) What is a radiation dosimeter?
- (c) Write down the total lung capacity and standard tidal volume of human body.
- (d) What do you mean by "blind spot"? What is the peak sensitivity of Rod cells?
- (e) What are the minimum and maximum sound pressures the human ear can detect?
- (f) Write down the relation between sensory input $s(t)$ and nerve impulse $f(t)$.
- (g) Define linear attenuation co-efficient for a collimated beam of γ -ray.
- (h) Write down the basic physical component of a pacemaker.

Group-B

Answer any two questions:

5×2=10

2. (a) What is sound pressure level?
- (b) If $p = p_0 \sin 2\pi ft$ represents a longitudinal pressure change, where p_0 is standard reference pressure, then express sound pressure level with respect to p and p_0 .
- (c) If average sound pressure level is $2P_a$, find the sound pressure level. 1+2+2=5

3. Write a short note on *any two* of the following:

(a) TLD

(b) NMR

(c) Ultrasound Imaging

$(2\frac{1}{2}+2\frac{1}{2})=5$

4. (a) A ray of UV light of wave length 3000\AA falling on the surface of a material whose work function is 2.28 eV , ejects an electron. Find out the velocity of the emitted electron.

(b) What is saturation current and stopping potential?

$3+(1+1)=5$

5. (a) What is NAP and MAP?

(b) Write down the differences between ECG and EEG.

(c) Define "resting potential" of a single nerve fiber.

$(1+1)+2+1=5$

Group-C

Answer *any two* questions:

$10\times 2=20$

6. (a) What is Brehmsstrahlung?

(b) Briefly describe the production of X-ray in Coolidge tube with appropriate schematic diagram.

(c) Define "mass absorption co-efficient".

(d) If, x_h is half-value thickness, then find absorption co-efficient in terms of x_h .

$2+(3+2)+1+2=10$

7. (a) Define "absorbed dose" of radiation and write down its SI unit.

(b) A large amount of radioactive material of half-life 20 days got spread in a room making the level of radiation 40 times the permissible level of normal occupancy. After how many days would the room be safe from occupation?

(c) Describe "dead-time", "recovery-time" and "resolving-time" of a operational GM counter.

$2\frac{1}{2}+3+(1\frac{1}{2}+1\frac{1}{2}+1\frac{1}{2})=10$

8. (a) Briefly describe the physical structure and properties of axon.

(b) Calculate the capacitance of an unmyelinated axon with length of $L = 1\text{ m}$, a membrane thickness of $b = 10\text{ nm}$ and a radius of $a = 2.5\ \mu\text{m}$. Also calculate the total amount of charge on axon surface.

(c) What is the main component of cardiovascular system in human body?

(d) Find the total resistance of circulatory blood system if, approximate flow rate $\approx 95\text{ ml/s}$ and right atrium pressure is 100 mm Hg .

$3+(3+1)+1+2=10$

9. (a) Define the term "medical imaging". Write down the different techniques of medical imaging.
(b) Briefly discuss about Positron-emission-tomography.
(c) What is mechanical ventilation?
(d) Write short note on A/c modes of ventilation.

(1+2)+3+2+2=10