2025/11

SET B

B.Sc. RADIOGRAPHY AND ADVANCED IMAGING TECHNOLOGY
THIRD SEMESTER
RADIOLOGICAL PHYSICS
BRI-303

[USE OMR SHEET FOR OBJECTIVE PART]

Duration: 3 hrs. **Full Marks: 70**

(Objective)

Time: 30 mins. **Marks: 20**

Choose the correct answer from the following: ***1×20=20***

1. A capacitor stores energy in the form of:
   a. Heat
   b. Chemical energy
   c. Electric field
   d. Magnetic field

2. If the plate area of a capacitor increases, its capacitance:
   a. Decreases
   b. Increases
   c. Remains same
   d. Becomes zero

3. A diode allows current to flow:
   a. In both directions
   b. Only when reverse biased
   c. In one direction only
   d. When AC is applied

4. In a forward-biased diode, the P-side is connected to:
   a. Negative terminal of battery
   b. Positive terminal of battery
   c. Both terminals
   d. Ground

5. In reverse bias condition, a diode:
   a. Conducts fully
   b. Blocks current flow
   c. Acts like a short circuit
   d. Amplifies the signal

6. Isotopes are atoms that have:
   a. Same number of neutrons but different protons
   b. Same number of protons but different neutrons
   c. Different number of electrons only
   d. Same mass number but different atomic number

7. Ionization is the process of:
   a. Adding electrons to an atom
   b. Splitting the nucleus
   c. Removing or adding electrons from an atom
   d. Absorbing X-rays

8. In X-ray interactions, ionization mainly occurs due to:
   a. Photoelectric effect and Compton scattering
   b. Pair production only
   c. Coherent scattering
   d. None of the above

9. The SI unit of radiation dose is:
   a. Rad
   b. Gray (Gy)
   c. Roentgen
   d. Sievert (Sv)

10. Ionization chamber works on the principle of:
    a. Magnetic induction
    b. Thermoluminescence
    c. Scintillation
    d. Ionization of gas

11. Which of the following particles determines the atomic number?
    a. Neutron
    b. Electron
    c. Proton
    d. Photon

12. Which of the following has no charge and no rest mass?
    a. Proton
    b. Neutron
    c. Photon
    d. Electron

13. Coulomb's law gives the relationship between:
    a. Current and resistance
    b. Charge and force
    c. Voltage and current
    d. Resistance and power

14. Rectifiers are used to:
    a. Convert AC to DC
    b. Convert DC to AC
    c. Increase voltage
    d. Decrease current

15. X-rays are produced when:
    a. Electrons strike the target
    b. Protons collide
    c. Light hits the anode
    d. Magnetic field is applied

16. The quality of an X-ray beam refers to:
    a. Number of photons
    b. Energy of photons
    c. Filtration used
    d. Focal spot size

17. Which detector uses light emission to measure radiation?
    a. Scintillation detector
    b. Ion chamber
    c. Semiconductor detector
    d. Photographic film

18. Radioactivity is due to:
    a. Stable nuclei
    b. Unstable nuclei
    c. Ionization
    d. Radiation absorption

19. A semiconductor is a material whose conductivity is:
    a. Zero
    b. Very high
    c. Between that of a conductor and an insulator
    d. Constant

20. The impurity added to increase conductivity of semiconductors is called:
    a. Insulator
    b. Doping agent
    c. Dielectric
    d. Amplifier

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Descriptive

Time : 2 hr. 30 mins. Marks : 50

[Answer question no.1 & any four (4) from the rest]

1. Define intrinsic and extrinsic semiconductors. Explain the process of doping and how it affects the conductivity of a semiconductor. 10

2. Explain in detail the structure of an atom. Discuss atomic number, atomic mass, isotopes and isobars with suitable examples. 10

3. Define and explain force, work, energy, and power. How are they interrelated? Give their units. 10

4. What is electromagnetic radiation? Explain its types and its sources with the help of a diagram of an electromagnetic spectrum. 10

5. What is electromagnetism? Explain the construction of electromagnet with the help of a diagram. 10

6. Explain in detail the production of X-rays. Describe the different types of interactions of X-rays with matter. 10

7. Name the two types of radiation detectors used in radiology. Explain the principle, construction and working of an ionization chamber. 10

8. What is scattered radiation? Explain its effects and methods to minimize it. 10

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