KENYA MEDICAL TRAINING COLLEGE

FACULTY OF DIAGNOSTIC SCIENCES

DEPARTMENT OF RADIOGRAPHY AND IMAGING

DIPLOMA IN RADIOGRAPHY AND IMAGING

MARCH/SEPT 2020

END OF SEMESTER TWO EXAMINATION

PAPER: MEDICAL PHYSICS AND CHEMISTRY II (MPC 1209)

DATE: 3rd August 2021	TIME:3hrs (9am-12pm)

INSTRUCTIONS

1. Attempt all questions.
2. Write your registration number on all the answer sheets provided and on the question paper
3. Ensure all examination scripts are handed in at the end of the examination.
4. Ensure you sign the examination register provided.
5. Any examination malpractices will be handled as per the college examination policy

REGISTRATION NUMBER:.....

SECTION1: MULTIPLE CHOICE QUESTIONS (40 MARKS)

1. Among the following electromagnetic waves which has the highest frequency
   A. Radio waves
   B. X-rays
   C. Gamma rays
   D. Ultraviolent radiation
2. Among the following electromagnetic waves which has the longest wavelength?
   A. Radio waves
   B. X-rays
   C. Gamma rays
   D. Ultraviolent radiation
3. During X- radiation production what percentage of energy is converted to x-rays
   A.1%
   B. 99%
   C. 90%
   D. 10%
4. Which of the following is a major source of occupational exposure?
   A. Photodisintegration
   B. Pair production
   C. Photoelectric interaction
   D. Compton interaction
5. A photon of 10 MeV colliding with a nuclear will likely result in what type of interaction?
   A. Photoelectric
   B. Photodisintegration
   C. Thompson
   D. Compton
6. Which of the following interactions contributes to most image fog?
   A. Classical
   B. Photoelectric
   C. Pair production
   D. Compton
7. The process of addition or removal of electrons from an ion is called?
   A. Disintegration
   B. Electrification
   C. Ionization
   D. Resistivity
8. The SI unit for radiation exposure to air is called?
   A. Absorbed dose
   B. Effective dose
   C. Rad
   D. Air kerma
9. Which of the following is the largest source of natural environmental radiation?
   A. Radium
   B. Radon
   C. Carbon
   D. Helium
10. Which of the following is a unit for absorbed dose?
    A. Rad
    B. Rem

C. Sievert
D. Becquerel

11. Identify the unit of the quantity of radioactive material
A. Gray
B. Curie
C. Rem
D. Rad

12. The following terminologies are applied in radiation dosimetry except
A. Accurate dose
B. Total dose
C. Skin dose
D. Absorbed dose

13. Which component is added to the tungsten used in x-ray tube anode to reduce surface crazing
A. Aluminum
B. Rhenium
C. Silver
D. Molybdenum

14. The following are functions of anode part of the x-ray tube insert except
A. To convert electron energy to x-radiation
B. To dissipate the heat created in the process of x-radiation production
C. To act as the positive electrode of the valve
D. Thermionic emission of electrons

15. X-rays are produced in a small area in the surface of the anode called
A. Focal spot
B. Cathode
C. Anode spot
D. Target

16. Electrons are emitted in the filament coil in the cathode of xray tube insert through_____ emission
A. Thermionic emission
B. Photoelectric emission
C. Secondary emission
D. Field emission

17. The space between the housing and tube insert in the xray tube is filled with
A. Vacuum
B. Oil
C. Air
D. Water

18. Deceleration of charged particles results in the emission of electromagnetic field called
A. X-radiation
B. Characteristic radiation
C. bremsstrahlung radiation
D. Gamma radiation

19. When electron change from one atomic shell to another _____are produced
A. X-radiation
B. Characteristic radiation

C. Bremsstrahlung radiation
D. Gamma radiation

20. Ultrasound is sound with frequency greater than
A. 2 Hz
B. 15 Hz
C. 20,000 Hz
D. 1540 Hz

21 The number of cycles that an acoustic variable goes through in a second is known as?
A. Wavelength
B. Frequency
C. Amplitude
D. Propagation speed

22. Place the following classification of matter in order of increasing sound propagation speed
i. Gas
ii. Solid
iii. Liquid
A i,ii,iii
B ii,iii,i
C i,iii,ii
D iii,ii,i

23. While frequency of ultrasound in soft tissues increase, the wavelength
A. Weakens
B. Is constant
C. Increases
D. Decreases

24. Propagation speed in bone is _____ that in soft tissues
A. Lower than
B. Equal to
C. Higher than
D. 10m/s greater than

25. Which of the following is the main quality which makes aluminum the metal of choice in making of the added filters in x-ray tube?
A. High density
B. High atomic number
C. Low melting point
D. Low atomic number

26. The following are inherent filters in x-ray tube except
A. Aluminum
B. Cooling oil
C. Glass envelope
D. Window of the x-ray tube

27. As the x-ray beam travels through matter the following happens
A. Penetrates matter without interacting with it
B. Interacts with matter and be completely absorbed
C. Interact with matter and get scattered
D. All of the above

28. The linear attenuation coefficient is affected by?
    A. Atomic number of the medium
    B. Material density
    C. Photon energy
    D. All of the above
29. Which of the following is not a principle which assists in maintaining low radiation dose during radiographic examination?
    A. Time
    B. Compression band
    C. Distance
    D. Shielding
30. Which of the following statement best describe stochastic effects of ionizing radiation?
    A. Probability of occurrence and severity are increased with dose
    B. Probability of occurrence are increased with exposure
    C. Probability of occurrence increases with dose while its severity is independent of dose.
    D. Probability of occurrence is increased with exposure while its severity is decreased with dose.
31. Which of the following is not a stochastic effect of ionizing radiation?
    A. Teratogenesis
    B. Cognitive decline
    C. Heart disease
    D. Cataracts
32. Distance between two successive crest or trough is called
    A. Wavelength
    B. Frequency
    C. Amplitude
    D. Propagation
33. High radiation dose give rise to which effect?
    A. Stochastic effects
    B. Deterministic effects
    C. Teratogenesis effects
    D. Cognitive decline effect
34. Which wave form do ultrasound waves travel in solid?
    A. Longitudinal wave
    B. Transverse wave
    C. Surface wave
    D. All of the above
35. Which wave form do ultrasound waves travel in liquid?
    A. Longitudinal wave
    B. Transverse wave
    C. Surface wave
    D. All of the above

36. Which wave form do ultrasound waves travel in gas?
    A. Longitudinal wave
    B. Transverse wave
    C. Surface wave
    D. All of the above
37. Which is the name of the wave form in which the propagating particle is oscillating in right angle to the direction of propagation
    A. longitudinal wave
    B. transverse wave
    C. surface wave
    D. none of the above
38. which is the name of the wave form in which the propagating particle is oscillating in the same direction of propagation
    A. longitudinal wave
    B. transverse wave
    C. surface wave
    D. none of the above
39. The filtration of an atomic beam has the effect of
    A. improving the quality of the transmitted x-ray beam
    B. increasing the quantity of the transmitted x-ray beam
    C. reducing the quantity and decreasing quality of the transmitted x-ray beam
    D. improving the quality and increasing quantity of the transmitted x-ray beam
40. B^- radiations are simply
    A. protons
    B. neutrons
    C. electron
    D. positron

SECTION 2: SHORT ANSWER QUESTIONS (40 MARKS)

1. State five (5) uses of ultrasound (5marks)
2. State the major properties of ultrasound (5 marks)
3. Which qualities of tungsten make it a metal of choice to use in the making of x-ray tube anode? (5marks)
4. Define attenuation as used in diagnostic radiation and state the four (4) processes of attenuation (5 marks)
5. You measure 37 grams of strontium 90 (half-life =28.8 years). How much was present 2 years before this? (5 marks)
6. State the application of radioactivity (5 marks)
7. Name five (5)basic components of ultrasound equipment (5 marks)
8. Give five (5) examples of deterministic effects of ionizing radiation (5 marks)

SECTION 3: LONG ANSWER QUESTION (2O MARKS)

1. Describe the modes of ultrasound