



# BRAINWARE UNIVERSITY

**Term End Examination 2021 - 22**

**Programme – Bachelor of Science in Medical Radiology & Imaging Technology**

**Course Name – Fundamental Physics and Radiological Physics**

**Course Code - BMRIT202**

**( Semester II )**

**Time allotted : 1 Hrs.15 Min.**

**Full Marks : 60**

[The figure in the margin indicates full marks.]

## Group-A

(Multiple Choice Type Question)

1 x 60=60

*Choose the correct alternative from the following :*

- (1) Coulomb is the unit of which quantity?
 

a) field strength	b) charge
c) permittivity	d) force
- (2) The S.I. unit of electric field intensity is
 

a) $\text{NC}^{-1}$	b) $\text{N}^{-1}\text{C}$
c) $\text{NC}$	d) none of the above
- (3) If in an alternating current circuit, resistance is 5 ohm, capacitive reactance is 12 ohm, what is the impedance?
 

a) 5 ohm	b) 10 ohm
c) 12 ohm	d) 13 ohm
- (4) Capacitor is a device used to \_\_\_\_\_
 

a) store electrical energy	b) vary the resistance
c) store magnetic energy	d) dissipate energy
- (5) Which of the following is used for measurement of high temperatures?
 

a) vapour thermometer	b) energy meter
c) resistance thermometer	d) pyrometer
- (6) A 10  $\mu\text{F}$ , 20  $\mu\text{F}$ , 22  $\mu\text{F}$ , and 100  $\mu\text{F}$  capacitor are in parallel. The total capacitance is
 

a) 102 $\mu\text{F}$	b) 152 $\mu\text{F}$
c) 180 $\mu\text{F}$	d) 201 $\mu\text{F}$
- (7) What is the total opposition to current in a series RC circuit called?
 

a) inductance	b) impedance
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- c) reactance  
d) resistance
- (8) What is the effective value of current?  
a) RMS current  
b) average current  
c) instantaneous current  
d) total current
- (9) In a sinusoidal wave, average current is always \_\_\_\_\_ rms current.  
a) greater than  
b) less than  
c) equal to  
d) not related
- (10) Process in which A.C is converted into D.C is called  
a) induction  
b) rectification  
c) inversion  
d) dispersion
- (11) In case of filament lamp at higher voltages, resistance of lamp  
a) decreases  
b) increases  
c) remains constant  
d) varies depending on the filament
- (12) In semiconductors upon increasing temperature, conductivity  
a) decreases  
b) increases  
c) remains constant  
d) haphazard
- (13) A moving charge produces  
a) electric field only  
b) magnetic field only  
c) both of them  
d) none of these
- (14) The divergence of magnetic flux density B  
a) 0  
b) 1  
c) -1  
d) none of these
- (15) The direction of propagation of electromagnetic wave is given by  
a) **Along the direction of  $\vec{E}$**   
b) **Along the direction of  $\vec{H}$**   
c) **Along  $\vec{E} \times \vec{H}$**   
d) none of these
- (16) Compressions and rarefactions are due to  
a) movement of air molecules  
b) vibration of air molecules  
c) variability of air pressure  
d) variability of vibration of air molecules
- (17) The pitch of sound depends on  
a) frequency  
b) amplitude  
c) both of these  
d) none of these
- (18) The hearing range of human ear is  
a) 20 Hz to 20,000 Hz  
b) less than 20 Hz  
c) more than 20,000 Hz  
d) 20 Hz to 25,000 Hz
- (19) Which of the following is/ are not applications of Ultrasonic Waves?  
a) for measuring the depth of sea  
b) in sterilizing of a liquid  
c) in Ultrasonography  
d) in sterilizing a needle
- (20) What is the effect of increase of temperature on the speed of sound?  
a) it increases  
b) it decreases  
c) it may or may not increase  
d) no effect
- (21) What is supersonic speed?

- a) when the speed of any object exceeds the speed of sound
- b) when the speed of any object exceeds the speed of light
- c) when the speed of any object exceeds 10000 m/s
- d) none of the above
- (22) Which of the following sound waves are used in echocardiography?
- a) infrasonic
- b) ultrasonic
- c) between 20 Hz and 2000 Hz
- d) none of the above
- (23) Which of the following can be measured using SONAR?
- a) distance of underwater objects
- b) direction of underwater objects
- c) speed of underwater objects
- d) all of the above
- (24) According to Stefan's law, the total radiation from a black body per second per unit area is proportional to (T is temperature in Kelvin scale)
- a) T
- b)  $T^2$
- c)  $T^{-4}$
- d)  $T^4$
- (25) Which of the following is the fastest process of heat transfer?
- a) conduction
- b) convection
- c) radiation
- d) insolation
- (26) At what temperature are the Celsius and Fahrenheit equal?
- a)  $+40^\circ$
- b)  $-40^\circ$
- c)  $0^\circ$
- d)  $100^\circ$
- (27) Which colour of heat radiation represents the highest temperature?
- a) blood red
- b) dark cherry
- c) white
- d) salmon
- (28) The heat transfer takes place according to
- a) Zeroth law of thermodynamics
- b) first law of thermodynamics
- c) second law of thermodynamics
- d) Kirchhoff's law
- (29) Cork is a good insulator because it has
- a) free electrons
- b) atoms colliding frequency
- c) low density
- d) porous body
- (30) The thermal diffusivities for solids are generally
- a) less than those for gases
- b) less than those for liquids
- c) more than those for liquids and gases
- d) more or less same as for liquids and gases
- (31) The heat transfer from a hot body to a cold body is directly proportional to the surface area and difference of temperatures between the two bodies. This statement is called

a) first law of thermodynamics

b) Newton's law of cooling

c) Newton's law of heating

d) Stefan's law

(32) Electric conduction in a semiconductor takes place due to

a) electrons only

b) holes only

c) both electrons and holes

d) neither electrons nor holes

(33) Ripple factor of full wave rectifier is

a) 0.52

b) 1.21

c) 0.48

d) 1

(34) The saturation point on the d.c. load line is

a)  $V_{BE}=0, I_{C,sat} = \frac{V_{CC}}{R_C}$

b)  $V_{CE}=0, I_{C,sat} = \frac{V_{CC}}{R_C}$

c)  $V_{CE}=0, I_{C,sat} = \frac{V_{BB}}{R_C}$

d)  $V_{BE}=0, I_{C,sat} = \frac{V_{BB}}{R_C}$

(35) When both the junctions of a transistor are reversed biased, the transistor operates in

a) saturation region

b) cut-off region

c) active region

d) none of these

(36) The base of a transistor is .....doped

a) heavily

b) moderately

c) lightly

d) none of the above

(37) The barrier voltage of a silicon diode is

a) 0.7 Volt

b) 2.5 Volt

c) 3 Volt

d) 10 Volt

(38) If the doping level in a crystal diode is increased , the width of depletion layer

a) remains the same

b) is decreased

c) is increased

d) none of the above

(39) The maximum possible efficiency of a half wave rectifier is

a) 40.6 %

b) 81.2 %

c) 50 %

d) 25 %

(40) The battery connections required to forward bias a pn junction are

a) +ve terminal to p and -ve terminal to n type

b) -ve terminal to p and +ve terminal to n

c) -ve terminal to p and -ve terminal to n

d) none of the above

(41) When a PN junction is reverse-biased

a) holes and electrons tend to concentrate towards the junction

b) the barrier tends to break down

c) holes and electrons tend to move away from the junction

d) none of the above

(42) For X-rays to travel

a) No medium required

b) Presence of water

c) Presence of oxygen

d) None of these

(43) Soft X-ray have the tube voltage of

- a) 0-10 kV  
b) 20-60 kV  
c) 150-400 kV  
d) 400-3000 kV
- (44) The filters used in diagnostic X-ray tubes are made up of  
a) Aluminium  
b) Copper  
c) Tin  
d) Lead
- (45) Tungsten is the ideal material for anode because it has  
a) High atomic number (74)  
b) High melting point (3370° C)  
c) High specific heat and high thermal conductivity  
d) All of these
- (46) The “Heel effect” is  
a) Higher on cathode side than anode side  
b) Higher on anode side than cathode side  
c) Equal on both on cathode and anode side  
d) All of these
- (47) X-ray beam when fall on the body, act as  
a) Reflected  
b) Absorbed  
c) Transmitted  
d) All of these
- (48) In coherent scattering, the single electron is involved in interaction in  
a) Thompson scattering  
b) Rayleigh scattering  
c) Both of these  
d) None of these
- (49) Early causes of X-ray tube failure are  
a) Overheating  
b) Mechanical damage of filament/glass envelope  
c) Electric failure  
d) Any of these
- (50) Modern X-ray tubes used in diagnostic radiology has  
a) Vacuum  
b) Helium gas  
c) Carbon dioxide  
d) None of these
- (51) Which of the following are called photons?  
a) X-rays  
b) Gamma rays  
c) Alpha rays  
d) Both X-rays and gamma rays
- (52) Flux gain is  
a) Number of output light photon divided by number of input X-ray photons  
b) Number of output light photons multiplied by number of input X-ray photons  
c) Number of output light photons plus number of input X-ray photons  
d) Number of output light photons number of input X-ray photons
- (53) Intensity of radiation depends on  
a) Quality and quantity of X-ray photon  
b) Quality of X-ray photon  
c) Quantity of X-ray photon  
d) All of these
- (54) The effective device to reduce the scattered radiation is  
a) Grid  
b) Glass tube  
c) Diaphragm  
d) Cone
- (55) With high grid ratio, the exposure dose to the patient is  
a) Increased  
b) Decreased  
c) Unaffected  
d) None of these
- (56) Air gap technique is used to

- a) Reduce scattered radiation  
c) Image sharpness deteriorates
- (57) Grid cut off can be reduced to  
a) Focussed grid  
c) High grid ratio
- (58) The bucky factor \_\_\_\_\_ with increasing kVp.  
a) Increases  
c) Halves
- (59) The major advantage of 3-phase generator over single-phase generator is  
a) X-ray energy is lower  
c) Produces a nearly constant potential
- (60) If a circuit produces 12 pulses per cycle, it is known as  
a) 3-pulse generator  
c) 9-pulse generator
- b) Magnification radiography  
d) All of these
- b) Unfocussed grid  
d) None of these
- b) Decreases  
d) Quarter
- b) Produces a pulsating potential  
d) Lower tube rating
- b) 6-pulse generator  
d) 12-pulse generator