



# TNPSC Assistant Professor

Previous Year Paper Radiology Physics (Medical Physics) 03 Sep 2017





Sl. No.: 10000125

•	AL	TAT T	111
Register Number			

#### 2017

# MEDICAL PHYSICS (P.G. Degree Standard)

Time Allowed: 3 Hours]

 $\leftarrow$ 

[Maximum Marks: 300

**A DN/ID/17** 

Read the following instructions carefully before you begin to answer the questions.

#### IMPORTANT INSTRUCTIONS

- 1. The applicant will be supplied with Question Booklet 10 minutes before commencement of the examination.
- 2. This Question Booklet contains 200 questions. Prior to attempting to answer the candidates are requested to check whether all the questions are there and ensure there are no blank pages in the question booklet. In case any defect in the Question Paper is noticed it shall be reported to the Invigilator within first 10 minutes and get it replaced with a complete Question Booklet. If any defect is noticed in the Question Booklet after the commencement of examination it will not be replaced.
- 3. Answer all questions. All questions carry equal marks.
- 4. You must write your Register Number in the space provided on the top right side of this page. Do not write anything else on the Question Booklet.
- 5. An answer sheet will be supplied to you, separately by the Invigilator to mark the answers.
- 6. You will also encode your Register Number, Subject Code, Question Booklet Sl. No. etc. with Blue or Black ink Ball point pen in the space provided on the side 2 of the Answer Sheet. If you do not encode properly or fail to encode the above information, action will be taken as per commission's notification.
- 7. Each question comprises four responses (A), (B), (C) and (D). You are to select ONLY ONE correct response and mark in your Answer Sheet. In case you feel that there are more than one correct response, mark the response which you consider the best. In any case, choose ONLY ONE response for each question. Your total marks will depend on the number of correct responses marked by you in the Answer Sheet.
- 8. In the Answer Sheet there are four circles (A), (B), (C) and (D) against each question. To answer the questions you are to mark with Ball point pen ONLY ONE circle of your choice for each question. Select one response for each question in the Question Booklet and mark in the Answer Sheet. If you mark more than one answer for one question, the answer will be treated as wrong. e.g. If for any item, (B) is the correct answer, you have to mark as follows:

lack lac

- 9. You should not remove or tear off any sheet from this Question Booklet. You are not allowed to take this Question Booklet and the Answer Sheet out of the Examination Hall during the examination.

  After the examination is concluded, you must hand over your Answer Sheet to the Invigilator. You are allowed to take the Question Booklet with you only after the Examination is over.
- 10. The sheet before the last page of the Question Booklet can be used for Rough Work.
- 11. Do not tick-mark or mark the answers in the Question Booklet.
- 12. Failure to comply with any of the above instructions will render you liable to such action or penalty as the Commission may decide at their discretion.

SEAL



- 1. Developing solution contain
  - (A) hydroquinone
  - hydroquinone and phenidone
  - (C) sodium sulfite
  - (D) sodium metaborate and sodium tetraborate
- 2. Characteristic curve or H & D curve is a curve between
  - the exposure and density
  - (B) the MAS and film density
  - (C) kV<sub>p</sub> and film density
  - (D)  $kV_{p}$  and MAS
- 3. Film contrast does not depend on
  - (A) Film density
  - (B) Characteristic curve of the film
  - (C) X-ray exposure
  - Patient thickness
- 4. Which algorithm is not used for image reconstruction in CT scanners?
  - (A) Back projection
  - Collapsed cone
    - (C) Analytics methods
    - (D) Iterative methods
- 5. Which of the below combination regards CT scanners is true?
  - (A) First generation Rotate Translate
  - (B) Second generation Rotate Fixed
  - Third generation Rotate Rotate
  - (D) Fourth generation Fixed Rotate Translate





- 6. Which is not true about Modulation Transfer Function (MTF)?
  - (A) Focal spor MTF deteriorates as the magnification factor increases
  - (B) Screen MTF improves with magnification
  - (C) MTF is 1.0 for films which image 10 to 20 lines per mm
  - MTF of the system includes noise
- 7. In tomography, the section thickness is
  - inversely proportional to the amplitude of tube travel
  - (B) directly proportional to the amplitude of tube travel
  - (C) directly proportional to the kV<sub>p</sub>
  - (D) changes rapidly with large tomographic arcs
- 8. What is true about zonography?
  - (A) less section thickness
  - (B) long exposure time
  - very little unsharpness
  - (D) considerable unsharpness
- 9. The photoconductive layer in xero radiography plate is
  - (A) Selenium crystals
  - Amorphous selenium
  - (C) Aluminium oxide
  - (D) Caesium iodide
- 10. Which does not change as the distance from the face of a parallel hole collimator is increased?
  - (A) Resolution

(B) Sensitivity

(C) Energy

- Patient dose
- 11. Imaging of thyroid yields the highest resolution with a
  - (A) High sensitivity collimator
- (B) Diverging collimator
- (C) High energy collimator
- (D) Pinhole collimator

APMP/17

4





12.	Whi	ch of the following is not a q	uality control test	performed on a gam	na camera?
	(A)	Field uniformity		99 Mo break through	ı .
	(C)	Extrinsic flood	(D)	Spatial resolution	
10	7D1				
13.		resolution of gamma camera	<del>-</del>		
	(A)	Photon energy	(B)	Septal thickness	
	(C)	NaI crystal thickness		Counting time	
14.	An i	leal radio pharmaceutical w	ould have all the	following EXCEPT	
	<b>((1)</b>	Long half life	(B)	No particulate emiss	ions
	(C)	Target specificity	(D)	150 to 250 keV photo	ons
<b>15</b> .	Whic	th of the following is not a ra	adio pharmaceuti	cal localization mecha	nism?
	(A)	Diffusion	(B)	Phagocytosis	
	(C)	Capillary blockage		Elution	
					-
16.	Wha	t determines the residual ac	ctivity of a 1 – wee	ek old 99 mo/99m TC g	generator?
	V.	Initial activity of molybde	num		
	(B)	Number of times one gene	rator was milked		
	(C)	Half life of 99 m TC	UU		
	(D)	Thickness of PB shielding			
<b>17</b> .	99 m	TC generators cannot be			•
	V.	produced in a cyclotron		•	
	(B)	used to dispense more tha	n IC		,
	(C)	shipped by air			•
	(D)	purchased by licensed use	rs	,	
<b>←</b>			5		APMP/17 [Turn over





18. In an ultrasound scanning the "acoustic enhancement" is caused by

- (A) Solid lesion
- Cystic lesion
- (C) Fibroid condition
- (D) Respiratory movement

19. What is a TGC in a scan machine?

- (A) Trigger Gain Control
- (B) Transducer Gain Control
- Time Gain Compensator
- (D) Trigger Gain Compensator

20. Potential applied to a piezoelectric crystal to produce sound

(A) 1000 - 2000 V

300 – 700 V

(C) 10,000 - 20,000 V

(D) 1 meV - 2 meV

21. Axial resolution in an ultrasound scan is given by

Pulse length / 2

(B) Pulse length  $\times 2$ 

(C) Pulse length / 4

(D) Pulse length alone

22. The Q factor in ultrasound is related to

- (A) Velocity response of crystal
- Frequency response of crystal
- (C) Pulse echo time of crystal
- (D) Time response of crystal

23. The advantage of colour doppler displays compared to spectral displays include

- (A) simple interpretation
- accurate recording of velocity
- (C) higher temporal resolution
- (D) fewer artifacts



	_													
24	ጥኤራ	ahoma	of operat	ion wh	ich pre	esents 1	the m	ost ii	nform	ation	in	ultrasoune	d scan	is

(A) A - mode

(B) B - mode

(0)

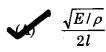
Duplex mode

- (D) M mode
- 25. The most commonly employed range of frequencies for diagnosis are
  - 1-20 MHz

(B) 2 - 20,000 Hz

(C) 2-10 Hz

- $(D) \quad 5 6 \text{ MHz}$
- 26. Natural frequency of an ultrasonic crystal is given



(B)  $2l\sqrt{E\rho}$ 

(C)  $\sqrt{2lE\rho}$ 

(D)  $\sqrt{\frac{E}{2l\rho}}$ 

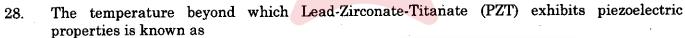
### 27. The relationship between speed (c), wavelength ( $\lambda$ ) and frequency (f) for sound waves is given by

(A)  $c = \frac{\lambda}{f}$ 

(B)  $\cdot f = \frac{\lambda}{c}$ 

(C)  $f = \lambda c$ 

 $c = \lambda f$ 



- (A) Latent temperature
- (B) Threshold temperature
- Curie temperature
- (D) Specific temperature



- 29. Among the following which have the highest attenuation of ultrasound
  - (A) Blood

Bone

(C) Fat

(D) Muscle

(A) Fat

B) Muscle

(C) Blood

Bone Bone

APMP/17 [Turn over



**APMP/17** 



31.	Whi	h class laser will not dama	ge the eye if it dir	ectly viewed for short period of time:
	4	Class 2b lasers	(B)	Class 3a lasers
	(C)	Class 3b lasers	(D)	Class 4 lasers
32.	The	spot size of laser used for la	ser Iridotomy is	
	(A)	40 μm	(2)	50 μm
	(C)	100 μm	(D)	80 μm
			·	
33.	Tiss	ue optical properties is meas	sured using	
	(A)	Photo luminescence	(2)	Integrated sphere
	(C)	UV visible spectrometer	(D)	FTIR
0.4	1171	4 . B . P		
34.		t is Radiance?		·
	(A)	Power emitted from energ		
	(B)	Power emitted from source		igle
	(C)	Power emitted per unit ar		
		Power emitted from source	e per unit solid ai	igle per unit area
35.	If the	e frequency of wave not equa	al and the natura	l frequency of free vibration of particle it is
	(A)	Resonance	(B)	Interference
	TO THE	Scattering	(D)	Reflection
			الالال	
36.	Lam	bert's law describes the loss	in intensity due (	<b>50</b>
	(A)	Scattering	(B)	Reflection
	(C)	Total attenuation		Absorption
37.	In tis	ssue – optics the energy den	sity is measured i	in units
	(A)	W/cm <sup>2</sup>		J/cm <sup>2</sup>
	(C).	J/cm <sup>3</sup>	(D)	J/ cm
			•	



(A)

(C)

(D)

38.	Wha	t are the gases used in ${ m CO_2}$ las	er?		
	(A)	$\mathrm{CO}_2$ and Nitrogen		(B)	CO <sub>2</sub> and Helium
	100	$\mathrm{CO}_2$ Nitrogen and Helium		(D)	CO <sub>2</sub> , Argon and Helium
			•		
3 <b>9</b> .	Wha	t is LIF?			
	4	Laser Induced Fluorescence			
•	(B)	Light Intrinsic Fluorescence			
	(C)	Laser Impedance Fluorescend	ce		
	(D)	Laser Inscripted Flopsy			
•					
<b>4</b> 0.	Whic	ch point is taken as reference po	oint in I	ECG m	easurement?
	(1)	Right leg		(B)	Left leg
	(C)	Right arm		(D)	Left arm
			•		
41.	Proto	on density weighted image is ac	hieved		
	4	long $T_R$ and short $J_E$		(B)	long TR and long JE
	(C)	short $T_R$ and short $J_E$		(D)	short TR and long JE
<b>42</b> .	Wha	t is the principle of coulter bloo	d cell c	ounter?	
	(A)	changes in optical property			
	(B)	changes in velocity			
	10	changes in electrical property			
	(D)	changes in chemical property			
	ν-,				

In inversion recovery pulse sequence, what is the inversion time TI?

The time delay between  $180^{\circ}$  RF pulse and  $90^{\circ}$  RF pulse

The time duration between two successive 180° RF pulse

The time delay between 180° RF pulse and receiving the echo

The time duration of the application of 180° RF pulse



The normal pH of blood is

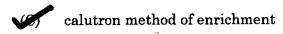


	(A)	7		7.4	
	(C)	7.8	(D)	6.6	
			•		
<b>45</b> .	In a	proton-density image wh	nich one of the followi	ng will appear bright	
	4.5	free water	(B)	air space	
-	(C)	soft tissue	(D)	fat	,
		•		•	
46.	То ра	roduce magnetic resonan	ce in MRI, it is neces	sary	
•	(A)	to apply RF pulse of direction	frequency equal to	Larnov frequency in the	magnetic field
	(B)	To apply RF pulse of a	ny frequency in the n	nagnetic field direction	
	YOU	To apply RF pulse of fr to magnetic field	requency equal to Lar	nov frequency in a direction	n perpendicular
	(D)	To apply RF pulse of a	ny frequenc <mark>y in a</mark> dire	ection perpendicular to ma	gnetic field
					• .
		•			
47.	What	t is the range of normal l	EEG frequency?		•
-	(A)	50 Hz to 100 Hz	(B)	100 Hz to 150 Hz	
,		0.5 Hz to 50 Hz	(D)	0.1 Hz to 20 Hz	•
48.	QRS	complex in ECG represe	nts	<b>5U 7</b>	
	(A)	contraction of atria			
	(D)	ventricular contraction			
	(C)	atrial relaxation		,	
	(D)	ventricular relaxation		•	•
			٠,	•	
<b>49</b> .	In M	RI, what is the function	of shim coils?	٠.	
	(1)	To increase the homogo	eneity of magnetic fie	ld	
	(B)	To decrease the homog	eneity of magnetic fie	eld	•
	(C)	To produce gradient m	agnetic field		•
	(D)	To produce fringe field			
APM	(P/17		10		<b>←</b>



_					
5	Division	of somatic	cells is	called a	S

- (A) synthesis
- mitosis
- (C) apoptosis
- (D) meiosis
- 51. What is the current method used for the enrichment of palladium 103?
  - (A) gas centrifuge enrichment
  - (B) laser isotope separation



- (D) activation in a reactor
- 52. Name the isotope which requires more encapsulation thickness for filtration
  - (A) Cobalt 60
  - (B) Gold 198
  - (C) Iodine 125



- 53. In the  $\beta$ -decay of Cobalt 60 to Nickel 60 (excited state), the number of  $\beta$ -rays emitted are
  - (A) 3
  - $\mathcal{L}$ ) 2
  - (C) 4
  - (D) 6





<b>04</b> .	treat	ment distance of usually	ie of the sources	s to one skin surface is o	hosen to gia
	(A)	0.1 to 0.10 cm	(B)	0.05 to 0.1 cm	
	40)	0.5 to 1.0 cm	(D)	0.5 to 0.6 cm	
<b></b>	Tr		<i>(</i> 1) 11 0 =		
55.		sure rate constant for radiu		_	
	(A)	8.4 R – cm <sup>2</sup> /h/mg	(B)	$3.26 \mathrm{R} - \mathrm{cm}^2/\mathrm{h/mg}$	
		$8.25 \mathrm{~R-cm^2/h/mg}$	(D)	$4.69 \mathrm{R} - \mathrm{cm}^2/\mathrm{h/mg}$	
•					
56.	Whice brack	ch of the following is not not be not the state of the st	ot used as a	Beta-emitting source fo	r intravascular
	(A)	Yittrium – 90	(Jr	Strontium – 90	
	(C)	${\bf Phosphorus-32}$		Ruthenium – 106	
			· ·		
57.	The I	Half Value Thickness (HVT)	for a cohalt 60 a	ouwao ia	
	(A)	11 mm Cu	TOT a cobait—oo s	11 mm Pb	,
	(C)	11 mm W	(D)		
	(0)	II mill W	(D)	11 mm H <sub>2</sub> O	,
58.	The e	effects of attenuation and se e is accounted by	catter in water o	n the transverse plane of	a brachytherapy
	(A)	Geometry function	(B)	Anisotropy function	
	(0)	Radial dose function	(D)	Exposure rate constant	
				29/	
59.	Air k	erma strength is defined as	the		,
	A	Air kerma rate	(B)	Dose rate	
	(C)	Apparent activity	(D)	Activity	•
					•
60.	For w	which of the following radia	tion, with energic	es between 1 keV and 100	keV, 1 sievert =
	(A)	Alpha particles	(B)	Neutrons	
	(C)	Protons		lpha and Gamma rays	
			•		
APM	P/17	•	12		4



61.	Electron-Positron annihilation is the reverse process of pair production, giving rise to t	wo
	photons each of 0.511 meV ejected in	

- (A) the same side
- (B) the perpendicular direction to each other
- the opposite side
- (D) the diagonal direction

#### 62. Which of the following does not emit light?

- (A) Thermo luminescent dosimeter
- Photo cathode
- (C) NaI scintillation crystals
- (D) CR imaging plates

#### 63. The reason for high subject contrast on < barium enema examination is due to

(A) Coherent scatter

(B) Compton scatter

Photo electric effect

(D) Pair production

## 64. The energy (E) and atomic number (Z) dependence of the photoelectric effect varies approximately as



(B)  $E^3/Z^3$ 

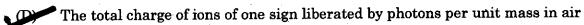
(C) Z/E

←

(D)  $Z^3 \times E^3$ 

#### 65. Exposure is defined as

- (A) Absorbed radiation energy per unit mass of air in electronic equilibrium
- (B) Average electrons liberated in air
- (C) The total kinetic energy of ions released in a unit mass of air in electronic equilibrium



#### 66. Which of the following match-up concerning radiation unit is false?

- (A) Radio activity Bacquerel
- (B) Absorbed dose Gray
- (C) Exposure Roentgen

KERMA – Curie

							•	
67.	Rega	arding Compton scatter	, all correct exce	ept			• •	
	(A)	Energy of photon is r	educed gradual	ly			-	
	V	90° scattered photon	has a higher en	ergy t	han 60° scatter	ed photon	• •	
	(C)	Direction of scattered			•			
	(D)	The energy of scatter	•		• •	= .,	ons	
						-		
		•			·			
68.	Whic	ch radio nuclide is not u	used in telethera	ару та	chine?	ř	•	
	(A)	Radium – 226		(B)	Cesium – 137			
	9	Iridium – 192		(D)	Cobalt – 60			
					· •		÷ .	
						•		
69.		transmission of a cobal	t –60 beam thro	ugh a	5.5 cm thick lea	ad block is abo	out :	
	(A)	25%		(B)	10%			
	(C)	7.5%		100	3.1%	•		
			-					
	****						* *	٠.
70.		ch of the following does	not accelerate e	electro	. *			
	(A)	Microtron		(3)	Cyclotron	**		
	(C)	Betatron		(D)	Vande Graaf (	generator		
<i>-</i>	1171							•
71.	Wha	t is the diameter range	of Co -60 sourc		,			
	<b>(A</b> )	1 to 2 cm		(B)	1 to 2 mm			
	(C)	2 to 3 cm		(D)	2 to 3 mm			
							• .	v.
<b>72</b> .	WA	t in the assess 1 - 1 - 1 - 1						
14.	inter	t is the average leakage national regulations?	ot a teletherap	y mac	nine head at 1 r	n from the so	urce as pe	r the
		< 2 mR/hr		(B)	< 2 mR/min		•	
	(C)	< 1 mR/hr		` '	< 1 mR/min			
				<del>(-)</del>		· ·		
			-		•		·	
73.	What	t is the frequency of mi	crowave region	used ii	accelerator?			,
			~					

(A)

(C)

 $\sim 3000$  kilo cycles/sec

~ 3000 mega cycles/sec

~ 3000 kilo cycles/min

~ 3000 mega cycles/min



<b>74.</b> ■	Wha	t is the energy used in cyber knife?
	(A)	4 mV 6 mV
	(C)	4 meV (D) 6 meV
	•	
<b>75</b> .	Whic	ch one is the microwave amplifier?
	4	Klystron -
	(B)	Van De Graaft generator
	(C)	Betatron
	(D)	Microtron
e c	117h i a	th radioactive isotope used for the high energy Beta emitter for Targeted Radiotherapy?
76.	Whic	Y-90 (B) Cu-67
	<b>(</b> ()	
	(C)	Rh-105 (D) Tb-161
٠,.		
77.	The i	maging modality that is not part of Image Guided Radiation Therapy (IGRT) is
	(A)	Kilo voltage cone beam computed tomography
	(B)	Mega voltage cone beam computed tomography
		Single-photon emission computed tomography
. •	(D)	Helical mega voltage computer tomography
-		
78.	The r	number of 60 Co sources available in a gamma knife radiosurgical device is:
	(A)	181 201
	(C)	221 (D) 101
	•	
<b>79</b>	The (	Collimator scatter (or Head scatter) factor (Sc)
	(A)	is independent of SSD
	<b>(B)</b>	decreases as the field is reduced by inserting secondary block
	<b>(C)</b>	increases with increase in the collimator defines field size
		both (A) and (C)
<b>←</b>		15 APMP/17
•	•	[Turn over





	·	
80.		minimum value of in-utero exposure which increases the probability or incidence of nood cancer is
1	(4.)	10 mg (B) 10 cg
	(C)	10 g (D) 1 mg
81.	Whic	h of the following statement is true?
	(A)	for the same dose, lower dose rate produces more cell killing
	(B)	fractionation results in worst therapeutic ratio
	4	for the same dose, higher dose rate produces more cell killing
	(D)	dose rate is not important when same radiation dose is delivered
	• • •	
82.	The 4	R's of radiobiology include
	(A)	Radio sensitivity, reconstruction, redistribution and reoxygeration
	(B)	Radio sensitivity, repair, repopulation and reoxygeration
	(C)	Radio resistant, repopulation, redistribution, reoxygeration
	Va j	Repair, reassortment, repopulation, reoxygeration
83.	$TD_{5/8}$	means
	Variation of the second	the minimum tolerance dose that causes a 5% complication rate within 5 years of radiation completion
	(B)	the maximum tolerance dose that causes a 5% complication rate within 5 years of radiation completion
	(C)	the total dose that causes 5% death of population in 5 years
	(D)	the time delay for the 5% of the cell population to duplicate in 5 years
•		

- 84. Chemical agents that generally promote both the direct and indirect effects of radiation is
  - (A) Radio activators
  - (B) Radio resistants
  - (C) Radio protectors
  - Radio sensitizers

APMP/17

16

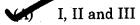


#### 85. Which of the following is true about hyperthermic treatment?

- (I) It uses heat to kill cells
- (II) Hyperthermic doses are expressing in minutes at STP
- (III) All the body tissues do not respond in the same way to heat
- (IV) Increases blood flow to normal cells
- (A) I, II and IV
- I, III and IV
- (C) I, II, and III
- (D) All are correct

#### 86. RBE depends on

- (I) LET
- (II) Dose rate
- (III) Biological system / end point
- (IV) Chemical changes



- (B) I and IV only
- (C) I and II only
- (D) I and III only

#### 87. Match the radiation types with OER:

- (a) X rays and  $\gamma$ -rays
- 1. 1.3 (OER)

3.

(b) Neutrons

- 2. 2-3.5 (OER)
- (c) High LET radiates (X rays)
- 1.5 (OER)

- (a)
- (b)
- 7 2
- 3

1

2.

2

- (B) 2
- .

(c)

1

3

3

1

- (C) 1
- (D) 3





OER for alpha particle is equal to **(B)** 1.6 2.5 (D) 3.0 89. Which is a unit of radiation exposure? (A) Joule Rad REM (C) C/Kg The equipment that measures the electrical activity of the heart is 90. (A) Electromyography Electro encephalography **(B)** Electro cardiography Electron microscope Other than hydrogen which one of the following nucleus is preferred for MRI 91.  $C^{13}$  $C^{14}$ **(B)**  $C^{12}$ (C)  $C^{10}$ (D) Which of the radio nuclides present in the human body? 92. H-3 and C-14 (A) **(B)** Ce-144 and C-14 K-40 and C-14 K-40 and Ba-140 (D) 93. The linear attenuation coefficient is defined as increase the radiation intensity per unit path length (A) reduction the radiation intensity per unit path length (C) reduction the radiation amount in the atom (D) increase the radiation amount in the atom



- 94. What does a collimator do?
  - (A) It reduces the exposure time by ionizing the radiation before it hit the patient
  - (B) Holds the patient in place during an exposure
  - It provides particular shape to the area to be exposed (treated)
  - (D) It is used to produce radiation
- 95. ALARA stands for
  - (A) As Low As Responsibly Acceptable
  - (B) Alarm Loss Activated Radiation Activated
  - As Low As Reasonably Achievable
  - (D) As Low As Reasonably Attenuated
- 96. The factor that indicate how much attenuation will take place per centimeter is known as the
  - (A) mass attenuation coefficient
  - linear attenuation coefficient
  - (C) decay rate
  - (D) atomic number
- 97. The abbreviation for QF of radiation is
  - (A) quantity factor of radiation
  - quality factor of radiation
  - (C) quantity fusion
  - (D) quantity fashion
- 98. A skin dose from a beta emitter is considered more hazardous then that from a Gamma emitter. Which of the following best support this statement?
  - (A) Betas not significantly attenuated by skin and thus cause more damage
  - (B) Gammas are significantly attenuated by skin and thus cause more damage
  - All the beta's energy is dissipated in the basal layers of the skin
    - (D) All the Gamma's energy is dissipated in the basal layers of the skin

APMP/17 Turn over



**APMP/17** 



99.	In di	agnostic radiology, which ty	pe of interacti	on d	lelivers	the maxi	mum d	ose to th	e patent
	(A)	Compton scattering	V	0)	Photo	electric ef	fect		
	(C)	Coherent scattering	O	D)	Photo	disintegra	ation	•	:
100.	Whic perso	ch interaction produces ra onnel during diagnostic inves	diation that	are	more	harmful	for di	agnostic	radiology
	W	Compton interaction		B)	Pair pi	oduction			•
	(C)	Photo electric effect		D)		ent scatte	ring	•	
101.	Name radio	e the factor that can be use llogy	d to some ex	tent	to con	trol scatt	er radi	ation in	diagnostic
	(A)	Field size	,	•				•	
	(B)	MAS	•						
	(C)	Thickness of the part to be	radiographed	ì					•
	C)	Kilo Voltage (kV <sub>P</sub> )			•				
102.	W/L:	1£41 £-11				· •			
102.		th of the following is correct?			<b>#</b> 0.111		,		
• .	(A)	1.5 mm Aluminium			70 kV	• .		•	
	(B)	Copper		\ .		ltration		ı	• .
	(C).	Molybdenum		edia	tric app	olication	*		
		Heavy metal filter (Holmiu	m) – ir	npro	oved ioc	line or ba	rium co	ntrast	
						. •			
103.	Grid :	ratio is						) ·	
	(A)	the ratio between the heigh	nt and width o	f th	e lead s	strips			
	(B)	the ratio between the heightings	ght of the lea	ad s	trips a	nd the di	stance	between	the lead
	(C)	the ratio of the height to th	e no. of lead s	strip	s			-	
	(D)	the ratio of the width to the	number of le	ad s	strips				
				•				,	
104.	Meth	od to increase screen speed	, e					•	•
202.	(A)	thinner phosphor layer	•					*	
		thicker phosphor layer					٠.		
,	(C)	lower absorption phosphor	• ,						
	(D)	average conversion efficien	CVV				1 -		•
•	(2)		·,	-					



Which of the following is not true about inherent filtration? 105.

- It is measured in aluminium equivalent
- The insulating oil contributes the maximum for inherent filtration B
- The Beryllium window is used to reduce inherent filtration (C)
- The glass envelope contributes the maximum for inherent filtration (D)

What is the thickness of the aluminium filter above which there is no appreciable 106. advantagé?

- (A)
- 1.5 mm Al
  - 3.0 mm Al

- 2.5 mm Al **(B)**
- **(D)** 2.0 mm Al

Which is not true about quantum mottle? 107.

- less no. of X ray, photons mox will be the quantum mottle (A)
- more no. of X ray, photons mox will be the quantum mottle
- greater with high kVP X ray photons (C)
- associated/seen with intensifying screen (D)

Match with the appropriate options: 108.

- Geometric unsharpness (a)
- Absorption unsharpness
- (b)
- Parallax unsharpness (c)
- Screen unsharpness (d)
- Round or oval objects 1.
- Small focal spor 2.
- Light diffusion 3.
- Double emulsion films 4.



(d) (b) (c) 1 4 3

1

2

2 1 3

3 4  $\mathbf{2}$ 3 1

(D)

Which concept provides an objective measurement of the combined effects that affect the 109. image clarity?

- LSF (Line Spread Function)
- MTF (Modulation Transfer Function)
- Wiener spectrum
- Quantum mottle





110. Gamma cameras are normally capable of re-solving

(A) 0.01 IP/mm

0.06 IP/mm

(C) 0.3 IP/mm

(D) 1.01 IP/mm

111. SPECT requires all of the following EXCEPT

- (A) Gamma emitting, radio isotopes
- (B) Gamma camera rotation

Coincidence detection

(D) Pulse height analysis

112. PET Scanners detect

- (A) positrons of the same energy in coincidence
- (B) positrons and electrons in coincidence
- (C) photons of different energies in coincidence

annihilation photons in coincidence

113. PET Scanners

- (A) need high energy parallel hole collimators
- (B) cannot handle very high count rates
- (C) suffer from significant attenuation losses
- detect 0.511 meV photons

114. The best radio nuclide spatial resolution is normally achieved using

- (A) SPECT
- (B) Low energy all purpose collimator
- (C) High resolution collimator
- PET,

115. Advantage of PET over gamma cameras include all of the following EXCEPT

- (A) More physiological traces compounds
- (B) Better resolution
- (C) Less mottle
- Availability of positron radio isotopes

APMP/17

22



(A)	Auger electrons	(2)	Beta - particles	
(C)	Internal conversion electrons	(D)	Gamma rays	
				•
. A lo	ong lived radionuclide with a daught	er (T42 = :	10 hours) reaches equilib	rium in
(A)	About 3 hours	•		. The second second
(B)	About 10 hours			
المال	About 40 hours			
(D)	About 200 hours			
,		•		
		•		
. Ар	ulse height analyzer window width o	of 20% det	ects 99 m TC gamma ray	s with energies o
(A)	140 keV only			
(B)	Between 135 and 145 keV			
(C)	Between 120 and 140 keV		•	
0	Between 126 and 154 keV			
_				
•				
. Gar	nma camera crystals			
(A)	are made of cesium iodide			
(B)	convert about 95% gamma ray en	ergy to lig	ght	
(C)	are generally 100 μm thick			
0	absorbs more than 90% of 140 ke	V photons		ה
				<b>′</b>
. NM	images acquired using a computer v	will typica	lly have all of the followi	ng EXCEPT
(A)	500,000 to 1 million counts			<b>,</b> .
(B)	Matrix sizes of 1282			
(C)	256 gray scale levels		• •	
	Approximately 10 MB of data		,	
•				
•				
. The	e pulse height analyser in NM imagi	ng increas	es·	
(A)	Detector efficiency	(B)	Scattered photons	
VO	Contrast to noise ratio	(D)	Count rate	
				APMP/1
		23		





122.	Whic	h of the following is not a major c	omponent c	of an ultrasound transducer?	
	(A)	Piezoelectric material	(B)	Backing block	•
	(C)	Accoustic absorbes		Display screen	
123.		mode ultrasound, the —————	— of each e	cho is represented by the brigh	tness at the
	(A)	Phase	(B)	Depth	
•	401	Amplitude	(D)	Attenuation	
124.	Avera	age velocity of the blood flowing th	rough a ve	ssel is	
	(A)	1500 m/sec		1 m/sec	•
	(C)	4500 m/sec	(D)	100 m/sec	
125.	What	bonding material is preferred to	opthalmic e	ocular scanning?	•
	(A)	Silica gel	(B)	Coconut oil	4
÷	(C)	Water	(D)	Tears	
126.	Acous	stic impedance is given by			
	مرین	$Z = velocity \times density$	(B)	$Z = density \times viscosity$	•,
	(C)	$Z = density \times temperature$	(D)	$Z = mass \times density$	
	i			24171	· · · · · · · · · · · · · · · · · · ·
127.	Veloc	ity of sound in Lung			
	(A)	1450 m/sec	(B)	1561 m/sec	
	(C)	4080 m/sec	0	331 m/sec	
128.	To pr	oduce longitudinal waves the qua	rtz should	be cut in such a way that it	· · · · · · · · · · · · · · · · · · ·
•	منہیں	cuts X axis parallel to Z axis		out the same of th	
	(B)	cuts Y axis parallel to Z axis			
•	(C)	cuts Z axis parallel to X axis			•
	(D)	cuts both X and Z axis	-		
APM	P/17		24		<b>←</b>
			_		•



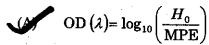
	angle	, a new angle of sound travel takes	place in t	he second material due to	•
	(A)	Attenuation	(B)	Rarefraction	
	(C)	Compression		Refraction	
	·				
				· ·	•
130.	The t	ypical range of frequency of medica		· · · · · · · · · · · · · · · · · · ·	
. •		2 – 10 MHz	(B)	100 – 1000 kHz	· · · · · ·
•	(C)	2-10  kHz	(D)	100 – 1000 MHz	
•	•	A. A. Carrier and			•
404	<b>.</b>		4 4	d with CO lease with a n	own of
131.	Treat	ment of soft small mucosal lesions			ower or
		5 – 10 W	(B)	2 – 5 mW	
•	(C)	15 – 20 mW	(D)	17 – 20 W	
	•				
132.		nators used in lasers belong to class		Charitan and a stance	
	(A)	Closed resonators	(B)	Cavity resonators	•
•	(C)	Noncavity resonators		Open resonators	•
100	mha 4	erm turbid media will be referred t	o the med	lium which has	
133.			o the med	irum winch mas	
	(A)	Only absorption Only scattering			
•	(B)	Both absorption and scattering			
	(D)	Only reflection			
	(D)	Only renection			
134.	Ther	oumping source in Nd : YAG laser i	s	· · · · · · · · · · · · · · · · · · ·	*
101.	(A)	Chemical		Optical	•
	(C)	Electrical	(D)	Mechanical	
3					
135.	Ìn wh	nich region, laser emission occurs ir	ı Nd-YAG	laser	•
•		IR region at 1.06 μm	(B)	Visible region	
	(C)	UV region	(D)	RF region	
	<b>\</b> -/			<del>-</del> -	• • • • • • • • • • • • • • • • • • •
<del>(</del>			25	·	<b>APMP</b> /17

When an ultrasound beam passes through the interface of two dissimilar materials at an



- 136. Which type of laser viewing is most hazardous?
  - (A) Viewing of a specularly reflected beam from a flat surface
  - (B) Viewing of a specularly reflected beam from a curved surface
  - (C) Extended source viewing of a diffused reflection
  - Intra beam viewing of a divert beam
- 137. Optical density  $OD(\lambda)$  of protective filter is given by

Where  $H_0$  is worst case exposure MPE maximum permissible exposure?



(B) OD  $(\lambda) = \log_{10} H_0$ 

(C) OD 
$$(\lambda) = \log_{10}(MPE)$$

- (D) OD  $(\lambda) = \log_{10} \left( \frac{\text{MPE}}{H_0} \right)$
- Which of the following colour signifies the highest temperature in pseudo colour coding of thermography?
  - White

(B) Red

(C) Brown

- (D) Yellow
- 139. What does the acronym LASER stand for?
  - (A) Light absorption by stimulated emission of radiation
  - (B) Light attenuation by stimulated emission of radiation
  - Light Amplification by stimulated emission of radiation
  - (D) Light alteration by stimulated emission of radiation
- 140. Wave length of He-Ne laser
  - (A) 628.4

G 632.

(C) 514.7

(D) 1034.0

- 141. What are ND filters?
  - (A) Nitro dioxan filters
  - (B) Nitrogen deuteron filters
  - (C) Non deposited filters
  - Neutral density filters



	W.	Niobium – Titanium alloy		•	
	(B)	Tungsten – Rhodium alloy	•		
	(C)	Rhodium – Titanium alloy		, ;	•
	(D)	Iridium – Titanium alloy	•		
	٠.			• '	
143.	To re	educe hemolysis, the blood pump des	ign shou	ld provide a flow that min	nimises
	, <b>(A)</b>	Oxygen tension	(3)	turbulance	÷.,
	(C)	body temperature	(D)	continuous flow	
:					*•
	•				
144.	Duri	ng Myocardial infarction one can use			•
	(A)	Pacemaker	(B)	Heart lung machine	
	(C)	Nerve simulator	(D)	Kidney machine	
				•	1 1
					,
145.	Wha	t is pacemaker?			<
	(A)	Instrument to measure electrical a	ctivity o	f heart	
	(B)	Instrument to give electric voltage	to the h	<mark>eart i</mark> n case of heart failu	re ·
	4	Instrument to maintain heart rhyt	hm		
	(D)	Instrument to measure the blood fl	low from	the heart	. •
146.	Whic	ch is the ch <mark>aracteri</mark> stic of peritoneal o	lialysis?		
	(A)	Blood is cleansed outside the body	and the	n returned to the body	
	(B)	A hollow fibre dialyser is used			÷
	4	Uses the membrane layer of abdon	ninal cav	rity to clean the blood	
	(D)	Blood is oxygenated outside the bo	dy and t	hen returned to the body	
147.	In M	RI, which magnet widely is used to p	roduce l	nigh magnetic field in the	order of 2 Tesla?
	(A)	Permanent magnet	(B)	Resistive magnet	
	100	Superconducting magnet	(D)	Inductive magnet	
				· · · · · · · · · · · · · · · · · · ·	
<del>(</del>			27	•	APMP/17
	٠,				[Turn ove

Super conducting material used to produce high magnetic field in MRI is





1.40	(T) 1 · 1 ·	TOTO	7		
148.	The high	KF power	deposition	occurs	1n
		F-::		~~~~~	

- (A) Spin-echo pulse sequence
- Inverse recovery pulse sequence
- (C) Gradient echo pulse sequence
- (D) In all pulse sequences, power deposition is save

#### 149. Recording of the peripheral nerves action potential is called

(A) Electro myography

- (B) Electro corticography
- Electro neutrography
- (D) Electro nephrography

#### 150. Which isotope has the mean photon energy of 406 keV?

(A) Pd - 103

(B) Yb - 169

(C) Tm - 170

(D) Au – 198

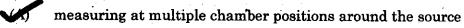
#### 151. Which is not the limitation of Point -A?

- (A) It does not relate to the anatomic structures
- (B) It is sensitive to the position of the ovoid sources and tandem position
- Point A may be inside or outside the cervix
- (D) It defines the tolerance of dose limiting structures in cecernin treatment

#### 152. The value of reference isodose in the paris system is

- (A) the isodose covering the implanted volume
- 85% of the basal dose
- (C) 95% of the prescribed dose
- (D) 95% of the basal dose

#### 153. Positioning uncertainities in in-phantom measurement can be reduced by



- (B) repetition of measurements at a specific distance from the source
- (C) use of larger distance from the source
- (D) use of larger volume chambers



#### 154. Match the following:

- (a) Apparent activity
- (b) Equivalent mass of radium
- (c) Reference exposure rate
- (d) Exposure around the source

	(a)	(b)	(c)	(d)
(A)	_3	1	2	4
(A) (P)	4	3	2	1
(C)	2	4	1	3
(D)	1	2	4	3

- 1. form and dimensions of the source
- 2. exposure at 1 m from the source
- 3. 0.5 mm platinium
- 4. measured at a distance of 1 m

155. Ir - 192 is made up of

- (A) 30% Ir and 70% Al
- (C) 70% Ir and 30% Al

- (B) 30% Ir and 70% Pt
- 70% Ir and 30% Pt

156. What is the half life of Ruthenium - 106?

- (A) 2.87 days
- (C) 28.7 years

- (3) 369 days
- (D) 36 years

157. Which report is used for the calculation of interstitial important treatment?

- (A) ICRU 55
- (C) ICRU 58

- (P) ICRU 56
  - (D) ICRU 60

158. What is the best detector to calibrate the brachytherapy sources?

(A) G.M Counter

- Well -type chamber
- (C) Semiconductor diode
- (D) Scintillation detector

159. The recommended system for dose specification and reporting for intracavitary brachytherapy is

- (A) The Paris system
- (B) The Quimby system
- The ICRU system

(D) The Paterson - Parker system





- 160. The mass attenuation coefficient of photons in water
  - (A) rises to a peak at about 3 eV
  - (B) decreases continuously with energy below 25 meV
  - decreases to about 3 meV, then rises again
  - (D) increases continuously with energy below 25 meV
- 161. The maximum number of photoelectrons produced in a photoelectric interaction by a single photon with incident energy of 150 keV is

  - (B) 5
  - (C) 10
  - (D) Any number, as long as the sum of individual electron energies is equal to 150 keV
- 162. The volume of air in an ionization chamber
  - Determines its sensitivity
    - (B) Should be small if the photon intensity is low
    - (C) Must be increased if high energy photons are to be detected
    - (D) Both (B) and (C)
- 163. Regarding the guard electrode in an ion chamber
  - (A) The guard ring electrode better defines the ion-collecting volume
  - (B) The guard electrode minimizes polarity effect
  - (C) The guard electrode maximizes polarity effect
  - Both (A) and (B)
- 164. As per the Bragg-Gray cavity theory, the ratio of dose to the surroundings medium to the dose to cavity air in given by (assume cavity size very small)
  - (A) the ratio of mass absorption coefficient of medium to that of air for the photon crossing the cavity
  - the ratio of mass stopping power of medium to that of air for the electron crossing the cavity
    - (C) the ratio of electron density of medium to that of air
  - (D) Roentgen to 'cGy' conversion factor for the medium

APMP/17

 $\leftarrow$ 



165.	Whic	th of the following is not particu	ilate radiation		4
	(A)	Alpha particles	(B)	Beta particles	
	(C)	Pi mesons		Gamma rays	
-				•	
		10			ī
166.	<sub>5</sub> <sup>12</sup> B,	$_{6}^{12}\mathrm{C}$ and $_{7}^{12}\mathrm{N}$ are called	··-		
	(A)	Isotopes	(B)	Isotones	
	CO	Isobars	(D)	Isomers	
		·			
167.		rity of sample of radio-active m life is	aterial decrea	ses to one eighth of origi	nal in 15 days. Its
	(A)	10 days	(B)	15 days	
	(C)	3 days	(6)	5 days	
168.	In be	eta decay nucleon number			
	(A)	decreased by one .	(B)	increased by one	
	(C)	increases by two	The state of the s	remains unchanged	•
			, , , , , , , , , , , , , , , , , , ,		
169.	Life	time of unstable nuclei is			
	(A)	Limited	(3)	<b>Unlimited</b>	
•	(C)	100 years	(D)	50 years	
170.	X ray	y exposure may be due to		241/	
•	(A)	The direct beam from the X	ray tube target		
	(B)	Scatter radiation arising from	n the object in	the direct beam	
	(0)	Both (A) and (B)			
	(D)	Both (A) and (B) plus residu X-ray unit has been turned o		at exists for the first few	minutes after the
	,		,		
171.		me required for one half of the erial to disintegrate is called	radio active n	nuclei to a particular san	nple of radio active
	(A)	The exposure time	(B)	A curie	
	(2)	A half life	(D)	A half value layer `	
_			0.1		APMP/17
<b>←</b>			<b>31</b> .	•	[Turn over





	4	Bragg peak	(B)	Kerma peak			
	.(C)	RBZ peak	(D)	LET peak			
173.	Acco radia	rding to AAPM guidelines (TO	3–142), the a	ignment between the light beam a	nd the		
	(1)	$\pm2$ mm	· (B)	±1 mm			
	(C)	$\pm 0.5 \text{ mm}$	(D)	± 1.5 mm			
174.	BSF	or PSF is the					
	4	TAR at Dmax	(B)	Scatter component of TAR			
	(C)	PDD at Dmax	(D)	Scatter component of TPR			
175.	PDD (Dma	for photon beams in worth	(or soft tissa	ue) beyond the depth of maximum	dose		
	(1)	decreases almost exponential	ly wit <mark>h dept</mark> h				
	(B)	increases almost exponentiall	y with depth				
	(C)	decreases almost linearly with	n depth				
	(D)	increases almost linearly with	depth				
l76.	The most extensively studied and most frequently used TLD for clinical dosimetry is						
	(A)	lithium borate (Li <sub>2</sub> B <sub>4</sub> O <sub>7</sub> )					
	(B)	calcium fluoride (Caf <sub>2</sub> )					
	(C)	calcium sulphate (CaSO <sub>4</sub> )					
	<b>D</b>	lithium fluoride (LiF)			-		
177.	Accor	ding to TG-51 protocol for calib d to water-equivalent depths us	ration of phot	on and electron beams, all depths my	ust be		
	(A)	$1 \text{ cm acrylic} = 1.21 \text{ cm } H_2O$					
	_	$1 \text{ cm acrylic} = 1.12 \text{ cm H}_2\text{O}$					
•	(7)	$1 \text{ cm actyle} = 1.12 \text{ cm } \text{H}_2\text{O}$					
•	(C).	1 cm acrylic = $2.12 \text{ cm H}_2\text{O}$					



	4	•
	- 1	-
-	,	,

Which one of the following is required for generating conformal treatment plan?

(A) GT

(B) CTV

PTV

(D) Internal margin

179. In mega voltage photon beams, the Tissue Maximum Ratio (TMR) varies with all of the following factors, except:

(A) Field size

(B) Depth

SSD

(D) Photon energy

180. Which of the following equation is used to compare various fractionation regimens?

(A)  $1-(1-e^{-D/D_0})^n$ 

(B)  $2.3 \times D_0$ 

(C)  $D_o/D_o$ 

 $nd\left(1+\left[\frac{d}{\alpha+\beta}\right]\right)$ 

181. Radio protectors are

- (A) Chemical agents that enhance cell response to radiation
- (B) Drugs used to kill cancer cells
- Chemical agents that reduce cell response to radiation
- (D) Multileaf collimators used in linear accelerators

182. The monthly limit of 0.5 msv to the embryo is to limit / reduce the risk of

(A) mental retardation

- (B) carcinogenesis
- (C) congenital malformation
- all the above

33

183. Which is the most sensitive period for foetal abnormalities?

- (A) pre implantation

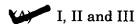
 $\leftarrow$ 

- 4-11 weeks of gestation
- (C) 16-25 weeks of gestation
- (D) more than 30 weeks





- 184. Bergonie and tribondean defined radio sensitivity as
  - (I) Mitotic activity
  - (II) Level of differentiation
  - (III) Directly proportional to a cell's reproductive activity and inversely proportional to a cell's degree of differentiation
  - (IV) Directly proportional to a cell's degree of differentiation and inversely proportions to a cells reproductive activity



- (B) I and III only
- (C) IV only
- (D) All are correct
- 185. Order the following in correct sequence of producing biological damage by indirect action
  - (I) Incident X-ray photon
  - (II) Ion radical
  - (III) Free radical
  - (IV) Chemical changes
  - (V) Biological changes
  - (A) I, III, II, V, IV



- (C) I, III, II, IV, V
- (D) I, II, IV, III, V
- 186. Which of the following is true?
  - (I) Oxygen is an effective radio protector
  - (II) Oxygen is an effective radiosensitive
  - (III) Hypoxic cells are radiosensitive
  - (IV) Hypoxic cells are radioresistant
  - (A) I and III only
  - (B) I, II and III
  - II and IV only
  - (D) IV only



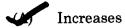


187. The dose - rate effect

- (A) does not affect significantly the biologic effect of X-rays / Gamma rays
- (B) is not important in Radiotherapy

involves in the reduction of the biologic effect of a given dose when the exposure time is increased

- (D) is not due to sublethal damage repair
- 188. As the dose decreases, the RBE of a given radiation type



- (B) Decreases
- (C) Initially increases later decreases
- (D) Remains constant
- 189. The Relationship between OER and LET is as follows
  - (A) OER is a constant function of LET
  - (B) OER has a value of about 3 at high LET values and then decreases to zero at low LET values
  - OER has a value of about 3 at Low LET values and then decreases to unity at high values (approximately 200 keV / micrometer)
  - (D) OER is constant only for RBE
- 190. The effect of radiation on genetic disease is
  - (A) to introduce new type of disease
  - to increase the occurrence probability of naturally existing diseases
    - (C) to decrease the severity of the existing diseases
    - (D) Both (A) and (B)





- 191. What is the principal reason for wearing a personnel monitoring dosimeter?
  - (A) It signifies that the worker is authorized to work with radiation
  - (B) The use of personnel monitoring dosimeters replaces the need for survey in the dept
  - (C) The dosimetry will absorb the radiation and reduce the individual exposure

The result of personnel monitoring dosimeter comprise a permanent record of an individual's occupational radiation exposure history

192. The unit of the collective effective dose is



Person - Sv

- (B) R
- (C) Gy
- (D) Sv

193. What is the radiation weighting factor for alpha radiation?

- (A) 1
- (B) 5
- (C) 10



20

ne following would most likely increase the anatial resolution of

194. Which of the following would most likely increase the spatial resolution of a screen/film combination?

- (A) High grid ratio
- (B) Slower film
- (C) Thicker screen



Thinner screen



195		nat will be the geometrical penumbra for a source of 2 D of 40 cms?	cm diameter	at 80 cms SSD with
	(A)	1.0 cm (B) 1.25 cm	i ,	•
	(C)	1.5 cm 2.0 cm		
	:		•	
196.	Whic	ich is correct in the following?	: ••	
		decrease of radiation intensity with increasing HVT	•	
•	(B)	decrease of radiation intensity with decreasing HVI	·	
	(C)	increases of radiation intensity with increasing HV		
	(D)	increases of radiation intensity with increasing for	different HVT	<b>S</b> .
			•	
197.	The 1	e use factor $(v)$ for the secondary barrier is		•
107.	(A)	0 (B) 1/4		
	(C)	1/2		
•	(0)			
• *				•
198.	The 1	NCRP 49 defined the occupancy factor for corridor		
	(A)	No occupancy	,	
	(B)	Full occupancy (1)		
	C)	Partial occupancy (1/4)	•	•
	(D)	Occasional occupancy (1/16)		
٠				
199.	Diag	gnostic Radiology workload calculate as		
	(1)	mA – min/week		
	(B)	mA – hr/week		
	(C)	mA – sec/week		
•	(D)			
			*.	
200.	What	at is the dose limit for the occupational as per the ICRI	?-60?	,
	(A)	20 mSv/day		
	(B)	20 mSv/month		
-	(0)	20 mSv/year		
	(D)	2 mSv/year		