

17673

16172

3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. (A) Attempt any **THREE** of the following :

12

- (a) With the help of diagram give working of radio-isotopes.
- (b) (i) Give any two installation steps to install ultrasound machine.
(ii) For following faults occur in the ultrasound m/c give (suggest) remedies :
 - (1) machine does not start
 - (2) ultrasound waveform does not generated
- (c) Give significance of relaxation process in NMR imaging. Define T_1 & T_2 relaxation time.
- (d) Draw and label a Geiger Muller Tube.

(B) Attempt any **ONE** of the following :

6

- (a) Give significance of angiography. Draw and explain block diagram of angiography. List application of angiography tech.

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- (b) Draw the labelled diagram of X-ray machine. Which controls in the X-ray machine are responsible for :
- (i) Quality of X-rays
 - (ii) Quantity of X-rays

2. Attempt any FOUR of the following :

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- (a) What is CT number or Hounsfield Unit (H) ? Indicate the CT No. for water and air.
- (b) State properties of ultrasound (any four).
- (c) State the meaning of word 'Endoscope' and draw the block-diagram of endoscopy machine.
- (d) Draw symbol and V.I. characteristics of
 - (i) SCR
 - (ii) TRIAC
- (e) Define the term maintenance and state the steps carried out in maintenance of angiography machine.
- (f) List out the points while handling CT and MRI machine (any four).

3. Attempt any FOUR :

16

- (a) Enlist the transducers used in ultrasound. Give working of phased array transducer.
- (b) Draw a neat labelled block diagram of Gamma camera and write importance of
 - (i) pulse-height analyser and (ii) computing circuit.
- (c) State principle of fluoroscopy. Draw labelled block diagram of fluoroscopy.
- (d) State the causes and remedies of the following faults occur in X-ray :
 - (i) Does not switch on
 - (ii) X-ray does not expose even power is on
 - (iii) X-ray table does not move
 - (iv) Give electrical shock
- (e) State the basic principle of NMR with diagram.

4. (A) Attempt any THREE of the following :**12**

- (a) State and give significance of each block of MRI detection system.
- (b) Differentiate between thermography and endoscopy based on following points :
 - (1) Basic principle
 - (2) Application technique
 - (3) Adv and dis.
 - (4) Specific application of each
- (c) List medical applications of X-ray (any four).
- (d) Draw the flowchart for installation of angiography machine.

(B) Attempt any ONE of the following :**6**

- (a) State types of maintenance. Give maintenance steps involved in X-ray machine. (any eight)
- (b) (i) Define :
 - (1) FLUOROSCOPY
 - (2) Radiography
- (ii) Differentiate between radiography and fluoroscopy based on :
 - (1) Diagram
 - (2) Working principle
 - (3) Viewing media
 - (4) Application

5. Attempt any FOUR of the following :**16**

- (a) An endoscope has the following defects. What can be the reasons for these ?
 - (i) There is no fluid flow.
 - (ii) There is a leakage in flexible endoscope.

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- (b) Define pulse echo techniques. Give its significance in case of ultrasound.
- (c) State the biological effects of MRI imaging (any **four**).
- (d) List out risk factors involved in handling of X-ray equipments. (any **four**)
- (e) List two X-ray tube ratings e.g. one X-ray tube is having KVP rating 60 KVP, miliampere rating 60 mA and X-ray emits for 10 seconds. Calculate the heat Unit value (HU) for this tube.
- (f) Enlist various image reconstruction techniques used in CT. Also draw block diagram for CT machine.

6. Attempt any FOUR of the following :

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- (a) Draw and explain electromagnetic spectrum.
 - (b) Which imaging tech. can be used to diagram diff. brain tissues, normal and coagulated blood ? Give its working principle.
 - (c) List out technical specifications of ultrasound scanner. Give importance of any two specifications.
 - (d) Is endoscopy an invasive or non-invasive imaging technique ? Draw and label the parts of an endoscope machine.
 - (e) State the causes of the faults occurring in an ultrasound scanner :
 - (i) Machine does not turn on
 - (ii) Ultrasound does not generate properly
 - (iii) Image quality is poor
 - (iv) Display is poor
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