

Name :

Roll No. :

Invigilator's Signature :

CS/B.TECH/BME(O)/SEM-5/BME-504/2012-13

2012

MEDICAL IMAGING - I

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP - A

(Multiple Choice Type Questions)

1. Choose the correct answers for any ten of the following :

10 × 1 = 10

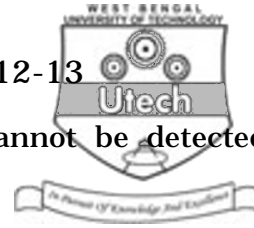
- i) Grid is used to reduce
 - a) primary X-ray radiation
 - b) scattered X-ray radiation
 - c) heating of anode plate
 - d) none of these.

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- ii) Diagnostic X-ray tubes have
- a) high kV & high mA
 - b) high kV & lower mA
 - c) high mA & low exposure time
 - d) low kV & high mA.
- iii) Filament of X-ray tube produces
- a) electrons
 - b) X-ray radiation
 - c) γ -ray radiation
 - d) β -ray radiation.
- iv) Scintillator detector is
- a) CsI
 - b) Xe gas
 - c) photo-multiplier tube
 - d) none of these.
- v) REM indicates
- a) absorption of incident energy
 - b) relative biological damage
 - c) maximum permissible dose
 - d) intensity of X-ray energy.



x) In scintillation detector which ray cannot be detected directly ?

- a) α -ray
- b) β -ray
- c) both (α) and (β) rays
- d) γ -ray.

xi) Wavelength of a diagnostic X-ray radiation is 3×10^{-8} m. What is its energy ?

- a) 6.6×10^{-8} J
- b) 9.9×10^{-17} J
- c) 5.5×10^{-13} J
- d) None of these.

xii) X-ray fluoroscopy imaging is used for

- a) still X-ray imaging
- b) dynamic and real time imaging
- c) both (a) and (b)
- d) none of these.



GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. What is the utility of automatic exposure control ? Describe the various methods used in X-ray exposure using this method. 1 + 4
3. What is 'angiography' ? Briefly discuss about the digital subtraction angiography (DSA) technique. 1 + 4
4. What is digital radiography ? Briefly describe the working principle of an image intensifier tube. 1 + 4
5. What are the detectors commonly used in digital X-ray radiography ? Briefly describe the working principle of scintillator detector coupled with Photo Multiplier Tube.

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

6. a) What is the function of an 'exposure timer' in X-ray radiographic system ? How does the R-C digital timer work ? 1 + 6
- b) Why are collimators and grids essential parts/devices in X-ray radiographic unit ? 6
- c) Why is rotating anode plate used in high capacity X-ray tube ? 2



7. Draw the electrical circuit diagram for conventional X-ray machine. Describe briefly the major sections for conventional X-ray machine. What are the limitations of single phase power supply in X-ray radiographic unit ? How is it overcome ? 4 + 5 + 2 + 4

8. What is the basic principle of thermographic imaging ? What are the detectors used in thermographic imaging ? Briefly describe a thermographic imaging technique or equipment. What are the advantages of thermographic imaging over radiographic imaging ? 3 + 3 + 7 + 2

9. Write short notes on any *three* of the following : 3 × 5

- a) Physical factors of thermographic imaging
- b) X-ray mammography technique
- c) Liquid crystal thermography
- d) Cine radiography
- e) Digital-C-Arm radiographic system.



10. a) What are the limitations of X-ray machine in radiation therapy ? 2
- b) Why is cobalt (Co) put to medical use and how is it obtained and used in therapy ? 4
- c) Briefly describe the cobalt (Co) radiation therapy with proper diagram. 6
- d) What precautions you must take for radiation therapy ? 3

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