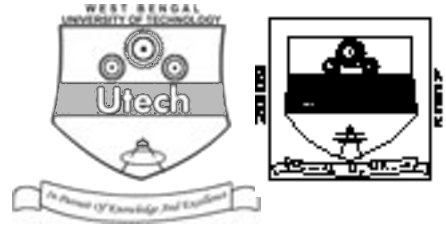


BIOMEDICAL IMAGING-II (SEMESTER - 6)

CS/B.TECH (BME)/SEM-6/BME-603/09



1.
Signature of Invigilator

2.
Signature of the Officer-in-Charge

Reg. No.

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Roll No. of the Candidate

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**CS/B.TECH (BME)/SEM-6/BME-603/09
ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009
BIOMEDICAL IMAGING-II (SEMESTER - 6)**

Time : 3 Hours]

[Full Marks : 70

INSTRUCTIONS TO THE CANDIDATES :

- This Booklet is a Question-cum-Answer Booklet. The Booklet consists of **32 pages**. The questions of this concerned subject commence from Page No. 3.
- In **Group – A**, Questions are of Multiple Choice type. You have to write the correct choice in the box provided **against each question**.
 - For **Groups – B & C** you have to answer the questions in the space provided marked 'Answer Sheet'. Questions of **Group – B** are Short answer type. Questions of **Group – C** are Long answer type. Write on both sides of the paper.
- Fill in your Roll No. in the box** provided as in your Admit Card before answering the questions.
- Read the instructions given inside carefully before answering.
- You should not forget to write the corresponding question numbers while answering.
- Do not write your name or put any special mark in the booklet that may disclose your identity, which will render you liable to disqualification. Any candidate found copying will be subject to Disciplinary Action under the relevant rules.
- Use of Mobile Phone and Programmable Calculator is totally prohibited in the examination hall.**
- You should return the booklet to the invigilator at the end of the examination and should not take any page of this booklet with you outside the examination hall, **which will lead to disqualification**.
- Rough work, if necessary is to be done in this booklet only and cross it through.

No additional sheets are to be used and no loose paper will be provided

FOR OFFICE USE / EVALUATION ONLY

Marks Obtained

Group – A

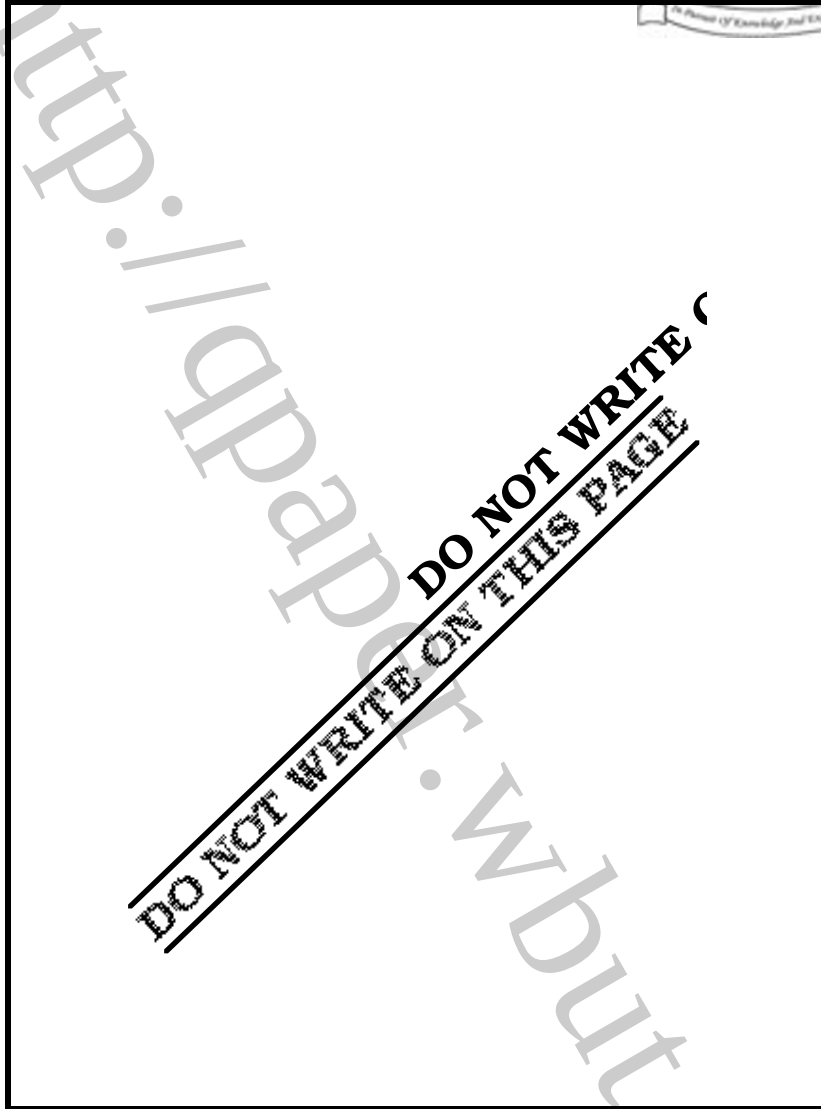
Group – B

Group – C

Question Number																					Total Marks	Examiner's Signature		
Marks Obtained																								

.....
Head-Examiner/Co-Ordinator/Scrutineer

6743 (09/06)





ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009
BIOMEDICAL IMAGING-II
SEMESTER - 6



Time : 3 Hours]

[Full Marks : 70

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : 10 × 1 = 10
- i) The image resolution is measured in
 - a) LP mm⁻¹
 - b) LP m⁻¹
 - c) LP in⁻¹
 - d) LP ft⁻¹ .

 - ii) Computed tomography measures the
 - a) transmitted intensity of X-ray
 - b) attenuation coefficient of X-ray
 - c) incident intensity of X-ray
 - d) detector's efficiency.

 - iii) Ring artefacts in CT image occurs due to
 - a) beam hardening
 - b) detector's non-uniformity
 - c) higher slice thickness
 - d) noise.

 - iv) The windowing system of CT, dispyayed the images using
 - a) 6-bit gray scale
 - b) 8-bit gray scale
 - c) 10-bit gray scale
 - d) 12-bit gray scale.

 - v) The radioisotope used in nuclear medicine is
 - a) ¹²⁴ Xe
 - b) ¹³⁰ Te
 - c) ⁹⁹ Tc
 - d) ²³⁵ U.



vi) Pixel is

- a) 1D image
- c) 3D image

- b) 2D image
- d) none of these.



vii) Precession or wobbling of MRI is a

- a) first order motion
- c) third order motion

- b) second order motion
- d) none of these.

viii) T2 relaxation of MRI is also called as

- a) spin-spin relaxation
- c) both of (a) and (b)

- b) spin-lattice relaxation
- d) none of these.

ix) Streak artefacts occur in

- a) CT images
- c) MRI

- b) Isotope imaging
- d) Ultrasound imaging.

x) Which of the isotope imaging scanners is not used any more *i.e.* obsolete ?

- a) PET scanner
- c) Rectilinear scanner

- b) Camera camera
- d) SPECT.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following questions.

3 × 5 = 15

2. Define 'Doppler Effect'. Draw a neat sketch and write an equation for the Doppler Frequency of blood flowing through a vessel. 2 + 3
3. What is Isotope Imaging ? Explain with a block diagram a Radioisotope Generator. 1 + 4

1 + 4



4. In CT what data are we measuring ? Draw and explain Hounsfield scale. 1 + 4
5. Compare the advantages and disadvantages of Ultrasound, CT and MRI. 5
6. What is the importance of time-gain circuit of medical ultrasound ? Describe the construction of ultrasound probe with a neat sketch. 2 + 3
7. Describe the basic principles of ultrasound imaging. What is therapeutic and diagnostic ultrasound ? 3 + 2

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following questions. 3 × 15 = 45

8. What is a Cyclotron ? Briefly explain its operation. Draw a diagram of Positron Emission Tomography (PET) used in Isotope imaging and explain the principle of imaging. 2 + 4 + 4 + 5
9. What is ultrasound ? Write an equation for the velocity of ultrasound wave. Draw a neat sketch of an ultrasound transducer (probe) and explain the function of all the components. 2 + 3 + 5 + 5
10. What is windowing system of CT image display ? Explain the CT image reconstruction technique in detail. 7 + 8
11. Explain different scanner systems of ultrasound imaging. Describe different modes of operation and their application. 7 + 8
12. Describe the basic principles of CT scan. Briefly explain the image quality and probable causes of CT image artefacts. 8 + 7
13. Write short notes on any *two* of the following : 2 × 7 $\frac{1}{2}$
- T1 and T2 relaxations of MRI
 - SPECT
 - Superconductive electromagnet of MRI
 - Generation of Computed Tomography (CT).

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END