



VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

REG.NO.: 24EN0014

SCHOOL OF HEALTHCARE SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST -II
FALL SEMESTER 2025-2026

SLOT: F1+TF1

Programme Name & Branch: B.Tech. Health Sciences and Technology

Course Code : BHST209L

Course Name: Principles of Bio-Medical Imaging and its Clinical Applications

Faculty Name(s): Dr. Raunak Kumar Das

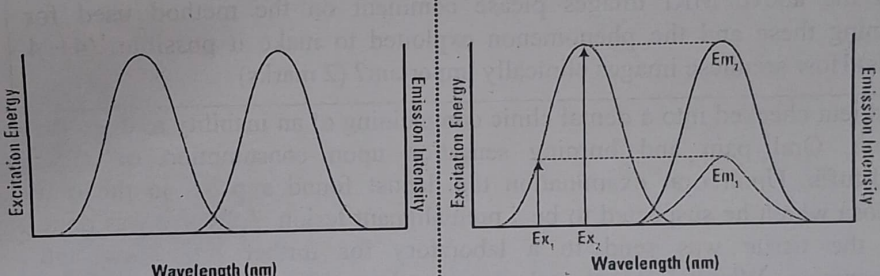
Class Number(s): VL2025260101034

Date of Examination: 10/10/2025

Exam Duration : 90 minutes

Maximum Marks: 50

General instruction(s): Answer all questions

Q. No	Question	Marks
1.	a) Name and state the principle which the graph shown below tries to describe? (2 marks)  b) A researcher wants to visualize Alexa Fluor (a fluorophore) which on excitation at 488nm gives an emission of 530 nm. The instrument he wants to use has the following sets of band pass filters: i) 485-495nm, ii) 490-495nm, iii) 525-535nm, iv) 470-480nm, v) 490-500nm. Help him to choose the emission and the excitation filters? (4 marks) c) What is the impact of the following factors on the resolving power of a bright field microscope? (4 marks) (i) Colour of light (ii) Intensity of light (iii) Angle of admittance of light in the objective lens (iv) Medium between the objective lens and specimen	10
2.	a) Is nuclear precession the same as resonance? (2 marks) b) What is meant by a chemical shift? Explain with an example. (4 marks) c) Why does the RF-field have to be applied exactly at the Larmor frequency for resonance to occur? (2 marks) d) In the context of MRI what happens during the time taken for 63% of the protons to realign with the longitudinal vector of the magnetic field. (2 marks)	10



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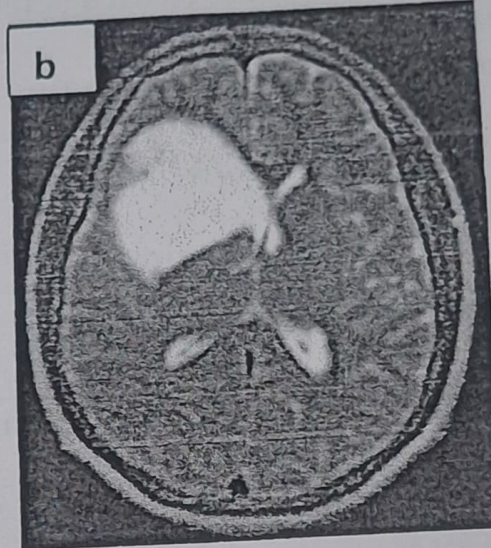
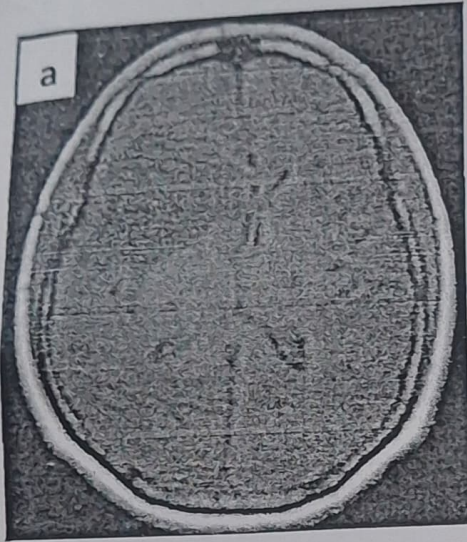
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3.



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From the above MRI images please comment on the method used for obtaining these and the phenomenon exploited to make it possible. (4+ 4 marks) How are these images clinically important? (2 marks)

4.

A patient checked into a dental clinic complaining of an inability to open the mouth, Oral pain and burning sensation upon consumption of spicy foodstuffs. Upon oral examination the dentist found a patch in the oral mucosa which he suspected to be a premalignant lesion. A biopsy was done and the tissue was send to a laboratory for further processing and examination. Which imaging technique can be used to analyse the stained tissue? (2 marks) Explain the technique with the help of a diagram and comment on its resolution. (8 marks)

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5.

Dephasing by inhomogeneities leads to a rapid loss of coherent transverse magnetization and therefore signals, so that it reaches zero before most tissues have had time to attain their T1 or T2 relaxation. Briefly explain the two methods that are used to regenerate the signals and measure the relaxation times. (5 +5 marks)

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