

Krishna VishwaVidyapeeth, “Deemed to be University”, Karad

Syllabus



**BSc MIT
(Code: 1901)**

Year of implementation:

BOS Meeting 22nd February 2025

Index

Sr. No.	Course Name	Title of the topic	Page No.
1	B.Sc MIT 1 st Year sem I & II	Anatomy, Physiology, Radiographer's responsibilities & patient care, X-ray tube care of radiographic Equipments. Fundamentals of Imaging technology, TLD.	8, 9, 10, 11.
2	B.Sc MIT 2 nd Year sem III& IV	Radiation Physics, Radiographic Techniques, Positioning, C-Arm, Mobile Radiography, Radiographic Procedures, Mammography, AERB, ALARA, USG imaging, Contrast media.	12, 13, 14.
3	B.Sc MIT 3 rd Year sem V& VI	CR, DR, CT & MRI techniques & procedures, PACS, PCPNDT, DSA< Radiotherapy, Nuclear medicine, Interventional Procedures. Introduction of CT Coronary Angiography. Spectroscopy evaluation	15, 16, 17.

Course outcome:

Candidate after completion of course should be able to perform all x-rays, including portable and C-arm, mammography, basic and advanced CT & MRI Imaging of the entire body.

Selection Method: Candidate must pass 12th science with min. 50% marks with PCB group and Entrance examination conducted by the university from candidates fulfilling eligibility criteria.

Course Director: Dr. P.R.Shaha, MD

Professor, Department of Radio-diagnosis

Course Coordinator: Dr. Asif Tamboli (DNB)

Associate Professor, Department of Radio-diagnosis

Infrastructure: We have fully functional department of Radio-diagnosis with state-of-the-art equipments, trained technical & support staff and Faculty with optimum clinical workload.

Facilities available in the department:

1. 1.5 Tesla MRI
2. 16 Slice MDCT
3. USG and Colour Doppler
4. Mammography
5. Fluoroscopy
6. Computed and Digital Radiography with static and portable x-ray machines
7. PACS (Picture Archiving and Communications System) server and workstations

MEDIUM OF INSTRUCTION: English

ATTENDANCE: As per university rule. 75% and above.

Syllabus: Subjects:

YEAR I

Semester - I

Paper I - Anatomy – I

Paper II - Physiology – I

Paper III - Basic Radiography – I & Radiology Technician's role (Duties and Responsibilities).

Semester - II

Paper I - Anatomy – II

Paper II - Physiology – II

Paper III - Basic Radiography – II & patient care.

YEAR 2

Semester - III

Paper I - Radiation Physics – I

Paper II - Radiographic techniques, Positioning – I & Mobile Radiography.

Paper III - Radiographic Procedures – I & USG imaging.

Semester - IV

Paper I - Radiation Physics – II (including contrast Media).

Paper II - Radiographic techniques, Radiographic Positioning – II & C-Arm.

Paper III - Radiographic Special Procedures & Mammography.

YEAR 3**Semester - V**

- Paper I - CR, DR & advanced Radiography – I
Paper II - CT & MRI techniques and procedures – I
Paper III - PACS, PCPNDT & Interventional Procedures.

Semester - VI

- Paper I - CR, DR & advanced Radiography – II
Paper II - CT & MRI techniques and procedures– II
Paper III - DSA, Radiotherapy, Nuclear Medicine & Miscellaneous.

YEAR 4

One year mandatory rotatory internship in KIMS hospital and research center under Radiology Department. No exit examination in fourth year.

Course name- Bachelor of Science Medical imaging technology (BSc. MIT)

Programme Code-1901

Course code- 1901-11

1901-12

1901-13

1901-21

1901-22

1901-23

1901-31

1901-32

1901-33

Course Objectives:

At the end of the course the student should be able to explain the theory and do the practical for the following topics

- 1) Perform all x-rays, including portable and C-arm, mammography, basic and advanced CT & MRI Imaging of the entire body.
- 2) Assist the radiologist in performing specialized radiological investigations like Barium studies, IVP, HSG etc.
- 3) Should have an advanced knowledge of the working of the X-rays, mammography, CT, MRI and ultrasound machines.
- 4) Student should be aware of the PCPNDT act and should be able to assist the radiologist in the documentation required under the PCPNDT act.
- 5) Should have a basic knowledge of CT and MRI anatomy in various planes and should be able to pick that there is some abnormality in the CT and MRI scans during scanning. Detailed knowledge of abnormality is not expected. Only an understanding that there is some abnormality in the scan is expected.
- 6) Understand radiation hazards, radiation safety issues and relevant administrative issues pertaining to AERB regulations.

Course outcome:

Candidate after completion of course should be able to perform all x-rays, including portable and C-arm, mammography, basic and advanced CT & MRI Imaging of the entire body.

Syllabus:

Semester I

A) Paper – I

- a) **Theory** – 75 Hrs (Credits - 05) Basic Anatomy.
- b) **Practical**–60 Hrs, (Credits - 02) Basic Anatomy- I.

B) Paper – II

- a) **Theory** – 60 Hrs (Credits - 04) Basic Physiology.
- b) **Practical** – 90 Hrs, (Credits - 03) Basic Anatomy- II.

C) Paper – III

- a) **Theory** – 60 Hrs (Credits - 04) fundamentals of Imaging, Radiographer's responsibilities.
- b) **Practical** – 90 Hrs, (Credits - 03) Basic Physiology.
- c) **Generic electives** – (120 Hrs; Theory 30, Practical 90, Credits- 5.)

- **Stress management**

- a) **Theory** – Stress eustress Distress Fight or Flight Negative Coping Techniques Social Support Nutrition Sleep Time Management Spirituality Comic Relief Positive Affirmations.
- b) **Practical** – Relaxation techniques Deep Breathing Muscle Relaxation Visualization Meditation Autogenic Training Yoga.

- **Personality development**

- a) **Theory**

- Introduction to Personality Development.
- The Developing Personality.
- Stages Of Development.
- “Need” a Little Personality ?

- b) **Practical**

- Basic Personality Traits.
- Moral Development.
- What's your personality type ?
- Hearing Jung Out.
- Personality and Career Choice.
- Changing Your Personality.

Semester – I

Course	Course title	Number of Hours per semester		Total	Number of Credits / Semester		Total Credits
		Theory	Practical		Theory	Practical	
Paper - I	Basic Anatomy	75	-	75	5	-	5
Paper - II	Basic Physiology	60	-	60	4	-	4
Paper - III	Fundamental of imaging technology, Radiographer's responsibilities	60	-	60	4	-	4
Paper - I	Basic Anatomy- I	-	60	60	-	3	3
Paper – II	Basic Anatomy- II	-	90	90	-	3	3
Paper - III	Basic Physiology	-	60	60	-	2	2
GE	-Stress management. -Personality development.	30	90	120	2	3	5
	Total	225	300	525	15	10	25

Semester II**A) Paper – I**

a) **Theory** – 45 Hrs (Credits - 03)

Anatomy- II.

b) **Practical** – 60 Hrs, (Credits - 02)

General Principles of Hospital practice care of patient – I.

B) Paper – II

a) **Theory** – 60 Hrs (Credits - 04) Physiology- II.

b) **Practical** – 90 Hrs, (Credits - 03)

General Principles of Hospital practice care of patient – II.

C) Paper – III

a) **Theory** – 60 Hrs (Credits - 04)

Radiographic photography, patient care.

b) **Practical** – 60 Hrs, (Credits - 02)

Radiographic Anatomy.

c) **DSE** – (150 Hrs; Theory 60, Practical 90, Credits- 7.)

Posting in Anatomy department.

Posting in Physiology department.

Semester II

Course	Course title	Number of Hours per semester		Total	Number of Credits/Semester		Total Credits
		Theory	Practical		Theory	Practical	
Paper-I	Radiological Anatomy	45	-	45	3	-	3
Paper-II	Physiology	60	-	60	4	-	4
Paper-III	Radiographic Photography and patient care	60	-	60	4	-	4

Paper-I	General Principles of Hospital practice care of patient-I	-	60	60	-	2	2
Paper-II	General Principles of Hospital practice care of patient-II	-	90	90	-	3	3
Paper-III	Radiographic Anatomy	-	60	60	-	2	2
DSE	- Posting in Anatomy department - Posting in Physiology department	60	90	150	4	3	7
	Total	225	300	525	15	10	25

Semester III

A) Paper –I

a) Theory–(Hrs-75 Credits -05)

Radiation Physics- I

b) Practical -(Hrs- 90,Credits–03)

Physics of Radiographic Equipment -I

A) Paper –II

a) Theory - (Hrs –75,Credits–05)

Radiographic Techniques–Positioning- I, Mobile radiography.

b) Practical -(Hrs-120,Credits –04)

Physics of Radiographic Equipment -II

A) Paper–III

a) Theory - (Hrs –75,Credits–05)

Radiographic Techniques–Special procedure and USG Imaging.

b) Practical -(Hrs-90,Credits– 03)

Radiographic Techniques–Special Procedure

Semester III

Course	Course title	Number of Hours per semester		Total	Number of Credits/Semester		Total Credits
		Theory	Practical		Theory	Practical	
Paper-I	Radiographic Techniques – Routine procedures	75	-	75	5	-	5
Paper-II	Radiographic Techniques – Routine Procedure	75	-	75	5	-	5
Paper-III	Radiographic Techniques – Special procedure	75	-	75	5	-	5
Paper-I	Physics Of radiographic Equipment- I	-	90	90	-	3	3
Paper-II	Physics of Radiographic Equipment-II	-	120	120	-	4	4
Paper-III	Radiographic Techniques – Special Procedure	-	90	90	-	3	3
	Total	225	300	525	15	10	25

Semester IV

A) Paper –I

a) Theory –(Hrs-45 Credits -03)

Radiation Physics- I.

b) Practical-(Hrs- 60,Credits–02)

Patient Care in Diagnostic radiology

A) Paper –II

a) Theory - (Hrs –60,Credits–04)

Radiographic Techniques- positioning- II and C-ARM.

b) Practical-(Hrs -90,Credits–03)

Quality Assurance and Radiation Safety

A) Paper–III

a) Theory - (Hrs –60,Credits–04)

Radiographic Special Procedures and Mammography.

b) Practical -(Hrs-60,Credits– 02)

Technologist's role, and Practical Project

c) DSE-(Hrs 150 Theory 60 Practical 90,Credits–07)

Clinical Posting in Medicine

Dept. Clinical Posting in Pediatrics Dept.

Semester IV

Course	Course title	Number of Hours per semester		Total	Number of Credits/Semester		Total Credits
		Theory	Practical		Theory	Practical	
Paper-I	Radiation Physics-II	45	-	45	3	-	3
Paper-II	Radiographic Techniques-positioning- II and C-ARM.	60	-	60	4	-	4
Paper-III	Radiographic Special Procedures and Mammography.	60	-	60	4	-	4
Paper-I	Patient Care in Diagnostic radiology	-	60	60	-	2	2
Paper-II	Quality Assurance and Radiation Safety	-	90	90	-	3	3
Paper-III	Technologists role, and Practical Project	-	60	60	-	2	2
DSE	- Clinical Posting in Medicine Dept. - Clinical Posting in Pediatrics Dept.	60	90	150	4	3	7
	Total	225	300	525	15	10	25

SemesterV

A)Paper –I

a)Theory –(Hrs-45 Credits -03)

CR, DR and Advanced Radiography- I.

b)Practical-(Hrs- 60,Credits–02)

CR, Digital Imaging.

A) Paper –II

a)Theory - (Hrs –60,Credits–04)

CT and MRI Techniques and Procedures – II.

b)Practical-(Hrs -90,Credits–03)

CT & MRI Basic Studies – I.

A)Paper–III

a)Theory - (Hrs –60,Credits–04)

PACS, PCPNDT & Interventional Procedures.

b)Practical -(Hrs-60,Credits– 02)

CT & MRI Basic Studies – II.

SemesterV

Course	Course title	Number of Hours per semester		Total	Number of Credits/Semester		Total Credits
		Theory	Practical		Theory	Practical	
Paper-I	CR, DR and Advanced Radiography- I.	75	-	75	5	-	5
Paper-II	CT and MRI Techniques and Procedures – II.	75	-	75	5	-	5
Paper-III	PACS, PCPNDT & Interventional Procedures.	75	-	75	5	-	5
Paper-I	CR, Digital X-Rays.	-	90	90	-	3	3
Paper-II	CT & MRI Basic Studies - I.	-	120	120	-	4	4
Paper-III	CT & MRI Basic Studies – II.	-	90	90	-	3	3
	Total	225	300	525	15	10	25

Semester VI

A) Paper –I

a) Theory –(Hrs-45 Credits -03)

CR, DR & Advanced Radiography- II

b) Practical-(Hrs- 60,Credits–02)

Digital Radiographs

A) Paper –II

a) Theory - (Hrs –60,Credits–04)

CT & MRI Techniques & Procedures- II

b) Practical-(Hrs -90,Credits–03)

CT & MRI Advanced Techniques & Procedures

A) Paper–III

a) Theory - (Hrs –60,Credits–04)

DSA, Radio-therapy, Nuclear Medicine.

b) Practical -(Hrs-60,Credits– 02)

MRI Studies of CARDIAC, MR-MAMMO., CT ANGIO.

c) DSE-(Hrs 150 Theory 60 Practical 90,Credits–07)

- Posting in Surgery
- Posting in Obs./Gyn

Semester VI

Course	Course title	Number of Hours per semester		Total	Number of Credits/Semester		Total Credits
		Theory	Practical		Theory	Practical	
Paper-I	CR, DR & Advanced Radiography- II	45	-	45	3	-	3
Paper-II	CT & MRI Techniques & Procedures- II	60	-	60	4	-	4
Paper-III	DSA, Radio-therapy, Nuclear Medicine.	60	-	60	4	-	4
DSE	<ul style="list-style-type: none"> ▪ Posting in Surgery ▪ Posting in Obs./Gyn. 	60	120	180	4	4	8
	Total	225	330	555	15	11	26

List of Suggested Books for reading

Sr. No.	Subject /Topic	Author/Editor	Title of Book	Publisher
1	Anatomy	Paul Butler	Applied Radiological Anatomy for Medical Students	Cambridge University Press
2	Radiography	A. Stewart Whitney and others	Clark's Positioning in Radiography 12th Edition	Hodder Arnold Press
3	Physics	Joseph Selman	The Fundamentals of X-ray & Radium Physics Eight Edition	Charles C Thomas
4	Physics	Thalayan	Physics of Radiology and Imaging	Jaypee Brothers
5	Physics	Govind Chavan	MRIMadeeasy	Jaypee Brothers
6	Ultrasound	Carol Rumack	Diagnostic Ultrasound Vol. 1 Fourth Edition	Mosby
7	CT and MRI Physics	Lee, Joseph K. T.; Sagel	Computed Body Tomography with MRI Correlation, 4th Edition	Lippincott Williams & Wilkins
8	CT & MRI	Chavan, Jankharia	Cross Sectional Anatomy CT & MRI	Jaypee
9	Radiology	Satish Bhargava Summet Bhargava	Textbook of Radiology For Residents & Technicians	CBS
10	Physiology	Ross & Wilson	Foundation of Anatomy and Physiology	Churchill Livingstone

ExaminationPattern

Internal assessment examination will be converted to of 20 marks theory (Each Paper) and 20 marks practical and will be added in End semester examination.

End semester examination:-

Question Paper Pattern:-

Theory: 80 Marks Answer all the questions.

- I. Long Question (Answer 6 out of 8) = $6 \times 10 = 60$ Marks.
- II. Essay question (Answer 1 out of 2) = $20 \times 1 = 20$ Marks.

Total=80Marks

Practical:

Oral Examination: 30

Marks Practical Examination

50 Marks Total Marks : 80.

Total exam marks for end semester are 100 marks theory and 100 marks practical.

1.Promotion and award of grades

A student shall be declared PASS and eligible for getting he/she secures at least 50% marks in that particular course including internal assessment.

2.Carry forward of marks

In case a student fails to secure the minimum 50% in any Theory or Practical course as specified, then he/she shall reappear for the end semester examination of that course. However his/her marks of the Internal Assessment shall be carried over and he/she shall be entitled for grade obtained by him/her on passing.

3.Improvement of internal assessment

A student shall have the opportunity to improve his/her performance only once in the Sessional exam component of the internal assessment. The re-conduct of the Sessional exam shall be completed before the commencement of next end semester theory examinations.

Grading of performances

Letter grades and grade points allocations:

Based on the performances, each student shall be awarded a final letter grade at the end of the semester for each course. The letter grades and their corresponding grade points are given in table I

Table – I Letter grades and grade points equivalent to Percentage of marks and performances

Percentage of Marks Obtained	Letter Grade	Grade Point	Performance
90.00 – 100	O	10	Outstanding
80.00– 89.99	A	9	Excellent
70.00– 79.99	B	8	Good
60.00– 69.99	C	7	Fair
50.00– 59.99	D	6	Average
Less than 50	F	0	Fail
Absent	AB	0	Fail

A learner who remains absent for any end semester examination shall be assigned a letter grade of AB and a corresponding grade point of zero. He/she should reappear for the said evaluation/examination in due course.

18. The Semester grade point average (SGPA)

The performance of a student in a semester is indicated by a number called 'Semester Grade Point Average' (SGPA). The SGPA is the weighted average of the grade points

obtained in all the courses by the student during the semester. For example, if a student takes five courses (Theory/Practical) in a semester with credits C₁, C₂, C₃, C₄ and C₅ and the student's grade points in these courses are G₁, G₂, G₃, G₄ and G₅, respectively, and then the student's SGPA is equal to:

$$\text{SGPA} = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4G_4 + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

The SGPA is calculated to two decimal points. It should be noted that, the SGPA for any semester shall take into consideration the F and ABS grade awarded in that semester. For example if a learner has a For ABS grade in course 4, the SGPA shall then be computed as:

$$\text{SGPA} = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4 * \text{ZERO} + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

Cumulative Grade Point Average (CGPA)

The CGPA is calculated with the SGPA of all the VIII semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all VIII semesters and their courses. The CGPA shall reflect the failed status in case of F grade(s), till the course(s) is/are passed. When the course(s) is/are passed by obtaining a pass grade on subsequent examination(s) the CGPA shall only reflect the new grade and not the fail grade earned earlier. The CGPA is calculated as:

$$\text{CGPA} = \frac{C_1S_1 + C_2S_2 + C_3S_3 + C_4S_4 + C_5S_5 + C_6S_6 + C_7S_7 + C_8S_8}{C_1 + C_2 + C_3 + C_4 + C_5 + C_6 + C_7 + C_8}$$

where C₁, C₂, C₃, is the total number of credits for semester I, II, III, and S₁, S₂, S₃, is the SGPA of semester I, II, III,

19. Declaration of class

The class shall be awarded on the basis of CGPA as follows:

First Class with Distinction = CGPA of 7.50

and above First Class = CGPA of 6.00 to 7.49

Second Class = CGPA of 5.00 to 5.99

20. Award of Ranks

Ranks and Medals shall be awarded on the basis of final CGPA.

21. Award of degree

Candidates who fulfill the requirements mentioned above shall be eligible for award of degree during the ensuing convocation.

FinalMarklistOfUniversityExamination

No.	Semester	Theory Papers	InternalAssessment		EndSemesterExamination		Total	
			Theory20mark	Practical20marks	Theory80marks	Practical80marks	Theory300marks	Practical100marks
1	SemesterI	I, II, III						
2	SemesterII	I, II, III						
3	SemesterIII	I, II, III						
4	SemesterIV	I, II, III						
5	SemesterV	I, II, III						
6	SemesterVI	I, II, III						