KRISHNA INSTITUTE OF MEDICAL SCIENCES, DEEMED TO BEUNIVERSITY, KARAD.

Department of Radio-diagnosis.

Programme Code-1901

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

Duration: 3 years + 1 year rotatory internship

Eligibility Criteria: 10+2 Science or equivalent with minimum 45% marks

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 - (Hrs 60 , Credits – 02)
Basic Anatomy - I

A) Paper – II

a) Theory -60 Hrs (Credits –04)
Basic Physiology

b) Practical - (Hrs 90 , Credits – 03)
Basic Anatomy - II

A) Paper – III

a) Theory - Hrs 60 (Credits –04)
Fundamentals of Imaging

b) Practical - (Hrs 60 , Credits – 02)
Basic Physiology

C) Generic electives - (Hrs 120; 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	Fundamentals of Imaging technology	60	-	60	4	-	4
Paper - I	Basic Anatomy - I	-	60	60	-	2	2
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 – (Hrs - 45 Credits - 03)
Radiological Physics

b) Practical - (Hrs- 60, Credits – 02)
General Principles of Hospital practice care of a patient - I

A) Paper – II

a) Theory - (Hrs – 60, Credits – 04)
Radiographic Anatomy

b) Practical - (Hrs - 90 , Credits – 03)
General Principles of Hospital practice care of a patient - II

A) Paper – III

a) Theory - (Hrs – 60, Credits – 04)
Radiographic Photography

b) Practical - (Hrs - 60, Credits – 02)
Radiographic Anatomy

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

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 Physics	45	-	45	3	-	3
Paper - II	Radiographic Anatomy	60	-	60	4	-	4
Paper- III	Radiographic Photography	60	-	60	4	-	4

Paper - I	General Principles of Hospital practice care of a patient - I	-	60	60	-	2	2
Paper - II	General Principles of Hospital practice care of a 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)
Radiographic Techniques –Routine procedures

b) Practical - (Hrs- 90, Credits – 03)
Physics of Radiographic Equipment -I

A) Paper – II

a) Theory - (Hrs – 75, Credits – 05)
Radiographic Techniques – Routine Procedure

b) Practical - (Hrs - 120 , Credits – 04)
Physics of Radiographic Equipment - II

A) Paper – III

a) Theory - (Hrs – 75, Credits – 05)
Radiographic Techniques – Special procedure

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	75	-	75	5	-	5

	procedures						
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)
Ultrasound Imaging

b) Practical - (Hrs- 60, Credits – 02)
Patient Care in Diagnostic radiology

A) Paper – II

a) Theory - (Hrs – 60, Credits – 04)
Interventional and Digital Radiology

b) Practical - (Hrs - 90 , Credits – 03)
Quality Assurance and Radiation Safety

A) Paper – III

a) Theory - (Hrs – 60, Credits – 04)
MRI Imaging, Patient Caring

b) Practical - (Hrs - 60, Credits – 02)
Technologists role, and Practical
Project

c) DSE - (Hrs 150 Theory 60 Practical 90 , Credits – 07)
Clinical Posting in Medicine Dept.
Clinical Posting in Paediatrics Dept.

Semester IV

Course	Course title	Number of Hours per semester		Total	Number of Credits / Semester		Total Credits
		Theory	Practical		Theory	Practical	
Paper - I	Ultrasound Imaging	45	-	45	3	-	3
Paper - II	Interventional and Digital Radiology	60	-	60	4	-	4
Paper- III	MRI Imaging, Patient Caring	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 Paediatrics Dept.	60	90	150	4	3	7
	Total	**225**	**300**	**525**	**15**	**10**	**25**

Semester V

A) Paper – I

a) Theory – (Hrs - 45 Credits - 03)
CT Imaging and Patient Care

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

MRI and Digital Imaging

A) Paper – II

a) Theory - (Hrs – 60, Credits – 04)
Technologists Role and Practical

b) Practical - (Hrs - 90 , Credits – 03)
Physics of New Imaging Modalities –CT and Ultrasound

A) Paper – III

a) Theory - (Hrs – 60, Credits – 04)
CT Imaging and Contrast Technique

b) Practical - (Hrs - 60, Credits – 02)
CT Imaging and Contrast Technique

Semester V

Course	Course title	Number of Hours per semester		Total	Number of Credits / Semester		Total Credits
		Theory	Practical		Theory	Practical	
Paper - I	CT Imaging and Patient Care	75	-	75	5	-	5
Paper - II	Technologists Role and Practical	75	-	75	5	-	5
Paper- III	CT Imaging and Contrast Technique	75	-	75	5	-	5
Paper - I	▪ MRI and Digital Imaging	-	90	90	-	3	3
Paper - II	▪ Physics of New Imaging Modalities – CT and Ultrasound	-	120	120	-	4	4
Paper - III	CT Imaging and Contrast Technique	-	90	90	-	3	3
	Total	**225**	**300**	**525**	**15**	**10**	**25**

Semester VI

A) Paper – I

a) Theory – (Hrs - 45 Credits - 03)
Radiographic Positioning

b) Practical - (Hrs- 60, Credits – 02)
Radiographic Positioning

A) Paper – II

a) Theory - (Hrs – 60, Credits – 04)
Radiographic Special Procedures

b) Practical - (Hrs - 90 , Credits – 03)
Radiographic Special Procedures

A) Paper – III

a) Theory - (Hrs – 60, Credits – 04)
Doppler

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

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	Radiographic Positioning	45	-	45	3	-	3
Paper - II	Radiographic Special Procedures	60	-	60	4	-	4
Paper- III	Doppler	60	-	60	4	-	4
Paper - I	Radiographic Positioning	-	60	60	-	2	2

Paper - II	Radiographic Special Procedures	-	90	90	-	3	3
Paper - III	Doppler	-	60	60	-	2	2
DSE	▪ 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 12 th Edition	Hodder Arnold Press
3	Physics	Joseph Selman	The Fundamentals of X –ray & Radium Physics Eight Edition	Charls C Thomas
4	Physics	Thalayan	Physics of Radiology and Imaging	Jaypee Brothers
5	Physics	Govind Chavan	MRI Made easy	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, Jankhariya	Cross Sectional Anatomy CT & MRI	Jaypee

Examination Pattern

Internal assessment examination will be converted to of 20 marks theory 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. Multiple Choice Question (MCQ) = 20 X 20 = 20
II. Essay question : 20 x1 =20
III. Long Answers(Answer 2 out of 3) = 2 X 10 = 20

IV. Short Answers (Answers 4 out of 6) = 4 x 5 = 20

Total = 80 Marks

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 ofgrades

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 ofmarks

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 internalassessment

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.

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Grading ofperformances

Letter grades and grade pointsallocations:

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 students' SGPA is equalto:

$$SGPA = \frac{C1G1 + C2G2 + C3G3 + C4G4 + C5G5}{C1 + C2 + C3 + C4 + C5}$$

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 F or ABS grade in course 4, the SGPA shall then be computed as:

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

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 grades earned earlier. The CGPA is calculatedas:

$$CGPA = \frac{C1S1 + C2S2 + C3S3 + C4S4 + C5S5 + C6S6 + C7S7 + C8S8}{C1 + C2 + C3 + C4 + C5 + C6 + C7 + C8}$$

where C_1, C_2, C_3,.... is the total number of credits for semester I,II,III,…. and S_1,S_2, S_3,....is the SGPA of semester I,II,III,…. .

19. Declaration ofclass

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

First ClasswithDistinction= CGPA of. 7.50 andabove

FirstClass= CGPA of 6.00 to7.49

SecondClass= CGPA of 5.00 to5.99

20. Award ofRanks

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

21. Award ofdegree

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

Final Mark list Of University Examination

Sr. No.	Semester	Internal Assessment		End Semester Examination		Total	
		Theory 20 marks	Practical 20 marks	Theory 80 marks	Practical 80 marks	Theory 100 marks	Practical 100 marks
1	**Semester I**						
2	**Semester II**						
3	**Semester III**						
4	**Semester IV**						
5	**Semester V**						
6	**Semester VI**						

CBCS FOR Imaging Technology

Program: B.Sc. Imaging Technology Department: KIMS Subject: Imaging Technology Scheme: CBCS

Subject		Sem-I			Sem-II			Sem-III			Sem-IV			Sem-V			Sem-VI			Total		
		T	P	Total	T	P	Total	T	P	Total	T	P	Total	T	P	Total	T	P	Total	T	P	Total
Core-I	Hr	75	60	135	45	60	105	75	90	165	45	60	105	75	90	165	45	60	105	**360**	**420**	**780**
	Cr	5	2	7	3	2	5	5	3	8	3	2	5	5	3	8	3	2	5	**24**	**14**	**38**
Core-II	Hr	60	90	150	60	90	150	75	120	195	60	90	150	75	120	195	60	90	150	**390**	**600**	**990**
	Cr	4	3	7	4	3	7	5	4	9	4	3	7	5	4	9	4	3	7	**26**	**20**	**46**
Core-III	Hr	60	60	120	60	60	120	75	90	165	60	60	120	75	90	165	60	60	120	**390**	**420**	**810**
	Cr	4	2	6	4	2	6	5	3	8	4	2	6	5	3	8	4	2	6	**26**	**14**	**40**
Elective DSE/ AEC	Hr	-	-	-	60	90	150	-	-	-	60	90	150	-	-	-	60	120	180	**180**	**300**	**480**
	Cr	-	-	-	4	3	7	-	-	-	4	3	7	-	-	-	4	4	8	**12**	**10**	**22**
Generic Elective	Hr	30	90	120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**30**	**90**	**120**
	Cr	2	3	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**2**	**3**	**5**
Grand Total	**Hr**	**225**	**300**	**525**	**225**	**300**	**525**	**225**	**300**	**525**	**225**	**300**	**525**	**225**	**300**	**525**	**225**	**330**	**555**	**1350**	**1830**	**3180**
	Cr	**15**	**10**	**25**	**15**	**10**	**25**	**15**	**10**	**25**	**15**	**10**	**25**	**15**	**10**	**25**	**15**	**11**	**26**	**90**	**61**	**151**

Generic Elective – Any One

1. Bioethics. 2.Biosafety

Discipline Specific Elective – Any One

Semester II- 1. Posting in Anatomy Department 2. Posting in Physiology Department

Semester IV- 1. Clinical Posting in Medicine Dept. 2. Clinical Posting in Paediatrics Dept.

Semester VI- 1. Posting in Surgery 2. Posting in Obs. /Gyn.