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Rajendra Mishra College Saharsa

Bihar – 852201

"A Constituent Unit of B.N.M.U, Madhepura, Bihar

"A Centre of Excellence / NAAC Accredited"

Draft Ordinance of Syllabus for B.Voc

Vinod Kumar Tiwari
Officer on Special Duty (Judicial)

Bhupendra Narayan Mandal University

Laloo Nagar, Madhepura

ADMISSION AND EXAMINATION

B.Voc

in

Health Care

(MEDICAL IMAGING TECHNOLOGY)

Rajendra Mishra College

(A constituent unit of B. N. Mandal University)

Tiwari Tola, Saharsa-852201

Bihar

REGULATION

Preamble

1. Bachelor in vocational programme in Health Care (Medical Imaging Technology) Generally known as B.Voc Health Care (Medical Imaging Technology) is a Professional programme to provide judicious mix of skills relating to a profession and appropriate content of General Education.
2. The B.Voc (Medical Imaging Technology) programme is under Skill Development Programme of N.S.Q.F (U.G.C) and that shall be under the Faculty of Science.

Course Objective

After the successful completion of this vocational course, the student would have acquired relevant appropriate and adequate technical knowledge together with the professional skills and competencies in the field of medical technologies so that he/she is properly equipped to take up gainful employment from this self finance course vocational course.

Duration of Course

1. The Integrated B.Voc programme shall be minimum three (03) academic years (having semesters of six month each)
2. The University examination shall be held after completing every semester on the dates as notified by the University.

INTERNSHIP

There shall be six months of compulsory internship after the final examination for candidates declared to have passed the examination in each of the subject. Internship should be done in a place that is recognized by the University/College. No candidate shall awarded degree certificate without successfully completing six months of compulsory Internship.

Working days

1. There shall be at least 16-18 weeks of teaching work excluding On Job Training (OJT).
2. The institution will run the course for a minimum of thirty six period in a week (Five or Six Days), during which physical presence in the institution of all the teachers and students will be necessary.
3. The minimum attendance of each student shall have to be 80% for all course work and 90 % for field attachment.

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Curriculum

1. The Course will be consisted of combination of practice, theory and hands on skills in the Medical Imaging Technology sector. The curriculum for each years of the programme would be a suitable mix of general education and skill development components as per N.S.Q.F.
   - The focus of skill development components shall be to equip students with appropriate knowledge, practice and attitude. The skill development components will be relevant to the industry as per its requirements.
   - The overall design of the skill development component along with the job roles selected will be such that it leads to a comprehensive specialization in few domains.
   - The curriculum will focus on work readiness skills in each year of the training.
   - Adequate attention will be given in curriculum design to practical work, the job training, development of students' portfolios and project work.
2. Apart from the 6 weeks in the various inter semester breaks; 7 weeks shall be allocated to the field immersion. Each year should have a total of at least 200 working days, excluding the admission and examination period.
3. The Entry of the students could be either on level 5.

(Syllabus for B.Voc from Level – 5 to Level – 7)

5 Semester I	**Theory**			
	5.GV.01	Electronic Measurement and Instrumentation -I	3	50
	5.GV.02	Basic Anatomy (Cross Sectional Anatomy-II)	3	50
	5.GV.03	Tools, Equipment & Safety Measures –I	3	50
	5.GV.04	Soldering & De-Soldering of Components –I	3	50
	Lab/Practical			
	5.VP.01	Identification of Components, Tools, Equipment and its working –Lab	1.5	50
	5.VP.02	Basic diagnostics (Lab)	1.5	50
	On-Job-Training (OJT)/Qualification Packs			
	Radiology Technician (HSS/Q0201)	(Any one)	15	200
	Theory			
	5.GV.05	Electronic Measurement and Instrumentation –II	3	50
	5.GV.06	Basic Imaging	3	50

5 Semester II	5.GV.07	Tools, Equipment & Safety Measures –II	3	50
	5.GV.08	Soldering & De-Soldering of Components & Emergency actions II	3	50
	Lab/Practical			
	5.VP.03	Soldering & De-Soldering of Components-Lab	1.5	50
	5.VP.04	Basic Imaging Practical Lab	1.5	50

Level	Code	Educational Component		Credit	Marks
	On-Job-Training (OJT)/Qualification Packs				
	To continue with the same QP as opted in Level 5 First semester		(Any one)	15	200
6 Semester I	**Theory**				
	6.GV.01	Fault analysis & Repairs		3	50
	6.GV.02	Cross Sectional Anatomy		3	50
	6.GV.03	Electronics Devices Circuit –I		3	50
	6.GV.04	Radiation and administrative Issues		3	50
	Lab/Practical				
	6.VP.01	Electronics Devices Circuits Lab		1.5	50
	6.VP.02	Fault analysis & Repairs - Lab		1.5	50
	On-Job-Training (OJT)/Qualification Packs				
	Assistant Duty Manager - Patient Relation Services (HSS/Q6103)		(Any one)	15	200
6 Semester II	**Theory**				
	6.GV.05	CT and Ultrasound		6	100
	6.GV.06	Manufacturing & Quality Norms		3	50
	6.GV.07	Electronics Devices Circuit –II		3	50
	Lab/Practical				
	6.VP.03	Electronics Devices Circuit –II Lab		1.5	50
	6.VP.04	Manufacturing Practices		1.5	50
	On-Job-Training (OJT)/Qualification Packs				
	To continue with the same QP as opted in Level 6 First semester		Any one)	15	200
	Theory				
	7.GV.01	MRI, Image Processing and Recording		6	100
	7.GV.02	Advanced Imaging		6	100

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7 Semester I	Lab/Practical			
	7.VP.01	MRI, Image Processing and Recording	1.5	50
	7.VP.02	Advanced Imaging	1.5	50
	On-Job-Training (OJT)/Qualification Packs			

Level	Code	Educational Component		Credit	Marks
	Duty Manager - Patient Relation Services (HSS/Q6104)		(Any one)	15	200
7 Semester II	Theory				
	7.GV.03	Admin, Medico Legal and interventional Procedures		6	100
	7.GV.04	Project		6	100
	Lab/Practical				
	7.VP.03	Admin, Medico Legal and Interventional Procedures		3	100
	On-Job-Training (OJT)/Qualification Packs (The practical and theory need to be performed in a hospital/radiological centre)				
	To continue with the same QP as opted in Level 7 First semester			15	200

(Source: Adopted from the Module curriculum for B.Voc / D.Voc in Medical Imaging Technology by AICTE New Delhi)

Note:

Language 1 / Communicative English shall have to be compulsorily read by the candidates admitted at B.Voc. Students have to pass this examination and the marks of this paper will not be included in grading.

4.GE.01	Language – I	3	50

Internal Assessment

There shall be a Departmental Internal Assessment Committee which will meet periodically to carryout and monitor Internal Assessment Programme. There should be a minimum of at least one seasonal examination of 75 Marks in each semester. 25 Marks will be awarded to the students for their sincerity and punctuality.

OJT (On Job Training)

- The marks of OJT will be awarded as per the report and assessment.
- The marks of OJT and internal assessment will be sent to the University after completion of one semester.

4. Registration

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Any such student who is not registered with respective University shall have to get himself/herself registered with that University after paying the requisite fee as mentioned in the Regulation. The student, who is not registered under their respective / concerned Universities, shall not be allowed to continue their studies, nor to appear at the examination. The registration will be valid as per university guidelines of B.N. Mandal University, Laloonagar, Madhepura.

5. Examination

B.Voc (Medical Imaging Technology) programme would follow semester system with continuous and comprehensive assessment.

5.1 B.Voc (Medical Imaging Technology) programme would follow system with continuous and comprehensive assessment as an integral part.

5.2 To be permitted to appear in the semester-end university examination for the B.Voc (Medical Imaging Technology) a candidate must have:

I. Completed the course of study prescribed for the B.Voc (Medical Imaging Technology) programme

II. Registered with the respective University as a student.

III. Completed 80% attendance in theory classes and 90% in internship and practicum of the total classes held.

IV. Completed the Integrated B.Voc (Medical Imaging Technology) course in a maximum of six (06) years / and incase of directly admitted at degree level B.Voc in a maximum of four (04) years from the date of admission to the progrmmme.

5.3. a. The candidates shall have to study 150 credits for Integrated B.Voc / 90 credits for B.Voc (Admitted directly at Degree Level). A credit contains 15 classes and each class would be of one an hour.

b. All the B.Voc students are required to go for project and internship as prescribed in the curriculum. The weightage of internal assessment and engagement with the field shall be of 100 marks.

c. Project will be carrying of 100 marks.

5.4 The written examination in each of the theoretical papers of 100 marks shall be of three hours and the practical papers of 50 marks shall be one and half hours duration, similarly the practical papers of 100 marks shall be of four hours and practical papers of 50 marks shall be two durations.

5.5 For the evaluation of project there shall be a provision of one external examination to be conducted by the University after completion of Internship programme.

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5.6 Course of study for B.Voc examination shall be the same as incorporated in the Regulation, and as finally approved by the Hon'ble Chancellor.

5.7. A candidate who, after having completed the courses duration, in case he/she fails to appear at the examination they will be given a chance to complete the course after filling the application form without repeating the semester/course fee. However, this opportunity shall be given only in one more examination; within a period not exceeding four (04) years (B.Voc) from the date of admission.

5.8.. A candidate shall be allowed to appear in the final examination of B.Voc course only if he/she clears the each semester from 1st to 5th examination to be allowed to appear in the final (6th Semester) examination.

6. Conduct of examination and moderation of result

6.1 All the semester end examination shall be conducted by University which shall also finalize the programme for the examination fee only shall be charged.

6.2 In Order to pass B.Voc examination a candidate shall have to obtain at least 50% marks in each theory paper and 60% marks in each practicum paper/activity separately. A candidate, not securing the above qualifying marks, shall be declared as fail.

6.3 a. Final result of B.Voc course shall be published on the basis of candidates' Performance in all the papers spread over all ten (10) / six (06) Semesters.

b. The final result will be published only after the candidate has cleared all the papers securing minimum qualifying marks as approved in the Regulations.

7. Promotion

7.2.1. A student who fails in not more than Two Papers (Theory + Practical) in first semester Examination, he/she may be promoted to second semester to continue his/her studies. But such a student will have to clear the backlog papers in immediate succeeding examination of that semester.

7.2.2. Like wise, if a second semester student fails in not more than two papers, he/she may be promoted to 3rd Semester but all such students will have to clear their backlog papers of 1st and 2nd both semesters in the next succeeding examination of that semester.

7.2.3. No student shall be promoted to final Semester, unless he/she has cleared all the backlog papers.

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7.2.4. The name of successful candidates shall be arranged in order of merit as follows :

PERCENTAGE OF MARKS	GRADE
86 & Above	O (Outstanding)
76 to 85	A+ (Excellent)
66 to 75	A (Very Good)
56 to 65	B (Good)
45 to 55	C (Average)
Less than 45	D (Fail)

Degree shall be awarded on computing the Grade point average system as follow :-
Computation of SGPA and CGPA : Following procedure to compute the semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) may be adopted :

- The SGPA is the ration of sum of the product of the number of credits with the grade point scored by a student in all the course components taken by a student and the sum of the number of credits of all the courses undergone by a student in a semester, i.e.,

$$\text{SGPA (Si)} = \sum(\text{Ci} \times \text{Gi}) / \sum \text{Ci}$$

Where 'Ci' is the number of credits of the I th course component and 'Gi' is the grade point scored by the student in the I th course component.

- The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$\text{CGPA (Si)} = \sum(\text{Ci} \times \text{Gi}) / \sum \text{Ci}$$

Where 'Si' is the SGPA of the ith semester and Ci is the total number of credits in that semester.

- The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

8.1. Result Improvement

8.2. A student can reappear in maximum of Two theory papers in the immediate succeeding examination of that semester to improve his/her result. Better of two scores shall be considered for preparation of the final result.

8.3. This facility shall be provided with 1st, 3rd and 5th Semester examination only.

8.4. Student can avail of this facility only once per semester, In no case second chance shall be provided/ permitted.

8.5. However, the name of such candidates with improved result, shall not be included in the Merit list.

9. Award of Degree

The Students/Candidate who complete the programme successfully, shall be awarded Degree of Integrated B.Voc / B.Voc by the respective University in prescribed format specifying the Class/Division/Grade in which he/she has been placed.

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ORDIDNANCE

FOR ADMISSION AND EXAMINATION

In

B.Voc Health Care

(MEDICAL IMAGING TECHNOLOGY)

A SELF FINANCED JOB ORRIENTED PROGRAMME APPROVED BY UNIVERSITY GRANT COMMISSION (Under N.S.Q.F) NEW DELHI

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B. Voc Healthcare (Medical Imaging Technology)

At A Glance

Duration : Minimum Three (03) Years after 10+2

Type : **B.Voc Degree Programme**

Eligibility : 10+2 or Equivalent from any Recognized Board (For B.Voc)

Admission Process : Entrance Test

Examination Scheme: Semester System

Course Fee : Semester wise

B. Voc Healthcare (Medical Imaging Technology) is an under graduate course that is designed with a diversified plan of study in advance imaging (MRI and CT), healthcare management and general knowledge about the discipline. Medical imaging technology is the technique and process used to create images of the human body or parts and function there of for clinical purposes or medical science. The duration of the course is five years for Integrated and three years for B.Voc and it may be in some cases more or less than this as per the direction of NSQF. This is a job oriented course established by UGC under N.S.Q.F.

Eligibility in Detail :

Minimum Qualification is 10+2 with science stream with English, Physics, Chemistry, Biology and Mathematics as optional subjects, and has scored not less than 50% of marks in Physics, Chemistry and Biology and Mathematics.

Benefits of this Course :

The Bachelor of Science in Medical Imaging program provides students with a diversified plan of study in Advanced imaging (CT, MRI and etc.), healthcare management, technical support knowledge (PACS and QM), and general studies in a balanced curriculum to prepared them for advancement in multiple career roles or continuation to Higher studies like masters and research.

Employment Area :

Commercial or Industrial , Advanced Imaging Modalities (CT or MRI), Healthcare Management or Administration, Graduate School (Radiologist Assistant or other graduate studies), Diagnostic Centres, Doctor's Offices, Educational & Research Institutes, Hospitals ,Radiology Clinics etc.

Job Types :

Medical Image Analysis Scientist, Research Assist in Imaging. , Marketing Executive, Medical Advisor, Radiographer, X-ray Technician

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Ordinance For Admission and Examination In Integrated B.Voc Course

1. Admission and Selection Procedure.

1.1 Admission process for 3 year B.Voc course in Health Care (Medical Imaging Technology) will usually start in the month of March, and shall be completely the end of June every year.

1.2 The selection of candidates for admission to the B.Voc programme in Regular mode will be made on the basis of merit obtained in B.Voc Entrance Test to be conducted centrally by the respective Universities / concerned College. Admission / Allotment of seats shall be done through counseling

1.3 The fee for appearing at the Entrance Test shall be Rs. 1000/- The Entrance Test fee may be revised by the competent authority as and when required.

1.4 To qualify for admission to B.Voc Course, a candidate must obtain minimum of 50% marks at the Entrance Test held for the purpose.

1.5 Admission shall be made strictly in order of merit that is percentage of marks secured by the candidate at the B.Voc Entrance Test held for the purpose.

1.6 Reservation of seats for the candidates of reserved categories shall be as per state govt. rules. The reserved category shall have to submit a copy of the certificate mentioning that the candidate belongs to particular reserved category from an officer not below the rank of S.D.M.

1.7 There of 3% seats will be reserved for person with disability (PWD) candidates i.e. visually Impaired (1%). These 3% seat are within the intake limit. Percentage of disability will be taken into consideration at the time of selection. The 3% seats PWD candidates will be filled up within the said limit fixed for that particular category to which the PWD candidates belong to.

1.8 Entrance test is mandatory.

1.9 List of admitted student will be published on website of university and college after declaration of merit list.

1.10 Allowed of seats, provide in the general ordinance for admission will be applicable only when candidate fulfils the minimum requirement of 50% marks in the Entrance Test.

1.11 After providing the opportunity for admission to the candidates in descending orders of merit of lower qualification as per marks obtained, if the reservation percentage of any reserved category is not unfilled / vacant in reserved categories, shall be filled up by admitting applicant from the merit list of general category.

1.12 If at any time it is found that a candidate has furnished any false information, his/her candidature shall be cancelled immediately and the deposited fee shall be forfeited and suitable legal action may be initiated.

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1.13 In case of any controversy of irregularly pertaining Integrated B.Voc course the respective University shall take the final decision as per the approved Ordinance and Regulations.

1.14 No applicant shall be admitted, who in the opinion of the concerned Vice-Chancellor / Principal, does not deserve to be admitted in the best interest of the University (specifying the ground of rejection.)

1.15 **Fee Details: Candidates admitted in B.Voc will have to pay rupees 20,000.00 in each semesters.**

- **Fee Details :-**

Tuition Fee	**:-**	**10,000**
Development Fee	**:-**	**6,000**
Library Fee	**:-**	**100**
Laboratory Charge	**:-**	**3,000**
Misc Expense	**:-**	**900**

2. **Eligibility :**

Candidates seeking admission to the B.Voc programme should have obtained at least 50% marks or an equivalent grade in the following programmes.

(i) 10+2 Exam from Bihar Senior Secondary Board, Patna.
or C.B.S.E / I.C.S.E or equivalent.

(ii) Examination passed with Physics, Chemistry, Biology
or Math with 50 percent marks.

3. **Intake :**

There shall be basic unit of 50 students. Additional unit in the programme shall be permitted only based on quality of infrastructure faculty & other facilities. This intake capacity may be modified as per the norms and guidelines by UGC time to time.

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Detailed Curriculum
Level 3 (Semester – I)
(D.Voc from Level – 3 to Level – 4)
Sub Code - (3.GE.01) Language - I

Module 1: Reading comprehension (prescribed texts) and functional grammar

A variety of genres – short stories, expository pieces, biographies, poems, plays, newspaper and magazine excerpts have been included. Teaching of grammar has been integrated with the reading texts. The emphasis is on functional grammar.

The following ten prose texts and five poems have been selected for development of different reading skills.

Prose texts (Prescribed)

1. A warmer or a colder earth (popular science) Arthur – C. Clark
2. The tiger in the tunnel (narrative) – Ruskin Bond.
3. First two or four pages from Sunny Days (autobiographical) – By Sunil Gavaskar
4. Case of suspension (narrative)
5. Big brother (narrative) Shekhar Joshi
6. Father, dear father (news paper article form the Hindu)
7. Face to face (autobiographical) Ved Mehta
8. I must know the truth (narrative) Sigrun Srivastva
9. If I were you (play) Douglas James
10. India, her past and her future (speech) Jawahar Lal Nehru

Poems

1. Leisure – W H Davis
2. The road not taken – Robert Frost
3. Where the mind is without fear- Tagore
4. My grandmother's house – Kamla Das
5. The night of the scorpion – Nissi, Ezekiel

Non prescribed

In this section learners will be exposed to newspaper, articles, tables, diagrams, advertisements etc. which they have to read carefully and interpret. In the examination similar pieces will be used.

Grammar and usage :

The following points of grammar and usage have been selected from the reading passages.

1. agreement/concord: number – gender etc.
2. Tenses: simple past (negatives/interrogatives) present perfect, past perfect continuous, past perfect, expressing future time (will and going to)

3. Passive voice (perfect tenses and modals)
4. Modals (must, should ought to, would)
5. Linking words (to like because although, instead of, if, as, since, who, which that, when however, in spite of)
6. Reported speech, statements, questions (yes/no)

Module 2: Functional writing and study skills

This module helps the learner to write descriptive and narrative paragraph, letters, reports notices etc. and also practice skills of note making

1. Paragraph writing
   - Describing objects
   - Describing people
   - Narrating events, stories
2. Letter writing
   - Application for leave
   - Application for jobs
   - Asking for information from various agencies (e.g. Last date for getting prospects; price of items before placing doers etc.)
3. Note making
   - Ending (punctuation, spelling, appropriate vocabulary, structures)

Level 3 (Semester – I)

Sub Code - (3.GE.02) Applied Chemistry

1. **Structure of Atom:**
   Rutherford model of the structure of atom, Bohr's theory of electrons, quantum numbers and their significance, de-Broglie equation and uncertainty principle, electronic configuration of 1 to 30 elements.
2. **Periodic Properties of Elements:**
   Periodic law, periodic table, periodicity in properties like atomic radii and volume, ionic radii, ionization energy and electron affinity. Division of elements into s, p, d and f blocks.
3. **Chemical Bonds:**
   Electrovalent, covalent and coordinate bond and their properties. Metallic bonding (electron cloud mode) and properties (like texture, conductance, luster, ductility and malleability).
4. **Fuel and their Classification:**
   Definition, characteristics, classification into solid, liquid and gaseous fuel. Petroleum and brief idea of refining into various factions and their characteristics and uses. Calorific value of fuel, Gaseous fuels- preparation, properties, composition and use of producer gas, water and oil gas.
5. **Water:**
   Impurities in water, methods of their removal, hardness of water, its types, causes and removal, disadvantages of hard water in boilers, pH value and its determination by calorimetric method.
6. **Corrosion:**
   Its meaning, theory of corrosion, prevention of corrosion by various methods using metallic and non-metallic coatings.
7. **Plastic and Polymers:**
   Plastic-thermo-plastic and thermo-setting. Introduction of Polythene. P.V.C. Nylon, synthetic rubber and phenol-formal-dehyde resin, their application in industry.

Sub Code - (3.GE.03) Applied Physics

1. **Units & Dimensions:** M.K.S. fundamentals & derived units, S.I. base units supplementary units and derived units, Dimensions of various physical quantities, uses of dimensional analysis.
2. **Surface Tension and Viscosity:** molecular forces, molecular theory of surface tension, surface energy, capillary action, concept of viscosity, coefficient of viscosity, principle and construction of viscometers.
3. **Vibrations:** Vibration as simple spring mass system, elementary and qualitative concept of free and forced vibrations, resonance. Effects of vibrations on building bridges and machines members.
4. **Heat:** Temperature and its measurement, thermoelectric, platinum resistance thermometers and pyrometers. Conduction through compound media and laws of radiations.
5. **Ultrasonics:** Productions of ultrasonic waves by magnetostriction and piezo-electric effect, application of ultrasonics in industry.
6. **Optics:** Nature of light, reflection and refraction of a wave from a plane surface. Overhead projector and Epidiascope.

Sub Code - (3.GE.04) Applied Biology - I

1. **Cell**-The Unit of Life Cell theory and cell as the basic unit of life: Structure of prokaryotic and eukaryotic cells; Plant cell and animal cell; cell envelope; cell membrane, cell wall; cell organelles - structure and function; endomembrane system, endoplasmic reticulum, golgi bodies, lysosomes, vacuoles; mitochondria, ribosomes, plastids, microbodies; cytoskeleton, cilia, flagella, centrioles (ultrastructure and function); nucleus.
2. **Biomolecules** Chemical constituents of living cells: Structure and function of proteins, carbohydrates, lipids, nucleic acids; Enzymes- types, properties, enzyme action.
3. **Cell Cycle & Cell Division**: Cell Cycle, Mitosis, Meiosis and their function
4. **Cellular Respiration** - glycolysis, fermentation (anaerobic), TCA cycle and electron transport system (aerobic); energy relations - number of ATP molecules generated; amphibolic pathways; respiratory quotient.
5. **Anatomy & Physiology of Human Body:** Definition, Anatomical terms, Tissues, Glands and membranes, Homeostasis
6. **Blood & its Components:** Different Blood Components and their functions, Coagulation of Blood, Blood Grouping
7. **Human Skeleton:** Identification, Classification and functions of bones, joints and muscles, Physiology of muscle contraction

   Sensory Organs: Eye, Ear, Nose, Tongue and Skin – Structure

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Sub Code - (3.GP.01) Applied Chemistry – Lab

1. Proximate analysis of solid fuel.
2. Experiments based on Bomb Calorimeter.
3. Determination of turbidity in a given sample.
4. To determine the flash and fire point of a given lubricating oil.
5. To determine the viscosity of a given lubricating oil by Redwood viscometer.
6. To determine cloud and pour point of a given oil.

Sub Code - (3.GP.02) Applied Physics – Lab

1. To determine the surface tension of a liquid by rise in capillary.
2. To determine the viscosity of a given liquid.
3. To determine the frequency of tuning fork using a sonometer.
4. To determine the frequency of AC main using sonometer.

   Time period of a cantilever.

- Attitude and behavior- professional behavior, treating people equally
- Code of conduct, professional accountability and responsibility, misconduct
- Differences between professions and importance of team efforts
- Cultural issues in the healthcare environment

5. Principals of Management

- Introduction to management
- Strategic Management
- Foundations of Planning
- Planning Tools and Techniques
- Decision Making, conflict and stress management
- Managing Change and Innovation
- Understanding Groups and Teams
- Leadership
- Time Management
- Cost and efficiency

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Sub Code - (3.GV.02) Basic Electricity

1. **Current Electricity**: Definition of Resistance, Voltage, Current, Power, Energy and their units, Relation between electrical, mechanical and thermal units, Temperature variation of resistance, Difference between AC and DC voltage and current.

2. **D.C. Circuits:** Ohm's Law, Series – parallel resistance circuits, calculation of equivalent resistance, Kirchhoff's Laws and their applications.

3. **Electric Cells:** Primary cell, wet cell, dry cell, battery, Li-ion battery, series and parallel connections of cells, Secondary cells, Lead Acid Cell, Discharging and recharging of cells, preparation of electrolyte, care and maintenance of secondary cells.

4. **Lighting Effects of Current:** Lighting effect of electric current, filaments used in lamps, and Tubelight, LED, their working and applications.

5. **Capacitors:** Capacitor and its capacity, Concept of charging and Discharging of capacitors, Types of Capacitors and their use in circuits, Series and parallel connection of capacitors, Energy stored in a capacitor.

6. **Electromagnetic Effects:** Permanent magnets and Electromagnets, their construction and use, Polarities of an electromagnet and rules for finding them.
   Faraday's Laws of Electromagnetic Induction, dynamically induced e.m.f., its magnitude and induction, inductance and its unit. Mutually induced e.m.f., its magnitude and direction, Energy stored in an inductance.

   Force acting on a current carrying conductor in magnetic field, its magnitude and direction, Principles and construction of dynamo.

7. **A.C Circuits**
   Generation of A.C. voltage, its generation and wave shape. Cycle, frequency, peak value R.M.S. value, form factor, crest factor, Phase difference, power and power factor, A.C. Series Circuits with (i) resistance and inductance (ii) resistance and capacitance and (iii) resistance inductance and capacitance, Q factor of R.L.C. series circuits.

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Sub Code - (3.GV.03) Basic Electronics

1. **Overview of Atom, Sub-Atomic Particles and CRO**
   - Brief History of Electronics.
   - Atom and its elements,
   - Electron, Force, Field intensity, Potential, Energy, current
   - Electric field, Magnetic field, Motion of charged particles in electric and magnetic field.
   - Overview of CRO, Electronic and Magnetic deflection in CRO, Applications.

2. **Voltage and Current**
   - Resistance, Ohm's law, V-I Characteristics, Resistors, Capacitors, Inductors.
   - Voltage and Current sources, Symbols and Graphical representation
   - Overview of AC, DC, Cells and Batteries, Energy and Power.

3. **Basics of Semiconductor**
   - Semiconductor materials, Metals and Semiconductors and Photo-electric emission.
   - N-type and P-type semiconductor, Effects of temperature on Conductivity of semiconductor.
   - PN junction diode, depletion layer, Forward & Reverse bias, V-I Characteristic, Effects of temperature, Zener diode, Photo diode, LED, Types and applications of diode.
   - Diode as a rectifier, Half wave and full wave rectification, Zener diode Regulator.
   - Introduction to Filters, Clippers, Clampers

4. **Bipolar Junction Transistor**
   - Operation of NPN and PNP transistors, Biasing of BJT.
   - CB, CE and CC configuration
   - Introduction to FET, JFET, MOSFET, CMOS and VMOS

5. **Transistor Amplifier and Applications**
   - Introduction, Single and Multi-stage amplifiers
   - Introduction to Oscillators
   - Introduction to Thyristors, PNPN diode, SCR, LASCR, DIAC, TRIAC

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Sub Code - (3.GV.04) Applied Biology –II

1. **Nervous System:** Introduction to nervous system, Classification of nerve fibres, Physiology of nerve transmission, Neurotransmitters, Human Brain, Spinal Cord, Refluxes, Epilepsy, Electroencephalogram, Autonomic Nervous System, Peripheral Nervous System

2. **Renal Physiology:** Kidney, Nephron, Urine Formation, Renal Function Test, Dialysis

3. **Reproductive System:** Male reproductive system, Female reproductive system, Menstrual Cycle, Fertility Control

4. **Endocrinology:** Hormones, Homeostasis, Pituitary Gland, Thyroid Gland, Parathyroid Gland, Endocrine function of pancreas, Adrenal hormones, Local Hormones

5. **Digestive System:** Introduction, structure and function of digestive organs Pharynx, esophagus, Stomach, Intestines, Liver & Pancreas.

6. **Respiratory System:** Physiological Anatomy of respiratory tract, physiology of respiration, different pulmonary volumes, Artificial respiration

7. **Cardiovascular System:** Structure and physiology of Human Heart, cardiac muscles and cardiac cycle

8. **Genetics:** Mendelian inheritance; deviations from Mendelism – incomplete dominance, codominance, multiple alleles and inheritance of blood groups, pleiotropy; elementary idea of polygenic inheritance; chromosome theory of inheritance; chromosomes and genes; Sex determination - in humans, birds and honey bee; linkage and crossing over; sex linked inheritance - haemophilia, colour blindness; Mendelian disorders in humans - thalassemia; chromosomal disorders in humans; Down's syndrome, Turner's and Klinefelter's syndromes.
9. **Genetic Materials:** Structure of DNA and RNA; DNA packaging; DNA replication; Central dogma; transcription,
10. Genetic code, translation; gene expression and regulation - lac operon; genome and human and rice genome projects; DNA fingerprinting.

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Sub Code - (3.VP.01) Basic Electricity Lab

1. Verify that resistance of conductor is directly proportional to resistivity and length and inversely proportional to cross- sectional area of the conductor.
2. Verification of Ohm's Law.
3. Verification of temperature co-efficient of resistance:
   (i) Positive for Tungsten and Nichrome and
   (ii) Negative for carbon.
4. Study of series resistive circuits.
5. Study of parallel resistive circuits.
6. Study of series and parallel connection of cells in circuits.
7. Preparation of Electrolyte for lead acid battery and its charging and measurement of Specific gravity with the help of hydrometer.
8. To find heat efficiency of an electric kettle.
9. Charging and Discharging of a capacitor.
10. Verification of magnetic field of a Solenoid with:
    (i) Iron core and
    (ii) Air core.
11. Verification of Faraday's Laws of electromagnetic induction.
12. Verification of Torque development in a current carrying coil in magnetic field.
13. Study of R.L. series circuit and measurement of power and power factor.
14. Study of R.C. series circuit and measurement of power and power factor.
15. Study of R.L.C. series circuit and measurement of power and power factor.
16. Study of R.L.C. series circuit for calculation of inductive reactance, capacitive reactance, impedance and Q- Factor.

Instruments Required

- Trainer kit for verifying ohm's law,
- Trainer kit for measuring TCR
- Lead acid battery,
- Hydrometer,
- Electric kettle,
- Trainer kit for measuring power and power factor in RLC circuits

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Sub Code - (3.VP.02) Basic Electronics – Lab

1. Study of current and voltage measurement using Ammeter and Voltmeter.
2. Study of current and voltage measurement using Galvanometer.
3. Study of current, voltage and resistance measurement using of Multi-meter
4. Study of Power and Energy measurement using Wattmeter and Energy meter.
5. Study of working principle of Signal Generator and measurement of amplitude, time period and frequency of signal using Oscilloscope.
6. Study of V-I Characteristic of Diode.
7. Study of V-I Characteristic of Zener Diode. And use of Zener Diode as voltage regulator.
8. Study of Half wave rectifier with and without filter circuit.
9. Study of Full wave rectifier with and without filter circuit.
10. Study CE configuration for NPN and PNP transistors and measurement of voltage and current gain.
11. Study CB configuration for NPN and PNP transistors and measurement of voltage and current gain.
12. Study CC configuration for NPN and PNP transistors and measurement of voltage and current gain.
13. Study of working of single layer PCB manufacturing
14. Study of working of double layer PCB manufacturing.
15. Design of 7 segment display using LED and bread board.

Instruments Required

- Ammeter
- Voltmeter,
- Multimeter,
- Galvanometer,
- Energy Meter,
- CRO,
- Diode Trainer kit
- Zener diode Trainer kit
- Rectifier trainer kit
- Transistor charactrics trainer kit,
- PCB manufacturing Lab
- Bread board trainer kit to design 7-segment display.

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Level 4 (Semester I)

Sub Code - (4.GV.01) Engineering Science

1. **Soldering and Brazing**

   General characteristics of soldering, brazing joints, processes and their characteristics, brief description of soldering and brazing tools equipment, types of solders and fluxes and their uses, soldering defects and their remedies, brazing materials, advantages and disadvantages of soldering and brazing. Introduction to PCB, PCB designing, wet etching, dry etching, track correction, wiring, single sided and double sided PCB.

2. **Measuring Instruments**

   Construction and working principles of moving iron and moving coil voltmeters and ammeters, dynamometer type wattmeter, ohm meter, megger and induction type energy meter- their circuit connection and application for measurement of electrical quantities.

3. **Electrical Engineering Drawing**

   Schematic and wiring diagram for domestic simple wiring, symbols used for different electrical devices and equipments.

4. **Electrical wiring**

   Types of wiring – cleat wiring, casing and capping, C.T.S./T.R.S. wiring, metal sheath wiring, conduit wiring and concealed wiring – their procedure. Factors of selection of a particular wiring system, importance of switch, fuse

5. **Earthing**

   Earthing of wiring system, types of faults, their causes and remedies. Types of earthing- plate earthing and Pipe earthing, their procedure and application. Methods of finding numbers of circuits and circuit distribution by distribution board system, loop in system of wiring connections IE rules related to wiring.

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Sub Code - (4.GV.02) Trouble Shooting & Maintenance of Electronic Equipment's-I

1. Basic Occupational Safety and Precautions

2. Microphones and Loudspeakers

- Construction, working principle and frequency response of Carbon Microphone, Variable Reactance Microphone, Capacitance Microphone, Piezo-Electric Microphone, Moving Coil Microphone.
- Frequency ranges of musical instruments, Intensity and Dynamic Range, Constructions and working principles of Moving Coil Loudspeaker, Impedance and Power Level of loudspeaker, Frequency characteristics of Practical Loudspeakers: Woofer, Tweeter, Squawker

3. Recorder

- Block diagram of disk recording and reproduction.
- Principle of optical recording, CD/ DVD manufacturing and recording, CD/ DVD player system, Advantages/ Disadvantages.
- Steps for Fault finding & Analysis.

Sub Code - (4.GV.03) IT Tools-I

I. Computer Organization & OS: User perspective.
- Understanding of Hardware.
- Basics of Operating System.

II. Networking and Internet.
- Network Safety concerns.
- Network Security tools and services.
- Cyber Security.
- Safe practices on Social networking.

III. Office automation tools:
- Spreadsheet.
- Word processing.
- Presentation.

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Sub Code - (4.GE.01) Language

Module – 3: Listening and speaking skills

In this module the learners will be exposed to a variety of listening activities recorded on audiotapes. These will be samples of good spoken English, which the learners can use as models. Work sheets will accompany the listening material.

This module will include the following:

1. Introducing yourself/friends in formal and informal situations.
2. Inviting people (over the phone and face to face) giving details of occasion, time place and date. Acceptance and refusal of invitation – formal and informal.
3. Seeking and supplying information (example opening an account in a bank, applying for loans etc.)
4. Talking and conveying messages (over the phone and face to face).
5. Giving directions / instruction.
6. Discussing contemporary issues related to environment, child labour, gender bias etc.
7. Listening to excepts form television and radio.
8. Listening to poems/plays (prescribed).
9. Listening to speeches / talks.
10. Listening to songs like "We shall overcome".

Module – 4 to 6: (English for specific purposes) (opt any one)

There modules are being offered. A learner has to opt for any one. The first is for academic purposes and the next two are for vocational purposes. The focus is not on the teaching of the subject matter like science and literature but on the way in which language is used in the deferent subjects.

Module 4: English for Science

This course will introduce learners to some interesting pieces of popular science

1. Health and hygiene
2. Conservation of (nearly extinct) animals.
3. Plant life.
4. Bio gas / solar energy.

These pieces illustrate the use of English in scientific writing: giving information factually, logically and objectively.

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Module 4: English for Receptionist

This module will introduce the learners to a variety of exercises, tasks and meaningful activities related to the receptionist's use of English. The printed course materials will be supported by tapes.

The following competencies be developed:

1. Receiving messages, making request etc.
2. Supplying information
3. Giving advice and making suggestions
4. Dealing with complaints
5. Making entries in an appointment book, register etc.

Module 4: English for Office Use

This course will help the learner to use English effectively and appropriately in the office environment. The competencies will be developed.

1. Using the telephone taking and passing messages.
2. Receiving messages
3. Marking noting on files and circular.
4. Writing office notes, memos, notices, agendas for meetings.
5. Telegrams and fax messages.
6. Writing business letters, application enquires, complaints.
7. Filling in forms, cheques, pay in slips etc.

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Sub Code - (4.VP.01) Engineering Science – Lab

1. Introduction to tools and measuring instruments, their safe keeping, safety
2. precautions
3. Measurement of resistance by ammeter and voltmeter method and Ohm meter.
4. Dismantling and reassembly of dynamo.
5. Calibration of ammeter, voltmeter and wattmeter with the help of standard meters.
6. Calibration of single phase energy meter with the help of standard wattmeter and stop watch.
7. Controlling lamps in series, parallel and series parallel.
8. Controlling lamps for two or three places.
9. Drawing schematic diagram to give supply to consumers.
10. Practice on casing and capping wiring.
11. Practice on cleat wiring.
12. Practice on CTS/TRS wiring.
13. Practice on metal sheet weather proof rigid PVC wiring.
14. Practice on conduit wiring.
15. Practice on concealed wiring.
16. Measurement of insulation resistance of wiring installation by megger.
17. Polarity test of wiring installation.
18. Testing of wiring installation.
19. Installation of pipe earthing for wiring installation.
20. Installation of plate earthing for wiring installation.

Instruments Required

- Ammeter
- Voltmeter
- Ohm meter
- Dynamo
- Wattmeter,
- Stop watch controlling lamp
- Different types of wire for practice on wiring,
- Conduit pipes
- Megger
- Materials for earthing

Sub Code - (4.VP.02) Trouble Shooting & Maintenance of Electronic Equipment's Lab

1. Assembly study and fault finding of an audio amplifier.
2. Assembly, study and fault finding of a graphic equaliser.
3. Study working, assembly & fault finding of Colour TV.
4. Study working, assembly & fault finding of LCD TV.
5. To trace the fault in the following panel controls and correct them:
   - Volume control.
   - Brightness control.
   - Contrast control.
   - Vertical hold control.
6. To trace the following stages of T.V. set: Tuner, MF stage, Video detector, Video amplifier.
   - Sound I.T. Sound output stage.
   - Syne separator.
   - Vertical oscillator.
   - Horizontal oscillator.
   - Line Driver Stage.
   - Line output transformer.
   - Power supply.
7. To find fault for the following defects:
   - No picture no sound.
   - Sound present, picture missing.
   - Picture rolls vertically.
   - Picture tears (Horizontal oscillator).
   - Faults in tuner/IF/power supply.
8. Study working, assembly & fault finding of tape recorder system.
9. Study working, assembly & fault finding of CD/DVD player system.
10. Study working, assembly & fault finding of Printer.
11. Study working, assembly & fault finding of Scanner.
12. Study working, assembly & fault finding of Microwave oven.
13. Study working, assembly & fault finding of Telephone.
14. Study working, assembly & fault finding of Fax Machine.
15. Study working, assembly & fault finding of UPS system.
16. Study working, assembly & fault finding of DTH kit.

Equipment's Required

1. Demo kit to understand the working of different section of color TV and to create the fault and rectifying the faults.
2. Trainer kit/ demo module to understand the working and fault finding of tape recorder system
3. Trainer kit/ demo module to understand the working and fault finding of CD/ DVD system
4. Trainer kit/ demo module to understand the working and fault finding of Printer system

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5. Trainer kit/ demo module to understand the working and fault finding of Scanner system
6. Trainer kit/ demo module to understand the working and fault finding of Microwave oven system
7. Trainer kit/ demo module to understand the working and fault finding of Telephone system
8. Trainer kit/ demo module to understand the working and fault finding of Fax Machine system
9. Trainer kit/ demo module to understand the working and fault finding of UPS system
10. Trainer kit/ demo module to understand the working and fault finding of DTH kit

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Level 4 (Semester II)

Sub Code - (4.GV.04) Physics and Technology in Imaging

1. **Physical Quantity, its unit and measurement:** Fundamental and derived quantity, SI unit, various physical/radiation quantity used in Diagnostic Radiology and its unit (for example, KVp, mA, mAS, Heat unit (HU)
2. **Radiation quantities and units:** Radiation intensity-exposure, roentgen, its limitations-kerma and absorbed dose-electronic equilibrium-rad, gray, conversion factor for roentgen to rad-quality factor-dose equivalent-rem, Sievert. Quality factor, dose equivalent, relationship between absorbed dose and equivalent dose.
3. **Radiation detection and measurements:** Principle of radiation detection-Basic principles of ionization chambers, proportional counters, G.M counters and scintillation detectors. Measuring system: free ionization chamber-thimble ion chamber-condenser chamber-secondary standard dosimeter-film dosimeter-chemical dosimeter-Thermo Luminescent Dosimeter-Pocket dosimeter.
4. **Radiation intensity** and exposure, photon flux and energy flux density.
5. **Photochemistry:** Principles: Acidity, alkalinity, pH, the processing cycle, development, developer solution. Fixing, fixer solution, washing, drying replenishment, checking and adjusting-latent image formation--nature of development-constitution of developer-development time-factors in the use of developer. Fixers-constitution of fixing solution-factors affecting the fixer-replenishment of fixer-silver conservation-Drying-developer and fixer for automatic film processor-rinsing-washing and drying. Replenishment rates in manual and automatic processing-Silver recovery-Auto and manual chemicals.
6. **X-rays:** Discovery of x-rays-X-ray production and properties: Bremsstrahlung radiations-Characteristics X-Rays, factors affecting X-ray emission spectra, X-ray quality and quantity, HVL measurements, heel effect, soft and hard X-Rays, added and inherent filtration, reflection and transmission targets.
7. **Fluoroscopy:** Fluorescence and phosphorescence - description, fluorescent materials used in fluoroscopic screens, construction of fluoroscopic screen and related accessories, tilting table, dark adaptation. Basic principles of cine fluoroscopy and angiography use of grid controlled x-ray tube.

Sub Code - (4.GV.05) Digital Electronics

1. **Number Systems and Boolean Algebra**
   - Basics of Analog and Digital.
   - Boolean algebra, De-morgan's law, Truth tables.

2. **Logical Circuits**
   - Logic gates: AND, OR, NOT, NOR, NAND, XOR, XNOR.
   - Combinational Circuits:
   - Arithmetic Circuits: Half adders, Full adders, sub tractors,
   - Data Processing Circuits: Encoders, Decoders, Multiplexers, De-Multiplexers
3. **Latches and Flip-Flops**
   - Concept of Latches, Types of Latches, SR latch.

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- SR Flip Flop, JK Flip Flop, D Flip flop, T Flip Flop, Flip Flop.
- Introduction to counters, Types of counters Asynchronous and Synchronous.
- Introduction to shift registers, types of shift registers,

4. **Introduction to Display Devices**
   - LED, LCD, 7 segment display
5. **Integrated Circuits and Memories**
   - Introduction to IC's, Importance and applications, Linear and Digital IC's.
   - Introduction to SSI, MSI, LSI and VLSI (Terminology & Definitions).
   - Memory Organisation and Operations, RAM, ROM.

Sub Code-(4.GV.06) Trouble Shooting & Maintenance of Electronics Equipment's-II

1. **TV System**
   - Working principle with block diagram of TV transmitter and receiver, Brief description with circuit diagram: TV Tuner, Video IF stage, Sound stage, Picture tube & its associated circuit, synchronizing circuits, Horizontal & vertical deflection circuits, Remote control of a TV receiver, Idea of bandwidth, blanking and synchronization pulses, modulation scheme, colour transmission.
   - Cable type TV system, Head end processor, Trunk & cable distribution system with block diagram, Scrambling.
   - Introduction to LCD and LED TV systems, Introduction to high definition systems. Steps for Fault finding & Analysis.
2. **Modern Appliances**

   Working principle and block diagram of following: Microwave oven, Telephone, Fax machine, Printers, Scanners. Steps for Fault finding & Analysis. Working principle and block diagram of following: Microwave oven, Telephone, Fax machine, Printers, Scanners. Steps for Fault finding & Analysis. Working principle and block diagram of following: Microwave oven, Telephone, Fax machine, Printers, Scanners. Steps for Fault finding & Analysis.

Sub Code - (4.GV.07) IT Tools-II

I. **Multi Media Design: (Open Source Design Tools).**
- Interface and Drawing Tools in GIMP.
- Applying Filters.
- Creating and handling multiple layers.
- Using Stamping and Smudging tools.
- Importing pictures.

II. **Troubleshooting: Hardware, Software and Networking.**
- Commonly encountered problems.
- (Monitor: No display, KB/Mouse not responding, monitor giving beeps, printer not responding, check for virus, delete temporary files if system is slow, adjust mouse speed).

III. **Work Integrated Learning IT – ISM**
- Identification of Work Areas.
- Work Experience.

Sub Code - (4.VP.03) IT Tools – Lab

- Spreadsheets, Word, Presentation
- Multimedia Design
- Troubleshooting
- Project / Practical File
- Viva Voce

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Sub Code - (4.VP.04) Digital Electronics – Lab

1. Verification of truth tables for AND, OR, NOT and NAND logic gates.
2. Verification of truth tables for NOR, XOR and XNOR logic gates.
3. Construction and verification of operations of half adder and full adder circuits using basic gates.
4. Construction and verification of operations of half adder and full adder circuits using XOR gates.
5. Construction and verification of operations of full adder and full adder circuits using NAND gates.
6. Construction and verification of operations of half & full Subtractor circuit using basic gates.
7. Construction and verification of operations of half & full Subtractor circuit using XOR gates.
8. Construction and verification of operations of half & full Subtractor circuit using NAND gates.
9. Study and verification of truth tables for 3 line to 8-line decoder.
10. Study and verification of truth tables for 8 line to 3 line and 10 line to 4-line encoder.
11. Study and verification of truth tables for 4:1 MUX using gates
12. Study and verification of truth tables for 1:4 DEMUX using gates.
13. Study and verification of truth tables for 8:1 MUX using IC 74151.
14. Study and verification of truth tables for 1:8 DEMUX using IC 74138.
15. To study and verify the truth table of excess-3 to BCD code converter.
16. To study and verify the truth table of binary to gray code converter.
17. Construction and verification of truth tables for S-R, D and J-K flip flops.
18. Study working of various display devices. (LED, Common anode, Common cathode 7 segment display)
19. Study and verification of truth table for universal shift register.
20. Study the operation of a synchronous counter.

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Level 5 (Semester I)

(B.Voc from Level – 5 to Level – 7)

Sub Code - (5.GV.01) Electronic Measurements and Instrumentation-II

Unit, dimensions and standards: Scientific notations and metric prefixes. SI electrical units, SI temperature scales, Other unit systems, dimension and standards.

Measurement Errors: Gross error, systematic error, absolute error and relative error, accuracy, precision, resolution and significant figures, Measurement error combination, basics of statistical analysis.

PMMC instrument, galvanometer, DC ammeter, DC voltmeter, series ohm meter

Transistor voltmeter circuits, AC electronic voltmeter, current measurement with electronic instruments, probes Digital voltmeter systems, digital multimeters, digital frequency meter system.

Sub Code - (5.GV.02) Basic Anatomy (Cross Sectional Anatomy-II)

1. Introduction to Sectional Anatomy & Terminology- Sectional planes, Anatomical relationships/terminology
2. Anatomy of the upper thorax and mid thorax- Surface anatomy relationships, Bony structures and muscles, Blood vessels, Lungs, heart and great vessels, Esophagus
3. Anatomy of the Abdomen- Major organs and their accessories, Abdominal blood vessels
4. Anatomy of the Pelvis- Bony structures and associated muscles, Digestive and urinary systems
5. Neuro Anatomy- Scan planes
6. Brain - Cerebral hemispheres, Sinuses, Ventricles, Brainstem and associated parts, Arterial/venous systems, Basal ganglia, Cranial nerves
7. Spine- Vertebra and disc, Spinal cord and meninges
8. Neck- Arterial/venous systems, Muscles, Glands and pharynx.

Sub Code - (5.GV.03) Tools, Equipment and Safety Measures-I

1. **Cables & Connectors**
   - Non-Metallic Sheathed Cable
   - Un grounded & Grounded Power Supply Cable
   - Metallic Sheathed Cable
   - Multi-Conductor Cable
   - Coaxial Cable
   - Unshielded Twisted Pair Cable
   - Shielded twisted pair cable
   - Ribbon Cable
   - Armoured & Unarmoured Cable
   - Twin-Lead Cable
   - Twin axial Cable
   - Optical fiber cable
   - Connectors
2. **ESD Clothing**
   - What to wear, how to wear

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Sub Code - (5.GV.04) Soldering & De-Soldering of Components-I

1. Soldering & De Soldering of Basic Components
   - Soldering Tools
   - Different types of Soldering Guns related to Temperature and wattages, types of tips
   - Solder materials and their grading
   - Soldering and De Soldering Stations and their Specifications
   - Preparing Component for Soldering
   - PCB Applications
   - Types of PCB
   - Soldering Basic Components on PCB
   - De soldering Basic Components
   - Safety precautions while Soldering & De soldering
   - Check for cold continuity of PCB
   - Identification of loose/dry solder, broken tracks on printed wire assemblies & discrete components mounted circuit boards
   - Join the broken PCB track and test
   - De soldering using Pump and wick
   - Introduction of SMD Components

Sub Code - (5.VP.01) Identification of Components, Tools, Equipment's & working – Lab

1. Identification & working of various electronic components
2. Working of testing equipment
3. Measurement using Multimeter & Clamp meter
4. Battery health check-up
5. Measure and test the voltage of given cells.

Sub Code - (5.VP.02) Basic Diagnostics (Lab)

1. **X-Ray Imaging**
   - X-Ray Tubes.
   - Stationary & Rotation Anode.
   - X-ray Consolestation (Demo of KV, MA and exposure time settings).
   - Procedures to reduce Scattered Radiation.
   - Focus Principle.
   - Grids.
   - Screen.
   - Image intensifiers.
   - Use of contrast materials.

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2. Dark Room Technique

- Images to ring devices.
- Film cassette construction.
- Duplicating a films
- Spectrum.
- Films types - Specialized use.
- Operation, storage.
- Photo chemistry.
- Development.
- Fixing.
- Radiation protection, counters.
- Assessment.

3. Radiological Positioning

- Patient transfer technique.
- Turning the patient.
- Restraint techniques - Trauma, Pediatric, Geriatric, physically handicapped, disturbed patients, an aesthetized patient, moving chair & stretcher patients.
- Tubes & catheters, Nasogastric, chest, Urinary, intravenous, oxygen & other (Castsurgical & cardiac) Alcoholic, bed pans & urinals.
- Assessment.

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Level 5 (Semester II)

Sub Code - (5.GV.05) Electronic Measurements and Instrumentation – II

Voltmeter and ammeter methods, Wheatstone bridge, low resistance measurements, low resistance measuring instruments AC bridge theory, capacitance bridges, Inductance bridges, Q meter

CRO: CRT, wave form display, time base, dual trace oscilloscope, measurement of voltage, frequency and phase by CRO, Oscilloscope probes, Oscilloscope specifications and performance. Delay time based Oscilloscopes, Sampling Oscilloscope, DSO, DSO applications

Instrument calibration: Comparison method, digital multimeters as standard instrument, calibration instrument Recorders: X-Y recorders, plotters

Sub Code - (5.GV.06) Basic Imaging

1. **The photographic Process:** Introduction, visible light, images produced by radiation, light sensitive photographic materials.
2. **Image Characteristic:** Real and mental images, reflected, transmitted and emitted light images Photographic emulsions. The photographic latent image. Positive process
3. **Film materials in X-ray:** History, structure of an x- ray film, single and double emulsion films, types of films, cross over effect.
4. **Spectral sensitivity** of film material, graininess of film material, speed and contrast of photographic materials.
5. **Sensitometry:** Photographic density, characteristic curves, features of the characteristic curve.
6. **Intensifying screens and cassettes.** Cassette design, care of cassettes, types of cassettes, and mounting of intensifying screens, loading and unloading of cassettes, Care of intensifying screens, tests to check screen film contact and light leakage.
7. **The fluorescent materials,** types of intensifying screens, intensification factor. The influence of KV, scattered radiation. Detail, sharpness and speed, size of the crystals, reciprocity failure, and quantum mottle.
8. **Film processing:** Development. The nature of development-manual or automatic. The PH scale, constitution of developing solutions both in manual and automatic processing and properties of developing chemicals, development time, factors in the use of a developer, developer activity.
9. **Dark Room:** Layout and planning. Dark room construction - Nature of floor, walls, ceiling and radiation protection, Dark room equipment and its layout. Location of pass through boxes or cassette hatches.
10. **Radiographic Image:** Components in image quality-density, contrast and detail.
11. **Photo Fluorography:** Cine cameras, cine fluorography, cine film, serial cameras, processing of cine films, flurographic films.

Level 5 (Semester II)

Sub Code - (5.GV.05) Electronic Measurements and Instrumentation – II

Voltmeter and ammeter methods, Wheatstone bridge, low resistance measurements, low resistance measuring instruments AC bridge theory, capacitance bridges, Inductance bridges, Q meter

CRO: CRT, wave form display, time base, dual trace oscilloscope, measurement of voltage, frequency and phase by CRO, Oscilloscope probes, Oscilloscope specifications and performance. Delay time based Oscilloscopes, Sampling Oscilloscope, DSO, DSO applications

Instrument calibration: Comparison method, digital multimeters as standard instrument, calibration instrument Recorders: X-Y recorders, plotters

Sub Code - (5.GV.06) Basic Imaging

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5. **Sensitometry:** Photographic density, characteristic curves, features of the characteristic curve.
6. **Intensifying screens and cassettes.** Cassette design, care of cassettes, types of cassettes, and mounting of intensifying screens, loading and unloading of cassettes, Care of intensifying screens, tests to check screen film contact and light leakage.
7. **The fluorescent materials,** types of intensifying screens, intensification factor. The influence of KV, scattered radiation. Detail, sharpness and speed, size of the crystals, reciprocity failure, and quantum mottle.
8. **Film processing:** Development. The nature of development-manual or automatic. The PH scale, constitution of developing solutions both in manual and automatic processing and properties of developing chemicals, development time, factors in the use of a developer, developer activity.
9. **Dark Room:** Layout and planning. Dark room construction - Nature of floor, walls, ceiling and radiation protection, Dark room equipment and its layout. Location of pass through boxes or cassette hatches.
10. **Radiographic Image:** Components in image quality-density, contrast and detail.
11. **Photo Fluorography:** Cine cameras, cine fluorography, cine film, serial cameras, processing of cine films, flurographic films.

Sub Code - (5.GV.07) Tools, Equipment & Safety Measures-II

1. Tools & Equipment
   - Types of tools & equipment required and deployed in manufacturing, installing & servicing
   - Identification and termination process
   - General maintenance of tools/equipment and recalibration of Test equipment
   - General safety and common-sense safety
2. PPE
   - Usage & benefits of PPE
   - Types & usage of various PPE
   - Maintenance of PPE
3. Clean Room Environment
   - Do's and Don't
   - Shop Floor Discipline

(5.GV.08) Soldering & De-soldering components & Emergency actions

1. Introduction to SMD Components

- Identification of 2, 3, 4 terminal SMD components
- Soldering the SMD components on the PCB
- Make the necessary settings on SMD soldering station to solder various ICs of different packages by choosing proper clamping tools
- Identify various connections and the setup required for SMD soldering station
- De solder the SMD components from the given PCB
- Make the necessary settings on SMD soldering station to de solder various ICs of different packages by choosing proper clamping tools
- Make a panel board using different types of switches for a given application
- Identification of crimping tools for various IC packages
- Reliable Soldering Practices

2. Emergency actions

- Minimum Requirements
- Reporting Emergencies
- Emergency exits
- Primary and secondary evacuation routes
- Locations of fire extinguishers
- Fire alarm pull stations' location
- Assembly points
- Medical Services

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Sub Code - (5.VP.03) Soldering & De-soldering components – Lab

1. Assemble the product
2. Dis-assemble the product
3. Safety Precautions & emergency plans

Sub Code - (5.VP.04) Basic Imaging Practical's Lab

1. Test to check the x-ray films and screen contact in the cassette
2. Test to check light leakage in the cassette.
3. To check the effect of safe light on exposed as well as unexposed x-ray film

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Level 6 (Semester I)

Sub Code - (6.GV.01) Fault Analysis & Repairs

1. Classification of fault
2. Identification of fault
3. Rectification of fault
4. Repairing/Replacing Module
5. Analysis for the different types of equipment's
   - Smartphones
   - Air Conditioning
   - Security systems
   - Electronically controlled doors
6. Fault analysis based on hardware and software component
7. Diagnostic and Testing Methods
8. Visual Inspection
9. Earth Continuity Test
10. Insulation Resistance Test

Sub Code - (6.GV.02) Cross Sectional Anatomy-II

1. Introduction to Sectional Anatomy & Terminology- Sectional planes, Anatomical relationships/terminology
2. Anatomy of the upper thorax- Surface anatomy relationships, Bony structures and muscles, Blood vessels.
3. Divisions of the mid-thorax, heart and great vessels- Lungs, heart and great vessels, Esophagus
4. CT/MRI Images of the Thorax - Normal and pathologic
5. Anatomy of the Abdomen- Major organs and their accessories, Abdominal blood vessels
6. CT/MR Images of Abdomen - Normal and pathologic
7. Anatomy of the Pelvis- Bony structures and associated muscles, Digestive and urinary systems
8. Reproductive Organs
9. CT/MR Images of the Male/Female Pelvis- Normal and pathologic
10. Neuro Anatomy- Scan planes
11. Brain - Cerebral hemispheres, Sinuses, Ventricles, Brainstem and associated parts, Arterial/venous systems, Basal ganglia, Cranial nerves
12. Spine- Vertebra and disc, Spinal cord and meninges
13. Neck- Arterial/venous systems, Muscles, Glands and pharynx

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Sub Code - (6.GV.03) Electronics Devices Circuit-I

Unit I

Energy Bands and Charge Carrier in Semiconductor: Bonding forces and energy bands in solids, Charge Carriers in Semiconductors, Carrier Concentrations, Drift Mechanism. Excess carriers in Semiconductors: Optical Absorption, Carrier Lifetime: Direct Recombination, Steady State Carrier Generation, Quasi-Fermi Level, Diffusion of carriers and Einstein relation.

UNIT II Junctions: Equilibrium Conditions, Forward and Reveres Biased Junctions; Steady State Conditions. Optoelectronic Devices: Photodiode V-I characteristic, Photodetector, Solar Cells, Light Emitting Diode.

Sub Code - (6.GV.04) Radiation & Administrative Issues

1. **Quality Assurance:** General principles and preventive maintenance for routine, daily, weekly, monthly, quarterly, annually – machine calibration. Basic concepts of quality assurance, Radiation proof test; Resolution test; Phantom measurements - CT, US and MRI, Sensitometry, State and local regulations governing radiation protection practice.
2. **Maintenance and care of equipment:** Safe operation of equipment, Routine cleaning of equipment and instruments, Cassette, screen maintenance, Maintenance of automatic processor and manual processing units, Routine maintenance of equipment.
3. **Radiation protection:** Somatic and genetic radiation effects, Basis for occupational exposure limits, Ionizing radiation from natural and man-made source and their approximate dose equivalent contribution. Legal and ethical radiation protection responsibilities of radiation workers.
4. **Units detection and measurement:** Units of radiation for exposure, absorbed dose, dose equivalent, and radio- activity, Quality factor to determine the dose equivalent.
5. **Radiation detection devices:** Ion-Chambers, Proportional counter, Thermo-luminescent dosimeters (TLD), Appropriate application and limitation of each radiation detection device.
6. **Personal monitoring and occupational exposures:** Monitoring devices, Body badges and ring badges. Thermo-luminescent dosimeters. Pocket ionization chambers. Applications, advantages and limitations of each device, Values for dose equivalent limits for occupational radiation exposures. Structures critical for potential life effect

for whole body irradiation. Age proportion formula for the determination of a maximum accumulated dose equivalent.

7. **Patient Protection:**

   Relationship of beam limiting devices with radiation protection of patients, Added and inherent filtration, Purpose and importance of patient shielding, Patient shielding devices and radiographic procedures shielding to the radiographic procedures, Protection of women at child- bearing age, Methods to avoid repeat radiographs, Importance of clear, concise, instruction (effective communication skills) as a method of radiation protection, Effects of immobilization techniques to eliminate voluntary motions

8. **AERB specifications:** Radiation safety (lead glass equivalence, lead lined doors) - room size - type approval – registrations & licenses - selection of exposure parameter for various protocols – diagnostic reference levels.

Sub Code - (6.VP.01) Electronic Devices and Circuits Lab

1. Study of Lab Equipments and Components: CRO, Multimeter, and Function Generator, Power supply- Active, Passive Components and Bread Board.
2. P-N Junction diode: Characteristics of PN Junction diode - Static and dynamic resistance measurement from graph.
3. Applications of PN Junction diode: Half & Full wave rectifier- Measurement of Vrms, Vdc, and ripple factor.
4. Characteristics of Zener diode: V-I characteristics of zener diode, Graphical measurement of forward and reverse resistance.
5. Application of Zener diode: Zener diode as voltage regulator. Measurement of percentage regulation by varying load resistor.

Sub Code - (6.VP.02) Fault Analysis & Repairs – Lab

1. Categorization of faults
   - Hardware/Software, User Induced, Component Failures
   - L0 to L4 repairs
2. Testing electrical/electronic components in the product
3. Troubleshoot and repair of the faults identified in the product
4. Preventive Maintenance Services

Level 6 (Semester II)

Sub Code - (6.GV.05) CT and Ultrasound

1. Computed Tomography (CT)

- **Basic Computed Tomography:** Basic principles of CT, generations of CT, CT instrumentation, image formation in CT, CT image reconstruction, Hounsfield unit, CT image quality, CT image display
- **X-ray tube:** Construction working and limitations, generations, methods of cooling the anode, anode rating chart, speed of anode rotation, angle of anode inclination, Focus, anode heel effect, Effect of variation of anode voltage and filament temperature, inherent filter and added filter, bow tie filter, effect on quality of the spectrum.
- **Collimator designs:** Pencil beam, Fan beam, Cone beam CT, Z-axis collimation, detector design – construction and working - Gas filled detectors – solid state detectors – flat panel detectors.
- **Principles of tomography:** advantages and limitations – generations – spiral CT – slip ring technology - Multislice CT – dual source CT - pitch – rotation time.
- **Basic principles of Image Reconstruction:** Back projection, analytical an iterative methods – MPR – MIP – volume rendering – surface shaded display (SSD) – bone reconstruction.
- **CT artefacts:** motion artefacts, streak artefacts, ring artefacts, partial volume artefacts etc. causes and remedy.
- **Dose and Dosimetry:** CT Dose Index (CTDI, etc.), Multiple Scan Average Dose (MSAD), Dose Length Product (DLP), Dose Profile, Effective Dose, Phantom Measurement Methods, Dose for Different Application Protocols, Technique Optimization
- **Advanced Computed Tomography:** Helical CT scan: Slip ring technology, advantages, multi detector array helical CT, cone – beam geometry, reconstruction of helical CT images, CT artifact, CT angiography, CT fluoroscopy, HRCT, post processing techniques: MPR, MIP, Min IP, 3D rendering: SSD and VR, CT Dose, patient preparation, Imaging techniques and protocols for various parts of body, CT contrast enhanced protocols – CT angiography – (Aortogram, selective angiogram head, neck and peripheral) image documentation and Filing, maintenance of equipment and accessories.
- **Technical Assessment and Equipment Purchase Recommendations**

2. Ultrasonography

- **Basic Acoustics, Ultrasound terminologies:** acoustic pressure, power, intensity, impedance, speed, frequency, dB notation: relative acoustic pressure and relative acoustic intensity.
- **Interaction of US with matter:** reflection, transmission, scattering, refraction and absorption, attenuation and attenuation coefficients, US machine controls, US focusing.
- **Production of ultrasound:** Piezoelectricity, Medical ultrasound transducer: Principle, construction and working, characteristics of US beam.
- **Ultrasound display modes:** A, B, M

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- **Real-time ultrasound:** Line density and frame rate, Real-time ultrasound transducers: mechanical and electronic arrays, ultrasound artifacts, ultrasound recording devices, and Distance, area & volume measurements.
- **Techniques for imaging different anatomic areas, ultrasound artifacts, biological effects and safety.**
- **Doppler Ultrasound:** Doppler Theory, Doppler-Frequency Shift, Reflector Velocity Dependence, Doppler Angle Dependence, Spectral Analysis, Continuous Wave (CW) Doppler, Pulsed Doppler, Pulse Transmission and Range Gating, Aliasing, Duplex Scanning, Color Flow Imaging, Power Doppler, Patient preparation for Doppler, Doppler artifacts, vascular sonography.

Sub Code - (6.GV.06) Manufacturing & Quality Norms

1. Manufacturing & Quality Norms- keep it differently according to all applications
   - Manpower Deployment and Operations as per Work Instructions and criticality of the process Understanding how to form each operation and practical training of operation
   - Understanding accept and reject criterion of a particular operation. Practical training of testing/checking each operation
   - Quality Norms of accept and practical training of electronic equipment's/Devices Acceptance/Rejection training of various defects
2. Manufacturing & Quality Norms – II
   - Process in packing line-packing line Operations sequence flow and its importance
   - Quality Systems - Accept, Reject criterion of various tests at OQA
   - Training of Assembly of electronic components - Assemble, Check, test electronic components
   - Various Labels and their Importance - Understanding Labels, Scanning and its importance
   - Packing of components/devices - Various Stages of packing
   - Acceptance, Reject and sampling following QA norms - AQL level, Sampling techniques, as per QA sampling accept, reject numbers

Sub Code - (6.GV.07) Electronics Devices Circuit-II

1. Good Manufacturing Concepts & Practices - II
   - Brief Introduction
   - Total Quality Management
   - ISO Standards
2. Kaizen
3. Toyota Production System
4. Lean Manufacturing
   - Combination of Inventory
   - Supply Chain
5. Quality and Inspection
   - 3 Sigma and 6 Sigma Orientation

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Sub Code - (6.VP.03) Electronic Devices and Circuits –II Lab

1. Characteristic of BJT: BJT in CE configuration- Graphical measurement of parameters from input and output characteristics. Measurement of Av, AI, Ro and Ri of CE amplifier with potential divider biasing.
2. Measurement of Operational Amplifier Parameters: Common Mode Gain, Differential Mode Gain, CMRR, Slew Rate.
3. Applications of Op-amp: Op-amp as summing amplifier, Difference amplifier, Integrator and differentiator.
4. Field Effect Transistors: Single stage Common source FET amplifier –plot of gain in dB Vs frequency, Measurement of, bandwidth, input impedance, maximum signal handling capacity (MSHC) of an amplifier.
5. Oscillators: Sinusoidal oscillators. Wein's bridge oscillator b. phase shift oscillator.

Sub Code - (6.VP.04) Manufacturing Practices

1. Work study concepts
2. Team work concepts

Level 7 (Semester I)

Sub Code - (7.GV.01) MRI, Image Processing and Recording

1. Basic concepts of Magnetic resonance imaging (MRI): Atomic structure, Hydrogen as imaging medium, magnetism, precession, resonance, Electromagnetic radiation, NMR - basic concepts of MRI, Faraday's cage.

2. Basic MR Image formation: RF Excitation, Relaxation (T1 and T2), Computation and display, Free induction decay, RF wave form designs.

3. Introduction to MR coils: Volume coils, Gradient coils, Slice selection, phase encoding, frequency encoding

4. Artifacts: Cause of artifacts, Image quality, image contrast, signal to noise ratio, resolution, artefacts, MR contrast agents, Advanced MR techniques, flow effects, MR angiography echo planner imaging, magnetization transfer, fat suppression, MR spectroscopy, functional imaging, Magnetic resonance hazards and safety, Recent development.

5. MRI Scanners: Methods of MRI imaging methods; Head and Neck ,Thorax, Abdomen, Musculoskeletal System imaging; Clinical indications and contraindications; types of common sequences effects of sequence on imaging; Protocols for various studies, slice section, patient preparation; positioning of the patient; patient care-calibration - paramagnetic agents and dose, additional techniques and recent advances in MRI; image acquisition-modification of procedures in an unconscious or un co-operative patient; plain studies; contrast studies; special procedures; reconstructions; 3D images; MRS blood flow imaging, diffusion/perfusion scans; strength and limitations of MRI; role of radiographer.

6. MR safety: instrumentation and biological effects

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Sub Code - (7.GV.02) Advanced Imaging

1. Computed Tomography its principle, various generations and advancements.
2. Ultrasonography, Color Doppler- its principle, advancements and applications.
3. Digital Radiography and Digital subtraction angiography equipment- principle, advancements and applications.
4. Fusion Imaging including PET-CT, PET- MRI.
5. Digital Mammography, DEXA equipment- principle, advancements and applications.
6. Tele radiology HIS, RIS and PACS
7. Image processing in digital radiography systems: Post processing techniques in console using CR, DR and flat panel fluoroscopy systems
8. Basic angiography and DSA

Sub Code - (7.VP.01) MRI, Image Processing and Recording

1. MRI Images of the Thorax - Normal and pathologic
2. MR Images of Abdomen - Normal and pathologic
3. MR Images of the Male/Female Pelvis- Normal and pathologic
4. Neuro Anatomy- Scan planes brain - Cerebral hemispheres, Sinuses, Ventricles, Brainstem and associated parts, Arterial/venous systems, Basal ganglia, Cranial nerves
5. Spine- Vertebra and disc, Spinal cord and meninges

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Sub Code -(7.VP.02) Advanced Imaging

1. Central Nervous System: Myelography, Cerebral studies, Ventriculography
2. Arthrography: Shoulder, Hip, Knee, Elbow
3. Angiography: Carotid Angiography (4 Vessel angiography), Thoracic and Arch Aortography, Selective studies: Renal, SMA, Coeliac axis, Vertebral angiography, Femoral arteriography, Angiocardiography
4. Venography: Peripheral venography, Cerebral venography, Inferior and superior venocavography, Relevant visceral phlebography
5. Cardiac catheterization procedures: PTCA, BMV, CAG, Pacemaker, Electrophyiology
6. Gynaecology: Hysterosalpingography
7. Biliary system: Plain film radiography, Intravenous cholangiography, percutaneous cholangiography, Endoscopic retrograde cholangio-pancreatography. (ERCP), Operative cholangiography, Post-Operative cholangiography (T-tube Cholangiography)
8. Gastrointestinal tract: Barium meal, Barium swallow, Small bowel enema, Barium enema.
9. Renal tract: Intravenous urography, retrograde pyelography, micturating cystourethrography.
10. Other: Sialography

Level 7 (Semester II)

Sub Code - (7.GV.03) Admin, Medico Legal and Interventional Procedures

1. Principals of Management: Introduction to management, Strategic Management, Foundations of Planning, Planning Tools and Techniques, Decision Making, conflict and stress management, Managing Change and Innovation, Understanding Groups and Teams, Leadership, Time Management, Cost and efficiency.

2. Medical law and ethics: Medical ethics; Definition, Goal, Scope; Introduction to Code of conduct; Basic principles of medical ethics – Confidentiality; Malpractice and negligence; Autonomy and informed consent - Right of patients; Care of the terminally ill-Euthanasia ; Organ transplantation; Medico legal aspects of medical records – Medico legal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical records - other various aspects; Professional Indemnity insurance policy; Development of standardized protocol to avoid near miss or sentinel events; Obtaining an informed consent.

3. Quality and patient safety: Quality assurance; Concepts of Quality of Care, Quality Improvement Approaches, Standards and Norms, Quality Improvement Tools, Introduction to NABH guidelines; AERB specifications, radiation safety (lead glass equivalence, lead lined doors), room size, type approval, registrations & licenses, selection of exposure parameter for various protocols, diagnostic reference levels.

4. Basics of emergency care and life support skills: Basic life support (BLS), sudden Cardiac Arrest (SCA), cardiopulmonary resuscitation (CPR), Automated External Defibrillator (AED).

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(7.GV.04) Project

Project work may include case study related to Newer Imaging Technology.

(7.VP.03) Admin, Medico Legal and Interventional Procedures

1. Quality assurance and Radiation safety survey in diagnostic X-ray installations.
2. Community orientation and clinical visit: Visit will include visit to the entire chain of healthcare delivery system - sub centre, PHC, CHC, SDH, DH and Medical College, private hospitals, dispensaries and clinics.
3. Governance at village level including interaction and group discussion with village panchayat and front line health workers.
4. Clinical visit to their respective professional department within the hospital.

Acknowledgement
Adopted from the Module curriculum for B.Voc / D.Voc in Medical Imaging Technology by AICTE Ne Delhi

ज्ञान-विज्ञान विमुक्तये

UNIVERSITY GRANTS COMMISSION
BAHADURSHAH ZAFAR MARG
NEW DELHI – 110 002

Speed Post

F.No. 5-1/2018 (NSQF)

July, 2018

Sub: Approval of Programmes/ courses under NSQF

Dear Sir/Madam,

This is with reference to your proposal for introducing vocational courses under NSQF. I am directed to convey approval of the UGC for the following programmes/courses to be run by your institution under NSQF from the academic session 2018-19:

Programme
B.Voc
1. Health Care (Medical Imging Technology)

It is further informed that the institution may admit 50 students per course, and appoint faculty and staff as per the provisions of the NSQF Guidelines.

You are requested to kindly ensure compliance of the terms and conditions/provisions as laid down in the Guidelines for providing Skill-based Education under National Skill Qualification Framework. You are also requested to convey your confirmation to start the course/s from the academic session 2018-19 along with the course-wise actual intake of students to UGC at the earliest.

With regards,

Yours faithfully,

(Mriganka Sekhar Sarma)
Education Officer

Registrar/Principal/Nodal Officer
Rajendra Mishra College,
Bypass Road, Tiwari Tola, Saharsa-852201,
Bihar.

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Officer on Special Duty (Jt. Cal)

B. N. MANDAL UNIVERSITY

Laloo Nagar, Madhepura-852113 (Bihar)

Ref.....

Date. .....

NO OBJECTION CERTIFICATE

This is to certify that R.M. College, Saharsa is a constituent unit under B.N. Mandal University, Madhepura and also included under section 2 (f) and 12 (B) of University Grant Commission Act-1956.This is a NAAC accredited grade-B college. This University has no objection if the college gets permission to start Bachelor of Vocational (B.Voc.) course by U.G.C.

By order of the Vice-Chancellor,

17/7/18

Co-ordinator
College Development Council

Memo No. (C.C.D.C.(B.Voc)-42/18)- 939/18 Dated:- 17.07.2018

Copy forwarded to: For information & necessary action.

01. The Principal, R.M. College, Saharsa
02. Inspectors of College (Arts & Commerce). B.N.M.U. Madhepura.
03. Inspectors of College-(Science). B.N.M.U. Madhepura.
04. Secretary-cum-P.A to Vice-Chancellor/Assistant to Pro. V.C./P.A to Registrar. B.N.M.U. Madhepura.

17/7/18

Co-ordinator
College Development Council

17/7/2018

Vinod Kumar Tiwari
Officer on Special Duty (Judicial)