सत्यमेव जयते

राजस्थान राज–पत्र विशेषांक	RAJASTHAN GAZETTE Extraordinary
साधिकार प्रकाशित	*Published by Authority*

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उप–खण्ड (I)
राज्य सरकार तथा अन्य राज्य–प्राधिकारियों द्वारा जारी किये गये (सामान्य आदेशों, उप–विधियों आदि को सम्मिलित करते हुए) सामान्य कानूनी नियम।

RAJASTHAN PARA-MEDICAL COUNCIL

NOTIFICATION

Jaipur, August 25, 2015

G.S.R. 78 :- In exercise of the powers conferred by sub-section(3) of section 42 of the Rajasthan Para-medical Council Act, 2008 (Act No. 25 of 2008), the Rajasthan Para-Medical Council, with the approval of the State Government hereby makes the .following regulations further to amend the Rajasthan Para-medical Council Regulations, 2014, namely:-

1. Short title and commencement.- (1) These regulations may be called the Rajasthan Para-medical Council (Amendment) Regulations, 2015.

(2) They shall come into force with immediate effect.

2. Substitution of regulation 41.- The existing regulation 41 of the Rajasthan Para- Medical Council Regulation, 2014, here in after referred to as the said regulations, shall be substituted by the following, namely:-

"**41. Courses and Syllabus.-** (1) The Council may allow the recognized institutions to run the courses specified in table given below. The Council may include more courses with the prior permission of the State Government.

TABLE

S. No.	Name of Course	Duration	Eligibility
1.	Diploma in Medical Laboratory Technology	2 Years	10 + 2 (Science subject)
2.	Diploma in Radiation Technology	2 Years	10 + 2 (Science subject)
3.	Diploma in Dental Mechanic Technology	2 Years	10 + 2 (Science subject)

4.	Diploma in Dental Hygiene Technology	2 Years	10 + 2 (Science subject)
5.	Diploma in Operation Theater Technology	2 Years	10 + 2 (Science subject)
6.	Diploma in Dialysis Technology	2 Years	10 + 2 (Science subject)
7.	Diploma in Orthopedic Technology	2 Years	10 + 2 (Science subject)
8.	Diploma in ECG Technology	2 Years	10 + 2 (Science subject)
9.	Diploma in Blood Bank Technology	2 Years	10 + 2 (Science subject)
10.	Diploma in Endoscopy Technology	2 Years	10 + 2 (Science subject)
11.	Diploma in EEG Technology	2 Years	10 + 2 (Science subject)
12.	Diploma in Cath Lab Technology	2 Years	10 + 2 (Science subject)
13.	Diploma in Emergency and Trauma Care Technology	2 Years	10 + 2 (Science subject)
14.	Diploma in Opthalmic Technology	2 Years	10 + 2 (Science subject)
15.	Diploma in Perfusion Technology	2 Years	10 + 2 (Science subject)

(2) The syllabus for the Diploma Courses mentioned in sub-regulation (1) above, shall be as specified in Schedule-1 to Schedule-15.

(3) The Council may, at any time, amend or modify syllabus of any course. Such amended or modified syllabus shall be effective from the next session of the course. "

3. Amendment of regulation 44.- In regulation 44 of the said regulations, for the exesiting expression "Schedule-21", the expression "Schedule-16" shal be substituted.

4. Amendment of regulation 45.- In sub-regulation (1) of regulation 45 of the said regulations, for the exesiting expression "Schedule-21", the expression "Schedule-16" shal be substituted.

5. Amendment of regulation 47.- In sub-regulation (1) of regulation 47 of the said regulations, for the exesiting expression "Schedule-21", the expression "Schedule-16" shal be substituted.

6. Amendment of regulation 51.- The existing sub-regulation (1) of regulation 51 of the said regulations shall be substituted by the following, namely: -

"(1) The minimum qualification for admission to the Para-medical Diploma Courses shall be Senior Secondry (10+2) Science (including any sub category of science subject) with minimum 45

percent marks in aggregate. Minimum aggregate marks for the Candidates belonging to Scheduled Castes, Scheduled Tribes, Backward Class or Special Backward Class shall be 40 percent. Allotment of students shall be made on the basis of marks obtained in 10+2 examination. Preference in admission shall be given to bonafide residents of Rajasthan."

7. Amendment of regulation 52.- In regulation 52 of the said regulations,-

(i) The exsting sub-regulation (1), shall be substituted by the following, namely:-

"(1) Every Para-medical institutions seeking recognition must have infrastructure facilities as specified in regulation 53."

(ii) in sub-regulation (2), for the exesiting expression "Schedule-21", the expression "Schedule-16" shal be substituted.

(iii) in sub-regulation (6), for the exesiting expression "Schedule-21", the expression "Schedule-16" shal be substituted.

8. Substitution of regulation 53.- The exsting regulation 53 of the said regulations shall be substituted by the following, namely:-

"**53. Infrastructure in Institutions.-** (1) For recognition of a Para-medical institution under these regulations, the institute must have the following infrastructure facilities, namely: -

A. **Physical Facility:**

(i) Building - Institute shall have preferably its own building. Whereas to start institute with a rented building, permission may be granted for a period of maximum 5 years on submission of registered rent agreement. But for permanent recognition own building shall be essential. Standard minimum requirement for one course with 25 students shall be as under:-

S. No	Description	Area
1.	Principal Office (1)	200 sq. ft
2.	Office Facilities	300 sq. ft
3.	Number of Class Rooms (2)	450 sq. ft each
4.	Number of Labs (1)	450 sq. ft each
5.	Library (1)	700 sq. ft

6.	Common Facilities	450 sq. ft • Toilet for girls in minimum 50 sq. ft • Toilet for boys in minimum 50 sq. ft • Common room for girls in 300 sq. ft
7.	Transportation Facilities	Sufficient number of vehicles required as per sanctioned seats
8.	Boys and Girls Hostel	Desirable
9.	Sports Facilities	Desirable

(ii) Dedicated space of 4000 Sq. ft. area per Diploma course for 25 seats is essential.

(iii) If sanctioned seats are above 25 (up to 50),-

(a) Number of class room required will be two but the area of each class room should be minimum 600 Sq. feat.

(b) Number of Lab required will be one only but the area of Lab should be minimum 600 Sq. feat.

(iv) If sanctioned seats are above 50, the number of class rooms and Labs will increase proportionately.

B. **Library Facilitie:**

(i) Two State level Hindi and one state level English newspaper and Journals related to course are essential.

(ii) Reference and text books in sufficient number in required.

C. **Teaching Faculty:**

S. No.	Designation	Qualification	Full Time/Part time Visiting
1.	Principal	MD/MS/MBBS/ or MSC with 5 Year experience as faculty	Full Time
2.	Assistant Professor/ Lecturer	MD/MS/MBBS or MSC with Para Medical subject or BSC in Para Medical Subject with 4 Year experience	Full Time/Part time Visiting
3.	Technician	Qualified in the specialty	Full Time

NOTE:

(i) Students Teachers Ratio should be - 10:1

(ii) Principal and technicians will be counted in teaching faculty

(iii) Minimum required faculty for each course will be 03

D. **Clinical Facility:**

(i) The Institute should have own Hospital/ Lab.

(ii) The Hospital/Lab should have Pollution Control Board certificate, Clinical Establishment Act registration and other essential licenses required from various departments under prevalent Act, Rules and Regulations.

(iii) Required clinical facilities are as under:-

	Name of course	Required Clinical Facilities
1.	Diploma in Medical Laboratory Technology	Applicants own lab with minimum :- 50 Pathological Examinations conducted per day 50 Biochemistry Examinations conducted per day 50 Microbiology Examinations conducted per day
2.	Diploma in Radiation Technology	Applicants own diagnostic centre in which minimum 50 X-Rays per day are conducted.
3.	Diploma in Dental Mechanic Technology	Applicants own centre where 50 patients are treated daily
4.	Diploma in Dental Hygiene Technology	Applicants own centre where 50 patients are treated daily
5.	Diploma in Operation Theater Technology	Applicants own minimum 50 Bed Hospital with facility of General Surgery.
6.	Diploma in Dialysis Technology	Applicants own minimum 50 Bed Hospital with Nafrology Department.
7.	Diploma in Orthopedic Technology	Applicants own minimum 50 Bed Hospital with Orthopadic Department
8.	Diploma in ECG Technology	Applicants own minimum 50 Bed Hospital with General Medicine Department
9.	Diploma in Blood Bank Technology	Applicants own Blood Bank
10.	Diploma in Endoscopy Technology	Applicants own minimum 50 Bed Hospital with Gastroenterology Department
11.	Diploma in EEG Technology	Applicants own minimum 50 Bed Hospital with Neurology Department
12.	Diploma in Cath Lab Technology	Applicants own minimum 50 Bed Hospital with Cardiology Department.
13.	Diploma in Emergency and Trauma Care Technology	Applicants own minimum 50 Bed Hospital with Trauma Department
14.	Diploma in Opthalmic Technology	Applicants own minimum 10 Bed Hospital with Eye Department
15.	Diploma in Perfusion Technology	Applicants own minimum 50 Bed Hospital with C.T. Surgery facility

(iv)Hospital/Lab should have modern machine and equipments.

(v)Distance of Institute from Hospital/Lab shall be,-

maximum 25 Km. from city with population above 10 lakh, and

maximum 10 Km. from city with population up to 10 Lakh.

E. **Equipments and Instruments:** (1)Equipments and instruments required for various Diploma courses shall be as specified in Schedule-17 to Schedule-31.

(2) Infrastructure facilities should be made available at the time of inspection for physical verification."

9. Substitution of regulation 54.- The existing regulation 54 of the said regulations shall be substituted by the following, namely:-

"54. Fees.- The fees payable in respect of all matters and proceedings provided for in these regulations shall be such as specified in Schedule-16."

10. Substitution of Form-4.- The existing Form 4 appended to the said regulations shall be substituted by the following, namely: -

"Form-4

[See regulation 52 (2) & (3)]

To

The Registrar
The Rajasthan paramedical council
Jaipur (Rajasthan)

Subject - Application for permission to start Para Medical Course..... (Name of the Courses).

Herewith we are submitting our application for permission to start .....(name of the courses). Details of information required are –

1. Name of the Institution
.....
.....
2. Name of the Chairperson/Secretary.....
3. Name of the Society/Trust/ Company/Partnership Firm/Individual **(Copy of relevant documents attested by the notary to be attached)**
.....
4. Address of the Institution where Para medical course will run

.....

.....

District.....State.....Pin Code.....

Tel. No.....Fax..... (M).....

E-Mail.....website.....

5. Name.of.the.Principal / Dean/HOD.....

Qualification.....Reg. No.....

Tel. No (Office).....Mobile No.....

6. Institution is under (Please √ mark)

1	Government		2	University		3	Society	
4	Trust		5	Company		6	Partnership	
7	Individual							

7. Year of establishment.....

8. Separate budget allocated to Paramedical Courses (Last year audited expenditure statement enclosed).

Annexure

9. Paramedical Courses applied for (Please mention names of the courses)

.....

10. Number of seats applied (course wise) .....

11. Other.Educational.Institutions.run.by.the management .....

12. Name.of.the.Courses.already.running.in.the.college .....

13. PHYSICAL FACILITIES:-

Separate building with 4000 Sq. ft. area wise distribution is given below:-

1.	Land available for the said Institution (relevant documents to be enclosed)	**Annexure**
2.	Whether the institution has own Building.	Yes.....No.....
3.	(i) Blue Print of building (ii) If rented then rent deed registered by sub-registrar for 05 years should be attached.	**Annexure**
4.	Principal Office	Area in sq. feet
5.	Office Facilities	Area in sq. feet
6.	Number of Class Rooms & Area in sq. feet	
7.	Number of Labs & Area in sq. feet	

8.	Library Area in sq. feet	
9.	Common facilities in sq. feet	
10.	Transportation Facilities (as per requirement)	
11.	Boys and Girls hostel (desirable)	
12.	Sports Facilities (desirable)	

14. LIBRARY FACILITIES:-

S. No	Specialty Subjects	No. of Books	No. of Journals	Amount	Bills enclosed

15. CLINICAL FACILITIES:-

Name of the Own Hospital/ Lab	**Annexure**
No. of Beds distribution	**Annexure**
Proof of the Hospital/Lab being own Hospital/Lab	**Annexure**
Pollution Control Board certificate	**Annexure**
Clinical Establishment Act registration certificate	
Distance of hospital from Para-medical Institution in KM	

16. TEACHING FACILITIES:-

Proposed names of teaching personnel (consent letters to be enclosed).

S. No	Name of teaching faculty	Desig-nation	Qualifi-cation	Speci-alty	Year of Passi-ng	Name of the Instt. / Univers-ity	Reg. No.	Teaching Exp.			Date of Joining
								UG	PG	Total	

Required Teaching Staff documents :-

1. Appointment letter.
2. Joining report / consent letter
3. Educational qualification Certificate .
4. Past Experience letter, Appointment letter & Reliving letter.
5. ID Proof

17. LIST OF NON- TECHING STAFF:-

S. No.	Name of Staff	Designation	Qualification	Board/university	Date of Joining

18.Intructional (instruments)facilities available.....
(Institute must have own equipment)

19. D. D. of Rs. 30000/- in favour of Registrar, Rajasthan Para-medical Council payable at Jaipur of any nationalized bank or challan or transaction number and ID if paid through online, for recognition fee per course.

20. D.D. of Rs. 5000/- in favour of Registrar, Rajasthan Para-medical Council, payable at Jaipur of any nationalized bank or challan or transaction number and ID if paid through online, for Application Fee.

21. Any Other information.

We request you kindly to arrange for Inspection at your earliest.
Thanking You

Yours faithfully

Date:

Authorised Signatory
With name, complete address,
Mobile no. and email.

List of Annexures

DECLARATION

(On 20 rupees non judicial stamp)

I.....S/o,D/o or W/o.....
declare that all the documents & information submitted in this application form are true to the best of my knowledge. I understand that if any, of the information is found wrong, my application will stand cancelled. I will abide by the rules & regulations in force in Rajasthan Paramedical Council and as amended from time to time.

Date :_____
Place:_____

(Signature of the Applicant)
Name of the Applicant

Seal of the Institution"

11. Substitution of Form 5.- The existing Form 5 appended to the said regulations shall be substituted by the following, namely: -

"Form-5
[see regulation52(5)]
Inspection Report

To
The Registrar
Rajasthan Para medical council
Jaipur, Rajasthan

Subject:- Inspection report
Reference:- Your letter number.....Dated.....

In reference to the above sighted letter I have inspected the institution and my report is as under-

1. Date of the Inspection
2. Name of the Institution
3. Name of the Chairperson/Secretary
4. Name of the society/Trust/Company
5. Complete address where para medical course will run.
6. Name of the Principal/Dean/HOD with qualification
7. Name of the courses applied for and requested annual admissions.

S. No.	Name of the Course	Number of Seats

8. Other courses running in the same premises
9. Physical Facilities are available as per norms (please sign in Yes or No column only):-

S.No	Description	Area	Yes	No
1.	Principal Office (1)	200 sq. ft		
2.	Office Facilities	300 sq. ft		

3.	Number of Class Rooms (2)	450 sq. ft each		
4.	Number of Labs (1)	450 sq. ft each		
5.	Library (1)	700 sq. ft		
6.	Common Facilities	450 sq. ft ➢ Toilet for girls in minimum 50 sq. ft ➢ Toilet for boys in minimum 50 sq. ft ➢ Common room for girls in 300 sq. ft		
7.	Transportation Facilities	Sufficient number of vehicles required as per sanctioned seats		
8.	Boys and Girls Hostel	Desirable		
9.	Sports Facilities	Desirable		

➢ 10. Library Facilities are available as per norms (mention Yes or No)

11. Clinical Facilities are available as per norms (please sign in Yes or No column only) :-

S.No	Particulars		
1.	Name of Own Hospital/Lab		
2.	Proof of the Hospital/Lab being Own Hospital/Lab		
3.	Beds distribution		
4.	Pollution Control Board certificate		
5.	Clinical Establishment Registration		
6.	Distance of Institute from Hospital/Lab in K.M.		
7.	Course wise clinical facilities		
	Name of Course	Details of clinical facilities available	facilities are as per Norms Yes/No

12. **Teaching Facilities available:-**

S. No.	Name of the faculty	Qualification	Teaching Experience	Date of Joining	Part time/Full time

	Yes	No
Teaching facility is as per Norms		

13. Required Equipments as per norms are available (Right only Yes or No)
(Purchase bills of the equipments should be verified by the inspector)
14. Videography of required infrastructure facility done in my presence and Video CD is enclosed.
15. Any other information
(No recommendation to be given)

Signature and
Name of the inspector

Date:
Place:

"

12. Substitution of Schedule 1 to 41.- Existing schedule 1 to 41appended to the said regulations shall be substituted by the following, namely: -

"Schedule-1

[See regulation 41(2)]

Syllabus of Diploma in Medical Laboratory Technology

FIRST YEAR

Subject -

1. Communication skills in English.
2. Computer application.
3. Anatomy and Physiology.
4. Hematology and blood banking.
5. Clinical pathology.
6. Clinical practical training.
7. MLT Instruments Practice Lab – 1.

Hospital: - Industrial training (4 Weeks) in summer vacation
Theory Classes – Monday to Friday – 1hrs/day – Total 5hrs/week
Rest of the time students do practical in their respective sections according to posting schedule
Examination Pattern – Internal/ Sessional exam – Taken on completion of course .
CPT – 1 (ML16) – 200 Marks
Practical – 200 marks, 3hrs, Practical exercises and related theory question
Exercises are – Hb- gm%
TLC/TRBC

PBF – Preparation, staining
DLC
ESR
Reticulocyte count
H&E staining
MGG Staining
Specimen mounting
Records – Prepared by students

200 marks are distributed among the given exercises. Practicals are taken according to the provided syllabus

Time for CPT and MLT not specified for sessional examination

MLT – 1(ML17) – 100 Marks

- It is Viva on instruments from different section
- Viva to be taken at 2 places in board examination

Pattern - A – Histopathology & Cytology – 50 Marks
B – Hematology & Blood Banking – 50 Marks

Theory – Theory exam of 100 marks

Practical –

CPT – 1 (ML16) – 400 Marks (For 3hrs) Practical exercise and related theory questions

Exercises are –
Hb- gm%
TLC/TRBC
PBF – Preparation, staining
DLC
ESR
Reticulocyte count
H&E staining
MGG Staining
Specimen mounting
Records – Prepared by students

400 marks are distributed among the given exercises.

MLT – 1(ML17) – 50 Marks

- It is Viva on instruments from different section
- Viva to be taken at 2 places

A – Histopathology & Cytology – 25 Marks
B – Hematology & Blood Banking – 25 Marks

Hospital Industrial Training

- Duration – 4weeks in summer vacation
- Marks are given out of 100 at the end of training

Marks distribution is as follow

OPD	Blood	Record	Viva	Total	Rating

(25)	Bank (25)	(25)	(25)	(100)	
					Excellent - >75% Good – 60-75% Average – 45-60% Poor - <45%

Rating is grading – Done on % of total Marks obtained out of – 100

SECOND YEAR

Subject -

1. Entrepreneurship & Professional management.
2. Environmental Studies.
3. Microbiology including parasitology and immunology.
4. Pathology.
5. Biochemistry.
6. Clinical practical training - II.
7. MLT Instruments Practice Lab – II.

Hospital/ Industrial training (4 Weeks) in summer vacation
Theory Classes – Monday to Friday – 1hrs/day – Total 5hrs/week
Rest of the time students do practical in their respective sections according to posting schedule

Examination Pattern – Internal/ Sessional exam – Taken on completion of course

CPT – II (ML26) – 200 Marks

CPT - 200	66 – Pathology 67- Microbiology 67 Biochemistry

MLT – 100 (ML27)	34 – Pathology **(it is viva on instrument same as taken for 1st year DMLT)** 33- Microbiology 33 Biochemistry

Exercises are –
Histopathology-

- Tissue processing block making, section cutting and routine H&E staining
- Different types of special staining in histopathology
- Preparation of fixatives

- Preparation of stains for sections and smears
- Paraffin embedding of tissues
- Preparation of paraffin blocks
- Honing of microtome razors
- Microtomy – Preparation of sections
- Frozen section techniques – Demonstration
- Preparation and fixation of smears for cytology
- Hematoxylin and cosin staining.
- Papanicuolu's staining
- Some of the special stains
- Mounting museum specimen
- Records keeping

Hematology-

- Hb-gm%
- TLC/TRBC
- PBF – Preparation, staining
- DLC
- Urine examination
- Bleeding and clotting time
- Interpretation of clot retraction
- Prothrombin time, APTT and TT
- Fibrinogen degradation product (FDP)
- Substitution tests for factor identification
- Records – Prepared by students

Practical examination is taken according to provided syllabus.
Time for examination for internal CPT and MLT not specified.
Theory examination of Pathology taken by – 100 Marks

Practical

CPT – II (ML-26) – 400marks	134 Pathology (Only Practical) 133 Microbiology 133 Biochemistry

MLT – II (ML27) – Same as sessional

CPT – II (ML-27) – 50 marks	16 Pathology (Only Viva on instrument) 17 Microbiology 17 Biochemistry

Hospital Industrial Training

- Duration – 4 weeks in summer vacation
- Marks are given out of 100 at the end of training

OPD (25)	Blood Bank (25)	Record (25)	Viva (25)	Total (100)	Rating

(25)	Bank (25)	(25)	(25)	(100)	
					Excellent - >75% Good – 60-75% Average – 45-60% Poor - <45%

Rating is grading – Done on % of total Marks obtained out of – 100

SECOND YEAR

Subject -

1. Entrepreneurship & Professional management.
2. Environmental Studies.
3. Microbiology including parasitology and immunology.
4. Pathology.
5. Biochemistry.
6. Clinical practical training - II.
7. MLT Instruments Practice Lab – II.

Hospital/ Industrial training (4 Weeks) in summer vacation
Theory Classes – Monday to Friday – 1hrs/day – Total 5hrs/week
Rest of the time students do practical in their respective sections according to posting schedule

Examination Pattern – Internal/ Sessional exam – Taken on completion of course

CPT – II (ML26) – 200 Marks

CPT - 200	66 – Pathology 67- Microbiology 67 Biochemistry

MLT – 100 (ML27)	34 – Pathology **(it is viva on instrument same as taken for 1st year DMLT)** 33- Microbiology 33 Biochemistry

Exercises are –
Histopathology-

- Tissue processing block making, section cutting and routine H&E staining
- Different types of special staining in histopathology
- Preparation of fixatives

- Preparation of stains for sections and smears
- Paraffin embedding of tissues
- Preparation of paraffin blocks
- Honing of microtome razors
- Microtomy – Preparation of sections
- Frozen section techniques – Demonstration
- Preparation and fixation of smears for cytology
- Hematoxylin and cosin staining.
- Papanicuolu's staining
- Some of the special stains
- Mounting museum specimen
- Records keeping

Hematology-

- Hb-gm%
- TLC/TRBC
- PBF – Preparation, staining
- DLC
- Urine examination
- Bleeding and clotting time
- Interpretation of clot retraction
- Prothrombin time, APTT and TT
- Fibrinogen degradation product (FDP)
- Substitution tests for factor identification
- Records – Prepared by students

Practical examination is taken according to provided syllabus.
Time for examination for internal CPT and MLT not specified.
Theory examination of Pathology taken by – 100 Marks

Practical

CPT – II (ML-26) – 400marks	134 Pathology (Only Practical) 133 Microbiology 133 Biochemistry

MLT – II (ML27) – Same as sessional

CPT – II (ML-27) – 50 marks	16 Pathology (Only Viva on instrument) 17 Microbiology 17 Biochemistry

Hospital Industrial Training

- Duration – 4 weeks in summer vacation
- Marks are given out of 100 at the end of training

OPD (25)	Blood Bank (25)	Record (25)	Viva (25)	Total (100)	Rating

					Excellent - >75% Good – 60-75% Average – 45-60% Poor - <45%

➢

➢ Rating is grading – Done on % of total Marks obtained out of – 100

1st Year Syllabus

Blood Banking :

- Introduction to blood banking, screening and selection of donor.
- Collection and storage of blood.
- Blood grouping ABO, RH and other system of grouping , subgroup A , Bombay blood group and their antibodies.
- Antibodies to ABO system, Anti 'AB' and Anti 'H' antibody.
- ABO Testing – slide & tube test. Reverse grouping, discrepancies between cells and serum results , sources of error, rouleux formation.
- RH Grouping – Slide or rapid tube test , false positive , false negative , Du system .
- Cross matching , reasons of cross match , saline albumin , coombs and enzymes in testing
- Coombs test- direct and indirect , principle , procedure , sources of errors , control , interpretation and clinical application.
- Organization of blood bank, preparation and uses of various components of blood.
- Transfusion reactions.

Haematology :

- Introduction to clinical haematology.
- Instruments and glassware's used in haematology.
- Preparation of various stains , buffers and solution used in haematology.
- Methods of collection of blood and anticoagulants used in haematology.
- Various methods of Hb estimation.
- Preparation and staining of PBF.
- RBC counting , WBC counting , Absolute eosinophill count.
- Platelet and Reticulocyte counting.
- Morphology of normal and abnormal forms of RBC's .

- Morphology of normal and abnormal forms of WBC's.
- DLC
- ESR
- PCV, Blood indices.
- Osmotic fragility test.
- Haemoglobin electrophoresis, estimation of foetal Hb.
- G6PD estimation.
- Sickling test.
- LE cell test, Test for cold agglutination.
- Bone marrow examination – Different sites and needle used
- Automation in haematology- Basic principles.

Clinical Pathology :

- Introduction to clinical pathology & safety measures in lab.
- Quality control – External and Internal.
- Complete urine examination.
- CSF examination.
- Examination of other body fluids.
- Semen analysis.
- Norms of biomedical wastes and discarding of infected blood.

2ND YEAR SYLLABUS

TOPICS:

- General principles of histopathology works; collection of specimen, numbering and giving tissue bits.
- Equipments used in histopathology, their merits, demerits and care to be taken
- Fixatives used in histopathology – Preparation, advantages and disadvantages
- Frozen section and cryostat technique staining and mounting, morbid anatomy
- Decalcification – Methods, advantages and disadvantages of each method
- Introduction of cytopathology, methods of collection of materials, making smears and preparations of fixatives used
- Different stains used in cytology, their preparation and staining the smears
- Exfoliative cytology of barr bodies (Six Chromatin) and pap staining
- Histopathology techniques. Morbid anatomy tissue processing, fixation, dehydration, clearing and impregnation in paraffin.
- Making of blocks and section cutting. Errors in section cutting and their correlation

- H&E staining including staining technique for rapid diagnosis and different types of mountants used
- Preparation of different type of hematoxylin and eosin
- Preparation of different types of special stains and special staining techniques
- immunohistochemical & immunocytochemical staining
- Histochemical and cytochemical techniques
- Normal coagulation cascade
- Investigation of bleeding disorders
- Bleeding time and clotting time – methods and interpretation
- Clot retraction time
- Prothrombin Time
- APTT
- Thrombin time
- Fibrin degradation products
- Preparation of specimen for mounting
- Preparation of fixations for mounting
- Techniques of mounting
- Organization of medical laboratory and museum and their maintenance.
- Equipments used in Histopathology
- Instruments of stains used in hematology
- Instrument used in cytology
- Lab diagnosis of Jaundice
- Lab diagnosis of Diabetes Mellitus
- Renal Function tests.

Schedule-2

[See regulation 41(2)]

Syllabus of Diploma in Radiation Technology

S. No.	Subject	Distribution of time			Distribution of Marks			
		Hours Per Week			Exam			
		Th	PR	T	Th	PR	Viva-voce	Total
RT-1	Radiological Anatomy ,Physiology & Pathology	1	-	1	100	-	-	100
RT-2	Radiological Physics	1	-	1	100	-	-	100
RT-3	Radiography- I (GEN).	1	-	1	100	-	-	100
RT-4	Dark Room Procedures	1	-	1	100	-	-	100

RT-5	Clinical & Instrumental Skill lab- I	-	32	32		75	25	100
RT-PRS	Sessional Assessment (PRS)	-	-	-	100	-	-	100
	Total	**4**	**32**	**36**				**600**

For Diploma IInd Year Radiation Technology

S. No.	Subject	Distribution of time			Distribution of Marks			
		Hours Per Week			Exam			
		Th	PR	T	Th	PR	Viva-voce	Total
RT-6	RADIOGRAPHY 2nd Special	1	-	1	100	-	-	100
RT-7	Basic Principles of Radiotherapy,Radiation Hazards & Protection	1	-	1	100	-	-	100
RT-8	Recent Advances	1	-	1	100	-	-	100
RT-9	Patient Care & Hospital Management	1	-	1	100	-	-	100
RT-10	Clinical & Instrumental Practice lab II	-	32	32		75	25	100
RT-PRS	Sessional Assessment (PRS)	-	-	-	100	-	-	100
	Total	**4**	**32**	**36**				**600**

RADIOLOGICAL ANATOMY, PHYSIOLOGY & PATHOLOGY RATIONALE

The study of anatomy physiology and pathology is essential because it will help in understanding the basic structure of the organs, their functions and changes due to various diseases affecting the organs of the human body.

CONTENTS

Gross Radiological surface anatomy of human body. The Human Skeleton bones and joints, formation of bones, growth of skeleton, centers of Ossification, types of bones,type of joints, thoracic contents and general location of organs and vessels, abdominal viscera and location of the major organs, types of cells, composition and development,Cell function and tissue differentiation.

2. Anatomy, Physiology and Pathology of Body system-Genes reproductive organs ,embryological development..The nature and appearance of Bacteria.Common
Benign Tumors,Malignant Tumors.Dissemination of Malignancy, Primary and Secondary spread.Composition and type of nerve tissue, muscular tissue and types.Abnormalities in tissues ,ulceration,Sepsis asepsis and anti sepsis.Heart and blood, vessels.structure of heart and function.Major vessels.of the circulatory system: blood circulation , purification.Common terms used for diseases and conditions of this system.

3. Respiratory system. and nasal passages and nasal sinuses, pharynx, Nature and function of respiration.common terms related to diseases and conditions of the system. Lymphatic system. lymphoid tissue and the tonsils.Reticulo endothelial system, liver and spleen. bone morrow.Life cycle of red and white corpuscles of the blood.Alimentary system.Functions of mouth and teeth.

4. Salivary gland,pharynx and oesophagus ,stomach, small intestine,.large intestine[colon], liver and biliary tract, and pancreas Functions of alimentary system digestion absorption of food, metabolism, urinary tract-Kidney Ureters and bladder urethra Urinary secretion.Reproductive system male genitalia, female genitalia, mammary glands. Menstruations, pregnancy and lactation.

Nerve system and common terms used in this system Main subdivisions organs of sense.Structure and the functions of eye,ear,Surface landmarks and topography in relation to organs of the body for radiography positioning. Inflamation. Pyrexia. Ulcer. bacteria and the specific granulomatous. disorders. endocrine. nutrition and metabolism.

Ref. Books:1.Foundation of Anatomy & physiology -Ross Wilson
2. Atlas of Radiological Anatomy - Weir & Abrahms

RADIOLOGICAL PHYSICS

RATIONALE

Every electric current is accompanied by magentic effects & electro magnetism is the branch of physics that deals with the relationship between electricity & Magnetism. X-ray belongs to a group of radiation called electromagnetic radiation. It is the transport of energy through space as a combination of electric and magnetic field. Any accelerating charge not bound to an atom will emit electromagnetic radiation.

CONTENTS

Basic Electricity and magnetism and Radiation physics :
Units of measurement force, work, energy .Heat and energy . Various method sof transmission of heat.
Magnetism, classification of magnets. properties of magnets .magnetic field and line of forces and their measurement, Electro magnetism.
Electricity, electrostatic conductor and insulators.elementary electron theory. Units of electric charges potential. Condensers and capacity of condensers.
Current, Electricity, Om's Law,various units of current ,Voltage and rectifiers.Heating effect of current, units of point and power consumption,Principal and working of moving coil and moving iron type of meters.
Electro Magnetic induction ,Transformers,.their losses,.rating ;induction motors.
Direct and Alternating currents, impedance, capacitance, Thermoionic emission , Characteristic curves of diode and triode valves, semiconductors.
Knowledge of Cathode , anode ,rectifier.solid state rectifier ,self rectified circuits imbalance of single valve rectifications .half wave and full wave rectifications ,transformer and HT cables ,HT cable calibration and measurement units of HT.Measurement of out put of x-ray Tube.
Apparatus for Radiography,radiotherapy and imaging & its routine maintenance. Mains supply,basic x-ray circuit control,and stablising,Equipment motors,various exposure timers control of scattered radiations fluoroscopy tomography.mobile equipment.photofluorography.mammographic equipment.

REFERENCE BOOKS:

1. Radiation physics — Satish Bharghav
2. The Fundamentals of x-ray and Radiation — Josaph Selman
3. RADIOLOGICAL BOOK FOR TECHNOLOGISTS — Bushong & sievert

RADIOGRAPHY – I (Gen.)

RATIONALE

Radiography is a branch of photography in which an image is formed on a film or plate by exposure to X-ray. An opaque object- e.g. Part of human body or a metal casting is placed between the source of the X-rays and the sensitized material; the resulting radiograph shows details of the internal structure which is widely used in medical field for diagnostic purposes.

CONTENTS

Routine Radiographic Techniques for whole body. (Different views of routine with special views of radiography

Skull & Neck: Different views of skull bones. Maxilla, mandible, zygoma, T.M. Joints. Open mouth & close mouth, mastoid, Petrous bones, optic foramen, sella turcica, internal auditory canal, sphenoid bone, soft tissue neck, nasopharynx, larynx.

Upper Limbs: Fingers individual and as a whole, hand carpal tunnel syndrome, wrist, forearm, elbow, head of radius humerus shoulder joints, acromio clavicular joint, sternoclavicular joint and scapula.

Chest and Thorax Bones : Chest PA (Tele radiography), Chest Supine, Lordotic, Oblique Lateral, sternum obliqué, lateral and thoracic inlet view & decubitus.

Abdomen : Preparation indication and contra indication, acute abdomen, different position of abdomen-upright (standing) sitting, lying, decubitus, supine, and in prone position.

Vertebral Column : Atlanto occipital, odontoid, cervical spine, cervico thoracic spine, dorsal spine, thoraco lumbar spine, lumbo sacral spine, sacrum, coccyx, scoliosis, kyphosis, flexion, extension and both oblique views of spines.

Hips and Pelvis : Pelvis with Hip joints in different positions. Internal and external rotation, frog positions. S.I. joints. Cephalic tilt and caudal tilt.

Lower Limbs : Toes, feet, calcaneum, ankle joints, leg bones. Different view of knee. Patella inter condylar notch and femurs.

Others: Dental radiography, macro and micro radiography, mobile and portable for bed side radiography operation theatre radiography, cine radiography, localization of foreign body, battery operated units , mass miniature radiography and all other emergency radiography.

REFERENCE BOOKS:

1. WHO – Manual of radiographic Technique.
2. Radiographic for Technicians
3. Pocket Atlas of Dental Radiology.
4. Clark's positioning in radiography

DARK ROOM PROCEDURES

RATIONALE

Radiography unquestionable begins and ends in the dark room.Where the necessary handling and processing of X-ray film

can be carried out safely and efficiently, without the hazard of producing film fog by accidental esposure to light or X-ray.

CONTENTS

Dark Room Procedures :Photographic Process-Light image.image produced by radiation.light sensitive materials,latent image.

Film Material :The structure of X-ray films.resolving power-graininess of film.sensitivity of film.speed of film.contrast of film and types of film.

Sensitivity :Characteristic curve and its usefulness.

X - Ray Film Storage :Storage of unexposed films.

Screens : Construction of intensifying screens. Choice of fluorescent material.intensifying factor detail Sharpness,Speed,screen contact,care of intensifying screens and type of screens.

Cassettes :Cassettes design and care of cassettes.Mounting of intensifying screens in the cassettes.

Film Processing :Consitutions of the processing solution and replenisher.Factors affecting the developer type of developer and fixer.factors affecting the use of the fixer,silver recovery method.

Film Rinsing Washing and Drying :Intermediate rinse. washing and drying of films.

Film processing Equipment :Manual and automatic processing.

Dark Room Design :Layout and material used

The radiographic image :The sharpness, contrast detail definition.viewing conditions.

Administration :Trimming, identification of film legends,relevant papers of the patients.records filling,Report distribution.

Dark Room Process :Light proof with colour.ventilation and temperature.maintenance.Technical and processing film faults. Fog static pressure and static currents. Artefacts of different types.Darkroom illuminations, orientation of laser cameras.

REFERENCE BOOKS:

1. WHO-Manual of darkroom Technique.
2. Radiographic physics and darkroom procedure.- Gupta.
3. Radiographic Photography. –CHESNEY D.H. & CHESNEY M.O.

CLINICAL & INSTRUMENTAL SKILL LAB. TRAINING-1

RATIONALE

It is very important for a X-ray trainee to have practical knowledge of various laboratory tests.The student will be able to interpret correctly the test results and correct diagnosis of a disease.

Practicals & training related to theory papers-Radiological Anatomy, Physiology& Pathology, Radiological Physics,Radiography –I (GEN.)Dark Room Procedures.

Note : The Essential Theory should be taught during the Practicals.

REFERENCE BOOKS :

1. WHO- A Guide to X-ray Department

For Diploma II nd Year Radiation Technology

S. No.	Subject	Distribution of time			Distribution of Marks				
		Hours Per Week			Exam				
		Th	PR	T	Th	PR	Viva-Voce	Sessional Assesment (PRS)	Total
RT-6	RADIOGRAPHY 2nd Special	1	-	1	100	-	-	-	100
RT-7	Basic Principles of Radiotherapy, Radiation Hazards & Protection	1	-	1	100	-	-	-	100
RT-8	Recent Advances	1	-	1	100	-	-	-	100
RT-9	Patient Care & Hospital Management	1	-	1	100	-	-	-	100
RT-10	Clinical & Instrumental Practice lab II	-	32	32		60	25	15	100
	Total	**4**	**32**	**36**					**500**

RADIOGRAPHY 2nd (Special)

RATIONALE

Radiography is branch of photography in which an image is formed on a film or plate by exposure to X-ray, an opaque object-e.g. Part of human body or a metal casting is placed between the source of the X-rays and the sensitized material; the resulting radiography shows details of the internal structure which are widely used in medical field for diagnosis.

CONTENTS

1. Special Radiographic Techniques & Applications & uses of contrast media Carotid Angiography, Investigation related to the blood
Supply of the brain.

Ventriculography – Position and techniques Pneumo-Encephalography trolley equipment, preparation of the patient and after care.

Angiography:- four vessel, Selective cath lab procedure

Gastro intestinal tract:- Ba. Swallow, Ba. Meal, Ba, Meal follow through, Ba. Enema.

Biliary Tract: Oral Cholecystography, IVC, trans hepatic percutaneous cholangiography, preoperative cholangiography, T-tube cholangiography and ERCP.

Myelography:- Vertebral Angiography, preparation of patient, contrast media equipment and techniques of procedure.

Urinary Tract – KUB, IVU ,Retro grade, cystourethrogram; micturating urethrography.

Hystero-Salpingography:- Investigation of uterus and fallopian tubes.

Tomography – Principle, equipment with type of movement, procedures.

Theatre technique – Sterile technique in OT, Cleanliness of mobile unit or C- arm.

Others – Dacrocystography, sialography, sinography; angiography (Cerebral and venography) Bronchography, arteriography, mammography, Spleenoportovenography, Lymphangiography, xerography and all other special investigations.

Ref. Books:- 1. Clark's positioning of Radiography

BASIC PRINCIPLES OF RADIOTHERAPY, RADIATION HAZARDS & PROTECTION

RATIONALE

X-ray may cause harm. Many somatic dangers of radiation became evident a few months after X-rays were discovered. Small doses of radiation can cause both mutations & neoplasm. No one knows just how much radiation is tolerable. Protection must be provided against any type of radiation to general public as well as radiation workers. The greatest risk from X-rays is for the operator and doctor, who may be exposed repeatedly over the years while they are working.

CONTENTS

General principle of radiotherapy, therapeutic ratio, cell cycle, Factors influencing radiation effects on normal tumour cells, Radiotherapy management of various malignancies treatment and side effects of radiations. Knowledge of Linear accelerators, brachytherapy & Teletherpy Machine & their Applications ,Radioactive isotopes & their applications Fundamentals of computers & its application in Radiodiagnosis & Radiotherapy Radiation hazards and its protection for occupational workers and general public, Planning of department of radiology, Radiotherpy.Structure of Atom, Radio Activity natural and artificial production.

Interaction of radiation with matter, quantity and quality of radiation and the factors on which it depends. H.V.T. T.V.T Various radiation units – Roentgen, rad, rem, etc, Dosimetry, various radiation measuring instruments, ICRP recommendations, measurement of X-ray and other radiation, rules of AERB , effects of radiation, radiation hazards, , film badge.

REFERENCE BOOKS:

1.Radiation Physics — Satish Bharghav
2.The Fundamentals of X-ray and Radiation — Josaphy Selman
3. A book of radiological Technologists — Bushong & sivert

RECENT ADVANCES

RATIONALE

Every electric current is accompaniend by magnetic effects & electromagnetism is the branch of physics that deals with the relationship between electricity & Magnetism.X-ray belongs to a group of radiations called electromagnetic radiation.If the transport of energy through space as a combination of electric and magnetic field.Any accelerating charge not bound to an atom will emit electromagnetic radiation.

CONTENTS

1. Recent Advances in Imaging radiology

Image intensifiers Rapid serial changers pressure syringe x-ray tube and complete knowledge of x-ray units along with all accessories. mobile and portable x-ray units.

Recent advance in imaging technology: - Knowledge of Ultra sonograhy, Color Doppler, different types of transducers.

(ii) CT Scan, conventional, spiral (Helical), Multi slice.

(ii) Magnetic resonance imaging (MRI)
(iii) Spectroscopy (MRS)
(iv) Computerized radiography
(v) Digital Radiography
(vi) DSA
(vii) Picture Archiving communication system (PACS)
(viii) Mammography
(ix) Orthopantography
(x) Positron emission Tomography (PET)
(xi) Different type of cameras e.g. laser, photography etc.

2. REFERENCE BOOK:

1. Radiation PhysicsSatish Bharghav
2. The Fundamentals of X-ray and Radiation — Josah Selman
3. Diagnostic Ultrasound — Rumack
4. Computed Tomography & Magnetic Resonance Imaging of the Whole Body — Haaga
5. Foundation of Computing — P.K Sinha & P Sinha, BPB Publication

Patient Care & Hospital Management

CONTENTS

Cleaning and care of enamel, stainless steel and glass instruments/cleaning of rubber and polythene goods, care of linen, woolen blankets, mattress and other sheets, bed making, giving bedpan, urinal and removing them.

Lifting of patients and first aid procedures. Transferring patients from wheel chairs, trolley or stretcher to the bed and x-ray couch and vice versa. Temperature, pulse, respiration and blood pressure, enema water and soap water enema. Explanation of hospital charts, sterilization and sterile technique of handling the sterile instruments.

Injection Technique : Intra Muscular, Intra Venous, setting up of drip, supply of oxygen, dignity of patient. Psychology of the sick. Preparation of the patient for any major investigation. Use of X-ray and radiation hazards. Preparation of the trays for special investigation and care of cancer patients. Maintaining up to date medico legal case (MLC) Radiographic record and verification of patient's marks of identity. Storage and distribution of reported films, storage of waste films and used solutions.

Hospital management

Rules & Regulations:
Licensing & registration procedure, Shop & Commercial Establishment act. Municipal bye laws & insurance coverage.

Management Techniques :
Leadership authority responsibility , Functions of Hospital Management

Quality Control & Quality Acceptance
Meaning importance of keeping standard, Factors responsible for deviation from standards.ISO and ISO 9000 to 9006, Total quality management.

Human Relations & Personality Development
Motivating the employees,Inter personnel relations, Grievances and their handling, Staff requirement, training and monitoring.

Bio Medical Waste Management:
Environmental impact of radiation, Introduction to bio-medicinal waste, Types of bio-medical waste, Collection of bio-medical waste, treatment and safe disposal of bio-medical waste

REFERENCE BOOK:

1. WHO – A Guide to X-Ray Department
2. WHO – Manual of Radiographic Technique.
3. Radiographic for Technicians.
4. Hand Bok on entrepreneurship Development O.P. harkut.
5. Environmental Impact Assessment Mc Graw Hill, New Yark, 1977

CLINICAL & INSTRUMENTAL SKILL LAB TRAINING– II

RATIONALE

It is very important for an X-ray trainee to have practical knowledge of various laboratory tests. The student will be able to interpret correctly the test results and correct diagnosis of a disease.

PRACTICALS

Practical & training related to theory papers – Radiography –II (Special). Radiotherapy Radiation Hazards & Protection, Physics of Recent Advances, Patient care & Hospital Management.

Since the trainee has to work on various medical instruments & equipments, he must have the basic knowledge and practical training about the different machines so that in case of any trouble during work. He/She will be able to correct and repair the faults.

PRACTICALS:

- Introduction to equipments
- Simple usage
- Indication & Contraindication use
- Repair & Maintenance of Instruments.

Note : The Essential Theory should be taught during the Practicals.

REFERENCE BOOKS:

WHO – A Guide to X-Ray Department.

Diploma in Radiation Technology

For Diploma Ist Year Radiation Technology

S.No.	Subject	Distribution of time			Distribution of Marks			
		Hours Per Week			Exam			
		Th	PR	T	Th	PR	Viva-voce	Total
RT-1	Radiological Anatomy ,Physiology & Pathology	1	-	1	100	-	-	100
RT-2	Radiological Physics	1	-	1	100	-	-	100
RT-3	Radiography- I (GEN).	1	-	1	100	-	-	100
RT-4	Dark Room Procedures	1	-	1	100	-	-	100
RT-5	Clinical & Instrumental Skill lab-I	-	32	32		75	25	100
RT-PRS	Sessional Assessment (PRS)	-	-	-	100	-	-	100
	Total	**4**	**32**	**36**				**600**

For Diploma IInd Year Radiation Technology

S. No.	Subject	Distribution of time			Distribution of Marks			
		Hours Per Week			Exam			
		Th	PR	T	Th	PR	Viva-voce	Total
RT-6	RADIOGRAPHY 2nd Special	1	-	1	100	-	-	100
RT-7	Basic Principles of Radiotherapy,Radiation Hazards & Protection	1	-	1	100	-	-	100
RT-8	Recent Advances	1	-	1	100	-	-	100
RT-9	Patient Care & Hospital Management	1	-	1	100	-	-	100

RT-10	Clinical & Instrumental Practice lab II	-	32	32		75	25	100
RT-PRS	Sessional Assessment (PRS)	-	-	-	100	-	-	100
	Total	**4**	**32**	**36**				**600**

RADIOLOGICAL ANATOMY,PHYSIOLOGY & PATHOLOGY RATIONALE

The study of anatomy physiology and pathology is essential because it will help in understanding the basic structure of the organs, their functions and changes due to various diseases affecting the organs of the human body.

CONTENTS

Gross Radiological surface anatomy of human body. The Human Skeleton bones and joints, formation of bones, growth of skeleton, centers of Ossification, types of bones,type of joints, thoracic contents and general location of organs and vessels, abdominal viscera and location of the major organs, types of cells, composition and development,Cell function and tissue differentiation.

2. Anatomy, Physiology and Pathology of Body system-Genes reproductive organs ,embryological development..The nature and appearance of Bacteria.Common

Benign Tumors,Malignant Tumors.Dissemination of Malignancy, Primary and Secondary spread.Composition and type of nerve tissue, muscular tissue and types.Abnormalities in tissues ,ulceration,Sepsis asepsis and anti sepsis.Heart and blood, vessels.structure of heart and function.Major vessels.of the circulatory system: blood circulation , purification.Common terms used for diseases and conditions of this system.

3. Respiratory system. and nasal passages and nasal sinuses, pharynx, Nature and function of respiration.common terms related to diseases and conditions of the system. Lymphatic system. lymphoid tissue and the tonsils.Reticulo endothelial system, liver and spleen. bone morrow.Life cycle of red and white corpuscles of the blood.Alimentary system.Functions of mouth and teeth.

4. Salivary gland,pharynx and oesophagus ,stomach, small intestine,.large intestine[colon], liver and biliary tract, and pancreas Functions of alimentary system digestion absorption of food, metabolism, urinary tract-Kidney Ureters and bladder urethra Urinary secretion.Reproductive system male genitalia, female

genitalia, mammary glands. Menstruations, pregnancy and lactation.

Nerve system and common terms used in this system Main subdivisions organs of sense.Structure and the functions of eye,ear,Surface landmarks and topography in relation to organs of the body for radiography positioning.Inflamation. Pyrexia.Ulcer. bacteria and the specific granulomatous. disorders. endocrine. nutrition and metabolism.

Ref. Books: 1.Foundation of Anatomy & physiology -Ross Wilson
2. Atlas of Radiological Anatomy- Weir & Abrahms

RADIOLOGICAL PHYSICS

RATIONALE

Every electric current is accompanied by magentic effects & electro magnetism is the branch of physics that deals with the relationship between electricity & Magnetism. X-ray belongs to a group of radiation called electromagnetic radiation. It is the transport of energy through space as a combination of electric and magnetic field. Any accelerating charge not bound to an atom will emit electromagnetic radiation.

CONTENTS

Basic Electricity and magnetism and Radiation physics :

Units of measurement force, work, energy .Heat and energy . Various method sof transmission of heat.

Magnetism, classification of magnets. properties of magnets .magnetic field and line of forces and their measurement, Electro magnetism.

Electricity, electrostatic conductor and insulators.elementary electron theory. Units of electric charges potential. Condensers and capacity of condensers.

Current, Electricity, Om's Law,various units of current ,Voltage and rectifiers.Heating effect of current, units of point and power consumption,Principal and working of moving coil and moving iron type of meters.

Electro Magnetic induction ,Transformers,.their losses,.rating ,induction motors.

Direct and Alternating currents, impedance, capacitance, Thermoionic emission , Characteristic curves of diode and triode valves, semiconductors.

Knowledge of Cathode , anode ,rectifier.solid state rectifier ,self rectified circuits imbalance of single valve rectifications .half wave and full wave rectifications ,transformer and HT cables ,HT cable calibration and measurement units of HT.Measurement of out put of x-ray Tube.

Apparatus for Radiography,radiotherapy and imaging & its routine maintenance. Mains supply,basic x-ray circuit control,and stablising,Equipment motors,various exposure timers control of scattered radiations fluoroscopy tomography.mobile equipment.photofluorography.mammographic equipment.

REFERENCE BOOKS:

1. Radiation physics Satish Bharghav
2. The Fundamentals of x-ray and Radiation Josaph Selman
3. RADIOLOGICAL BOOK FOR TECHNOLOGISTS Bushong & sievert

RADIOGRAPHY – I (Gen.)

RATIONALE

Radiography is a branch of photography in which an image is formed on a film or plate by exposure to X-ray. An opaque object- e.g. Part of human body or a metal casting is placed between the source of the X-rays and the sensitized material; the resulting radiograph shows details of the internal structure which is widely used in medical field for diagnostic purposes.

CONTENTS

Routine Radiographic Techniques for whole body. (Different views of routine with special views of radiography

Skull & Neck: Different views of skull bones. Maxilla, mandible, zygoma, T.M. Joints. Open mouth & close mouth, mastoid, Petrous bones, optic foramen, sella turcica, internal auditory canal, sphenoid bone, soft tissue neck, nasopharynx, larynx.

Upper Limbs: Fingers individual and as a whole, hand carpal tunnel syndrome, wrist, forearm, elbow, head of radius humerus shoulder joints, acromio clavicular joint, sternoclavicular joint and scapula.

Chest and Thorax Bones : Chest PA (Tele radiography), Chest Supine, Lordotic, Oblique Lateral, sternum oblique, lateral and thoracic inlet view & decubitus.

Abdomen : Preparation indication and contra indication, acute abdomen, different position of abdomen-upright (standing) sitting, lying, decubitus, supine, and in prone position.

Vertebral Column : Atlanto occipital, odontoid, cervical spine, cervico thoracic spine, dorsal spine, thoraco lumbar spine, lumbo

sacral spine, sacrum, coccyx, scoliosis, kyphosis, flexion, extension and both oblique views of spines.

Hips and Pelvis : Pelvis with Hip joints in different positions. Internal and external rotation, frog positions. S.I. joints. Cephalic tilt and caudal tilt.

Lower Limbs : Toes, feet, calcaneum, ankle joints, leg bones. Different view of knee. Patella inter condylar notch and femurs.

Others: Dental radiography, macro and micro radiography, mobile and portable for bed side radiography operation theatre radiography, cine radiography, localization of foreign body, battery operated units , mass miniature radiography and all other emergency radiography.

REFERENCE BOOKS:

1. WHO – Manual of radiographic Technique.
2. Radiographic for Technicians
3. Pocket Atlas of Dental Radiology.
4. Clark's positioning in radiography

DARK ROOM PROCEDURES

RATIONALE

Radiography unquestionable begins and ends in the dark room.Where the necessary handling and processing of X-ray film can be carried out safely and efficiently, without the hazard of producing film fog by accidental esposure to light or X-ray.

CONTENTS

Dark Room Procedures : Photographic Process-Light image.image produced by radiation.light sensitive materials,latent image.

Film Material :The structure of X-ray films.resolving power-graininess of film.sensitivity of film.speed of film.contrast of film and types of film.

Sensitivity : Characteristic curve and its usefulness.

X - Ray Film Storage : Storage of unexposed films.

Screens : Construction of intensifying screens. Choice of fluorescent material.intensifying factor detail Sharpness,Speed,screen contact,care of intensifying screens and type of screens.

Cassettes : Cassettes design and care of cassettes.Mounting of intensifying screens in the cassettes.

Film Processing : Consitutions of the processing solution and replenisher.Factors affecting the developer type of developer and fixer.factors affecting the use of the fixer,silver recovery method.

Film Rinsing Washing and Drying : Intermediate rinse. washing and drying of films.

Film processing Equipment : Manual and automatic processing.

Dark Room Design : Layout and material used

The radiographic image : The sharpness, contrast detail definition.viewing conditions.

Administration : Trimming, identification of film legends,relevant papers of the patients.records filling,Report distribution.

Dark Room Process : Light proof with colour.ventilation and temperature.maintenance.Technical and processing film faults. Fog static pressure and static currents. Artefacts of different types.Darkroom illuminations, orientation of laser cameras.

REFERENCE BOOKS:

1. WHO-Manual of darkroom Technique.
2. Radiographic physics and darkroom procedure.- Gupta.
3. Radiographic Photography. –CHESNEY D.H. & CHESNEY M.O.

CLINICAL & INSTRUMENTAL SKILL LAB. TRAINING-1

RATIONALE

It is very important for a X-ray trainee to have practical knowledge of various laboratory tests.The student will be able to interpret correctly the test results and correct diagnosis of a disease.

Practicals & training related to theory papers-Radiological Anatomy, Physiology& Pathology, Radiological Physics,Radiography –I (GEN.)Dark Room Procedures.

Note : The Essential Theory should be taught during the Practicals.

REFERENCE BOOKS :

2. WHO- A Guide to X-ray Department

For Diploma II nd Year Radiation Technology

S. No.	Subject	Distribution of time			Distribution of Marks				
		Hours Per Week			Exam				
		Th	PR	T	Th	PR	Viva-Voce	Sessional Assesment (PRS)	Total
RT-6	RADIOGRAPHY 2nd Special	1	-	1	100	-	-	-	100

RT-7	Basic Principles of Radiotherapy, Radiation Hazards & Protection	1	-	1	100	-	-	-	100
RT-8	Recent Advances	1	-	1	100	-	-	-	100
RT-9	Patient Care & Hospital Management	1	-	1	100	-	-	-	100
RT-10	Clinical & Instrumental Practice lab II	-	32	32		60	25	15	100
	Total	**4**	**32**	**36**					**500**

RADIOGRAPHY 2nd (Special)

RATIONALE

Radiography is branch of photography in which an image is formed on a film or plate by exposure to X-ray, an opaque object- e.g. Part of human body or a metal casting is placed between the source of the X-rays and the sensitized material; the resulting radiography shows details of the internal structure which are widely used in medical field for diagnosis.

CONTENTS

1. Special Radiographic Techniques & Applications & uses of contrast media

Carotid Angiography, Investigation related to the blood Supply of the brain.

Ventriculography – Position and techniques Pneumo-Encephalography trolley equipment, preparation of the patient and after care.

Angiography:- four vessel, Selective cath lab procedure

Gastro intestinal tract:- Ba. Swallow, Ba. Meal, Ba, Meal follow through, Ba. Enema.

Biliary Tract: Oral Cholecystography, IVC, trans hepatic percutaneous cholangiography, preoperative cholangiography, T-tube cholangiography and ERCP.

Myelography:- Vertebral Angiography, preparation of patient, contrast media equipment and techniques of procedure.

Urinary Tract – KUB, IVU ,Retro grade, cystourethrogram; micturating urethrography.

Hystero-Salpingography:- Investigation of uterus and fallopian tubes.

Tomography – Principle, equipment with type of movement, procedures.

Theatre technique – Sterile technique in OT, Cleanliness of mobile unit or C- arm.

Others – Dacrocystography, sialography, sinography; angiography (Cerebral and venography) Bronchography, arteriography, mammography, Spleenoportovenography, Lymphangiography, xerography and all other special investigations.

Ref. Books:- 1. Clark's positioning of Radiography

BASIC PRINCIPLES OF RADIOTHERAPY, RADIATION HAZARDS & PROTECTION

RATIONALE

X-ray may cause harm. Many somatic dangers of radiation became evident a few months after X-rays were discovered. Small doses of radiation can cause both mutations & neoplasm. No one knows just how much radiation is tolerable. Protection must be provided against any type of radiation to general public as well as radiation workers. The greatest risk from X-rays is for the operator and doctor, who may be exposed repeatedly over the years while they are working.

CONTENTS

General principle of radiotherapy, therapeutic ratio, cell cycle, Factors influencing radiation effects on normal tumour cells, Radiotherapy management of various malignancies treatment and side effects of radiations. Knowledge of Linear accelerators, brachytherapy & Teletherpy Machine & their Applications ,Radioactive isotopes & their applications Fundamentals of computers & its application in Radiodiagnosis & Radiotherapy

Radiation hazards and its protection for occupational workers and general public, Planning of department of radiology, Radiotherpy.Structure of Atom, Radio Activity natural and artificial production.

Interaction of radiation with matter, quantity and quality of radiation and the factors on which it depends. H.V.T. T.V.T

Various radiation units – Roentgen, rad, rem, etc, Dosimetry, various radiation measuring instruments, ICRP recommendations, measurement of X-ray and other radiation, rules of AERB , effects of radiation, radiation hazards, , film badge.

REFERENCE BOOKS:

1.Radiation Physics — Satish Bharghav

2.The Fundamentals of X-ray and Radiation — Josaphy Selman

3. A book of radiological Technologists Bushong & sivert

RECENT ADVANCES

RATIONALE

Every electric current is accompaniend by magnetic effects & electromagnetism is the branch of physics that deals with the relationship between electricity & Magnetism.X-ray belongs to a group of radiations called electromagnetic radiation.If the transport of energy through space as a combination of electric and magnetic field.Any accelerating charge not bound to an atom will emit electromagnetic radiation.

CONTENTS

1. Recent Advances in Imaging radiology

Image intensifiers Rapid serial changers pressure syringe x-ray tube and complete knowledge of x-ray units along with all accessories. mobile and portable x-ray units.

Recent advance in imaging technology: -

(i) Knowledge of Ultra sonograhy, Color Doppler, different types of transducers.
(ii) CT Scan, conventional, spiral (Helical), Multi slice.
(xiii) Magnetic resonance imaging (MRI)
(xiv) Spectroscopy (MRS)
(xv) Computerized radiography
(xvi) Digital Radiography
(xvii) DSA
(xviii) Picture Archiving communication system (PACS)
(xix) Mammography
(xx) Orthopantography
(xxi) Positron emission Tomography (PET)
(xxii) Different type of cameras e.g. laser, photography etc.

2. REFERENCE BOOK:

1. Radiation Physics Satish Bharghav
2. The Fundamentals of X-ray and Radiation Josah Selman
3. Diagnostic Ultrasound Rumack
4. Computed Tomography & Magnetic Resonance Imaging of the Whole Body Haaga
5. Foundation of Computing P.K Sinha & P Sinha BPB Publication

Patient Care & Hospital Management

CONTENTS

Cleaning and care of enamel, stainless steel and glass instruments/cleaning of rubber and polythene goods, care of linen,

woolen blankets, mattress and other sheets, bed making, giving bedpan, urinal and removing them.

Lifting of patients and first aid procedures. Transferring patients from wheel chairs, trolley or stretcher to the bed and x-ray couch and vice versa. Temperature, pulse, respiration and blood pressure, enema water and soap water enema. Explanation of hospital charts, sterilization and sterile technique of handling the sterile instruments.

Injection Technique : Intra Muscular, Intra Venous, setting up of drip, supply of oxygen, dignity of patient. Psychology of the sick. Preparation of the patient for any major investigation. Use of X-ray and radiation hazards. Preparation of the trays for special investigation and care of cancer patients. Maintaining up to date medico legal case (MLC) Radiographic record and verification of patient's marks of identity. Storage and distribution of reported films, storage of waste films and used solutions.

Hospital management

Rules & Regulations:

Licensing & registration procedure, Shop & Commercial Establishment act. Municipal bye laws & insurance coverage.

Management Techniques :

Leadership authority responsibility , Functions of Hospital Management

Quality Control & Quality Acceptance

Meaning importance of keeping standard, Factors responsible for deviation from standards.ISO and ISO 9000 to 9006, Total quality management.

Human Relations & Personality Development

Motivating the employees,Inter personnel relations, Grievances and their handling, Staff requirement, training and monitoring.

Bio Medical Waste Management:

Environmental impact of radiation, Introduction to bio-medicinal waste, Types of bio-medical waste, Collection of bio-medical waste, treatment and safe disposal of bio-medical waste

REFERENCE BOOK:

6. WHO – A Guide to X-Ray Department
7. WHO – Manual of Radiographic Technique.
8. Radiographic for Technicians.
9. Hand Bok on entrepreneurship Development O.P. harkut.
10. Environmental Impact Assessment Mc Graw Hill, New Yark, 1977

CLINICAL & INSTRUMENTAL SKILL LAB TRAINING– II

RATIONALE

It is very important for an X-ray trainee to have practical knowledge of various laboratory tests. The student will be able to interpret correctly the test results and correct diagnosis of a disease.

PRACTICALS

Practical & training related to theory papers – Radiography –II (Special). Radiotherapy Radiation Hazards & Protection, Physics of Recent Advances, Patient care & Hospital Management.

Since the trainee has to work on various medical instruments & equipments, he must have the basic knowledge and practical training about the different machines so that in case of any trouble during work. He/She will be able to correct and repair the faults.

PRACTICALS:

- Introduction to equipments
- Simple usage
- Indication & Contraindication use
- Repair & Maintenance of Instruments.

Note : The Essential Theory should be taught during the Practicals.

REFERENCE BOOKS:

WHO – A Guide to X-Ray Department.

Schedule-3

[See regulation 41(2)]

Syllabus of Diploma in Dental Mechanics Technology

PART- 1

APPLIED PHYSICS, CHEMISTRY & MECHANICS.
DENTAL MECHANICS.
APPLIED ORAL ANATOMY.

PART- 2

DENTAL MECHANICS (FINAL).
DENTAL MATERIALS & METALLURGY.
BASIC KNOWLEDGE OF COMPUTERS & RECORDS MANAGEMENT.

TEACHING AND EXAMINATION SCHEME

S.No.	Subject	Distribution of time			Distribution of Marks			
		Hours Per Week			Exam			
		Th	PR	T	Th	PR	Viva-voce	Total
DM-1	APPLIED PHYSICS, CHEMISTRY &	1	-	1	100	-	-	100

	MECHANICS							
DM-2	DENTAL MECHANICS	1	-	**1**	100	75	25	**200**
DM-3	APPLIED ORAL ANATOMY.	1	-	**1**	100	75	25	**200**
DM-PRS	Sessional Assessment (PRS)	-	33	-	-	100	-	**100**
	Total	3	33	**36**	300	250	**50**	**600**

TEACHING AND EXAMINATION SCHEME

S. No.	Subject	Distribution of time			Distribution of Marks			
		Hours Per Week			Exam			
		Th	PR	T	Th	PR	Viva-voce	Total
DM-4	DENTAL MECHANICS (FINAL).	1	-	**1**	100	75	25	**200**
DM-5	DENTAL MATERIALS & METALLURGY.	1	-	**1**	100	-	-	**100**
DM-6	BASIC KNOWLEDGE OF COMPUTERS & RECORDS MANAGEMENT.	1	-	**1**	100	-	-	**100**
DM-PRS	Sessional Assessment (PRS)	-	33	-	-	100	-	**100**
	Total	3	33	**36**	300	175	**25**	**500**

SYLLABUS FOR DIPLOMA IN DENTAL MECHANICS
PART- 1
APPLIED PHYSICS, CHEMISTRY & MECHANICS

1. APPLIED PHYSICS:

Specific gravity density, properties of matter, including cohesion, capillarity, surface tension viscosity, elasticity, diffusion and osmosis.

Heat: temperature and its measurements thermometers and Pyrometers. General account of expansion by heat of solids, liquids and gases, thermostats, pressure gas and hydraulic. Boyle's and Charles Laws. Unit of heat, thermal capacity and specific Heat, Change of stage: Latent heat: melting Point. Properties of vapors, conduction,

convection and radiation. Principles of electro-technology applied to dental work room,

Exercises/ Demonstrations:

- Balance- weighing correct to a milligram
- Determination of specific gravity by the principle of Archimedes (Solids and Liquids).
- Determination of Surface tension of liquid by capillary rise.
- Determination of Linear expansion of solids (level methods).
- Determination of the specific heats of solids and liquids by the method of mixtures.
- Small motors- constructional features and characteristics (Demonstration only)
- Determination of the electro- chemical equivalent of copper.

Applied Mechanics:

Parallelogram and triangle of forces. Moments, Couples, Centre of gravity, Principles of lever and cantilever work, Energy, Power, Friction, Inclined plane, Screw Strees, heating Strain, Torsion, Bending movements, Strength and stiffness of materials.

Exercises/ Demonstrations:

Verification of the parallelogram and triangle laws of forces.

Inclined plane Determination of mechanical advantage

Determination of Young's Modulus by bending of beams.

Applied Chemistry:

Distinction between physical and chemical change; elements, mixtures and compounds: position of the atmosphere; oxygen oxides; burning and rusting; water solvent properties and rusting, water solvent properties crystnillization; action of water on metals; composition of water hydrogen; laws of chemical ; meaning of chemical symbols valency; simple chemical equations; acids, bases and

Electrolysis, The ionic theory of solution. The electro potential series, electroplating, general characteristics of the metals including an elementary study of the common metals and alloys with special reference alloys with special reference to those used in the dental work room.

Alcohol, ethers adlehydes and ketones, futty acids and their more important derivatives, Simple treatment of carbohydrates, fats and proteins, benzens and its homologues characteristics of

aromatic substances. Synthetic resins and plastics used in Dentistry.

Exercises/ Demonstrations:

Tests for acids and alkalis radicals.

Acid- base titration- Neutralisation of acids with. Titration of N/10 NaOH with N/10 H_2SO_4 Phenolphthalein or methyl red as indicator 2^4

Total Nitrogen determination in In – oragnic nitrogenous materials, digestion and distillation.

Total Nitrogen determination in In- organic (ammonical) solutions (or salts) by direct distillation with Mg.

Determination of Phosphorus in in- oraganic materials by prexipitation.

Determination of Potassium in aqueous solution by per chlorate method.

Electrolytic deposition (electrolysis and electroplating of metals).

(c) Deposition of Copper by electrolysis of copper sulphate solution.

(d) Calculation of E. C. E.

DENTAL MECHANICS

1. **Dental mechanics (Primery):**

Bite blocks:- base plates and wax rims.

Articulators: classification, daily uses, and care of articulators.

Adjustments, mounting of casts.

Articulation, occlusal plan, protrusive balance, working bite, balancing bite, curve of space, compensating curve, lateral curve.

Principles of selection of teeth.

Setting of teeth and wax finishing.

Flasking, dewaxing, packing, curing and deflasking.

Finishing and polishing of dentures.

Additions, repairs, relining and revasing of dentures.

Immediate denture construction.

Making of acrylic teeth.

Kennedy's classification of partial dentures.

Principles of partial denture, clasp surveyor, surveying, path of insertion and removal. Establishment of clasp seat.

Clasp's parts, classification, function and reciprocation.

Principles of wire bending, preparation of wrought clasps, occlusal rests and lingual bars.

APPLIED ORAL ANATOMY

APPLIED ORAL ANATOMY:

Elementary anatomy and structure of denture/ bearing area.
Human dentition and occlusion
Functions of teeth and morphology of crowns of teeth
Muscles of mastication and facial expression
Movements of tempera- mandibular joint
Exercise/ Demonstrations
Tooth Carving in wax and plaster. (Crown and root, scale and enlarged models).

SYLLABUS FOR DIPLOMA IN DENTAL MECHANICS
PART- 2
DENTAL MECHANICS (FINAL)

2. Dental mechanics (Final):

Casting machines: Centrifugal and pressure casting machines, furnaces, principles of casting.
Casting techniques of partial denture (Skeletal) clasps, bars, occlusion rest.
Setting of teeth and completion of dentures on metal skeletons.
Mechanical principles of orthodontic appliances, anchorage, force, tissue changes and retention.
Stainless steel wire-preparation of clasps, springs and arch wires for orthodontic appliances.
Use of various types of expansion screws.
Designing – implant supported prosthesis (if facilities available for dental implants.
Ceramic, laminates and veneers.
Fabricating:- Maxillofacial prosthesis such as eye, nose ear, cheek, obturater and splint.
Indirect resin restoration preparation techniques.
Porcelain firing techniques:
Preparation of removable orthodontic appliances, activators. Retention appliances and oral screen.
Construction of fixed orthodontic appliances, bands, tubed and arches.
Soldering and spot welding- soldering of claps, tags, strengtheners and lingual bars.

Inlays and Crowns- classification and construction facing & backings.
Casting procedures
Principles of bridge work- types of abutments – abutments and pontics- construction of bridges using porcelain and acrylic pontics.

DENTAL MATERIALS & METALLURGY

3. DENTAL MATERIALS AND METALLUURGY

Dental Materials:

Composition, properties, uses, advantages & disadvantages of the following materials:-
Plaster of paris: dental stone, die stone
Investment materials,
Tray materials,
Denture base materials, both foe cold curing, tooth materials waxes,
base plates,
zinc oxide,
dental luting cements
dental ceramics and indirect resin restoration materials.

Dental Metallurgy:

Metallurgical terms,
General
Study of:
(a). Metals used in dentistry particularly gold, so;ver, coppr, aluminium.
(b). Alloys used in dentistry particularly, casting gold wrought gold
Heat treatment-annealing and tempering.
Solders, fluces, anti fluxes.
Tarnish and corrosion.
Elcctic deposition.
Dental implant materials

BASIC KNOWLEDGE OF COMPUTERS & RECORDS MANAGEMENT

4.Basic Knowledge of computers

General office routine economics, record-keeping services, professional referrals
And compuring skill;

Record keeping of materials indented and audit of use.
Receipt and dispatch of work from clinicians.

IV. Practical Examinations

The practical examination shell includes, but not necessarily limited to the following

I. Primary examination
   a. Model preparation, beading, boxing of models
   b. Class I ideal denture setup and wax up
   c. RPD – surveying of models and wax pattern preparation
   d. Spotting of dental materials
   e. Manipulation of lab dental materials

II. Final examination
   1. Three units FPD
      Model poring
      Die-preparation
      Specer application
      Wax pattern
      Casting pf a;; meta; brodge
   2. Ceramic application on single unit crown (Casted before)

Schedule-4

[See regulation 41(2)]

SYLLABUS OF DIPLOMA IN DENTAL HYGIENE TECHNOLOGY

PART- 1

ANATOMY, PHYSIOLOGY & HISTOLOGY.
PHARMACALOGY, PATHOLOGY& MICROBIOLOGY.
FOOD NUTRITION & RADIOLOGY

PART- 2

DENTAL HYGIENE & ORAL PROPHYLAXIS.
DENTAL EDUCATION,COMMUNITY/PUBLIC HEALTH DENTISTRY, PREVENTIVE DNTISTRY.
DENTAL MATERIALS,DENTAL ETHICS & JURISPRUDENCE, ORIENTATION IN DENTISTRY.

TEACHING AND EXAMINATION SCHEME

S.No.	Subject	Distribution of time			Distribution of Marks			
		Hours Per Week			Exam			
		Th	PR	T	Th	PR	Viva -voce	Total
DH-1	**ANATOMY, PHYSIOLOGY & HISTOLOGY**	1	-	1	100	75	25	200

DH-2	**PHARMACALOGY, PATHOLOGY& MICROBIOLOGY**	1	-	**1**	100	75	25	**200**
DH-3	**FOOD NUTRITION & RADIOLOGY**	1	-	**1**	100	75	25	**200**
DH-PRS	Sessional Assessment (PRS)	-	33	-	-	100	-	**100**
	Total	3	33	**36**	300	400		**600**

TEACHING AND EXAMINATION SCHEME

S. No.	Subject	Distribution of time			Distribution of Marks			
		Hours Per Week			Exam			
		Th	PR	T	Th	PR	Viva-voce	Total
DH-4	**DENTAL HYGIENE & ORAL PROPHYLAXIS**	1	-	**1**	100	75	25	**200**
DH-5	**DENTAL EDUCATION,COMMUNITY/PUBLIC HEALTH DENTISTRY,PREVENTIVE DNTISTRY**	1	-	**1**	100	75	25	**200**
DH-6	**DENTAL MATERIALS,DENTAL ETHICS & JURISPRUDENCE, ORIENTATION IN DENTISTRY**	1	-	**1**	100	75	25	**200**
DH-PRS	Sessional Assessment (PRS)	-	33	-	-	100	-	**100**
	Total	3	33	**36**	300	400		**600**

SYLLABUS FOR THE DIPLOMA IN DENTAL HYGIENISTS
PART- 1
ANATOMY, PHYSIOLOGY & HISTOLOGY.

(1) ANATOMY, GENERAL AND DENTAL:

Lectures:

General structure of mucosa membrane (tongue, pharynx, lips), bones, muscles, blood vessels, lymphatic, glands & nerves. Blood and nerve supply in relation to face in general and teeth and associated structure in particular.

Elementary knowledge of development of the jaws and teeth.

Structure nomenclature and morphology of human teeth.
Eruption, resorption & occlusion of teeth.
Relationship of teeth with investing tissues.
Muscles of mastication and facial expression.
Tempro mandibular Articulation.
Course and distribution of Vth and VIIth cranial nerves.

Practical:

Osteology of head and neck in general and face, including jaws in particular
Morphology of teeth.
Alveolar process of jaw bones.
Section of tooth in situ.

(2) PHYSIOLOGY & HISTOLOGY, GENERAL & DENTAL:

Lectures:

Cell structure of the human body.
Salivary glands, ducts and their function.
Composition and function of Saliva.
Blood: Compositins & function.
Mastication deglutition & Phonation.
General outlines of the physiological processes of the human body- particularly circulatory.

Practical:

Study of prepared histological slides of oral and dental tissue, sections of a tooth.
Routine blood examination.

PHARMACALOGY, PATHOLOGY& MICROBIOLOGY.

(3) PHARMACOLOGY, GENERAL & DENTAL:

Lectures:

Brief description, nomenclature, derivation, dosage, pharmacological action and therapeutic uses of drugs commonly used in dentistry (Obtundent, astringent, mouth wash, antiseptics)

Practical:

Preparation of gum paints, mouth washes and dentifrices.

(4) PATHOLOGY & MICROBIOLOGY, GENERAL AND DENTAL:

Lectures:

General principles of Pathology-
Inflammation degeneration and repair.

Applacation of general principles of pathology to tooth and surrounding tissues.

Dental Anomalies.

Attrition, Abrasion and Erosion.

Oral manifestation of systemic diseases like diabetes, syphilis, anemia, vitamin deficiencies and infectious diseases like AIDS & Hepatitis B

Infection Control in Dental Operatory and Bio- Medical waste Management and Handling Neoplasm with reference to oral cavity.

Elementary knowledge of Bacteriology, Asepsis, infection, Immunity, brief description of Pathology and Bacteriology of Dental caries ad gingival infections.

Practical:

Study of prepared pathological and bacteriological slides relating to oral and dental conditions.

Clinical demonstration of oral and dental manifestation of systemic disorders.

FOOD NUTRITION & RADIOLOGY

(5) DENTAL RADIOLOGY:

Lectures:

Fundamental and elementarprinciple of Dental radiology including X- Ray machine, its components and maintenance.

Basic knowledge of Radio Visio Grapy technique & extra oral radiograph including Panoramic (Ortho- pantographs and cephalostats).

Automatic film processing

Cataloging & Indexing of IOPA films.

Knowledge of occlusal, bitewing and digital radiography.

Technical aspects of Dental Radiographs i. e. the taking, processing and mounting of Dental Radiographs.

Characteristics of acceptable image, factors that influence finished radiographs, rules of radiation protection.

Radiation Hazards.

Practical:

Taking processing and mounting of Intra & Extra oral Radiographs.

(6) FOOD AND NUTRITION:

Lectures:

Basic food chemistry in relation to general and Oral Health.

Physical nature of diet in prevention of dental diseases.

Carbohydrates, fats, proteins, vitamins, minerals and water in relation to dental and oral health.

General food requirements for growth, maintenance and repair of the ody.

Assessments & charting of individual diet & counseling.

Effect of malnutrition on oral health.

Special diet and its administration in maxillofacial injury cases.

SYALLABUS FOR THE DENTAL HYGIENISTS COURSE FINAL (II YEAR)

DENTAL HYGIENE & ORAL PROPHYLAXIS.

(7) DENTAL HYGIENE AND ORAL PROPHYLAXIS (Primary and Final):

Lectures:

Definition of Hygiene

Objective of Dental Hygiene

Oral Prophylaxis- Various methods

On teeth- extrinsic, intrinsic and their management

Dental Plaque

Flossing technique

Dental calculus

Technical knowledge of ultrasonic scaling

Brief description and the role of Oral Prophylaxis in Gingivitis, Periodontitis, Periodontal and Alveolar abscess.

Clinical:

Instruments, technique of Oral Prophylaxis

Distaining and polishing of teeth

Copical application of fluorides

Care of oral cavity and appliances during treatment of maxillofacial cases.

DENTAL EDUCATION, COMMUNITY/PUBLIC HEALTH DENTISTRY, PREVENTIVE DNTISTRY.

(1) DENTAL HEALTH EDUCATION COMMUNITY PUBLIC HEALTH DENTISTRY & PREVENTIVE DENTISTRY:

Lectures:

Definition of Health and dental health

Aims and objectives of Denta; health education

Dental Health and Children

Steps in preventive program, patient counseling

Dental Health Education- Parents, mothers (anti and post-natal), infants pre- chool

Children and grownup Handicapped children

Dental caries- Prevalence and Prevention
Prevention by fluoridation
Periodontal diseases.
Saliva in relation to dental health and disease.
Dietary habits and Dental Health
Habits and Malocclusion
Oral Cancer
Brief outline of historical background of Public Health, History of dentistry and Public Health Services. Dental Health Team in relation to community health.
Technical knowledgr of Topical fluoride Application.

Practical:

Preparation of models of jaws and teeth- normal and pathological dental conditions.
Dresigning drawing and painting of posters on dental health education.
Procedure for arranging short talks, skits and features on dental and oral health, visual aids.
Collection of Oral Health realted statistics by conducting a small survey of an area.

DENTAL MATERIALS,DENTAL ETHICS & JURISPRUDENCE, ORIENTATION IN DENTISTRY

(2) DENTAL ETHICS, JURISPRUDENCE AND ORIENTATION IN DENTISTRY:

Lectures & Practical:

Difference between ethics and law, types of law.
Legal impositions in relation to dental practice code of ethics
Unlicensed practice of dentisity
Regulatory and professional organization
Place and function of dental profession in the society discussion of economic problems involved there in.
Social factors in Dental progress, income and living standard of people.
Objective and scope of dentistry.
Dental specialiries.

(3) BASIC KNOWLEDGE OF COMPUTER

General office routine economics, record- keeping services, professional referrals and computing skill;

DENTAL MATERIALS

Lectures & Practical:

General knowledge of various material used in Dentistry such as impression material, gypsum products, waxes, investing materials and various filling materials, temporary and Permanent cements, orthodontic material and implant materials used in maxillofacial and surgical prosthesis. Recognition and knowledge of various dental equipment and stores Used in dental establishment. Organization of dental stores, storage and accounting, handing and maintenance of dental items, assembly and minor repair of dental equipment.

Schedule-5

[See regulation 41(2)]

Syllabus of Diploma in Operation Theater Technology

First Year

1. Anatomy & Physiology
2. Computer & Communication Skills
3. Basic Bio Chemistry Pathology & Micro Biology
4. Basic obstetrics and Gynecology
5. General Principal of Hospital Practice and Patient Care

Practical:

- Anatomy & Physiology
- Basic Bio Chemistry, Pathology & Micro Biology
- Basic obstetrics and Gynecology
- O.T. Instruments & Technique
- Hospital Training 45 Days after final examination

Second Year

1. Entrepreneurship & Professional Management
2. Environmental &Bio Medical Waste Management
3. Patients Care education and Intensive Care unit
4. Introduction to Anesthesia Technology
5. Basic Anesthesia Technology
6. Applied Anaesthesia Technology

Practical:

- Patients Care education and Intensive Care unit
- Introduction to Anesthesia Technology
- Basic Anesthesia Technology
- Applied Anesthesia Technology
- O.T. Instruments & Technique
- Hospital Training 45 Days after final examination

Examination Scheme *for (1st Year)* Diploma in Medical Operation Theater Technology

Subjects	Hrs. Per Week			Theory Paper	Exam Hrs.	Maximum Marks						
						I.A.			Exam			Total
***D.O.T.T* First Years**	**L**	**T**	**P**			A	B	Total	A	B	Total	
Anatomy & Physiology	5	1	-	T	3	15	15	30	35	35	70	100
Computer & Communication Skills	2	1	-	T	3	15	15	30	35	35	70	100
Bio Chemistry & Pathology, Micro Biology	5	1	-	T	3	15	15	30	35	35	70	100
Basic obstetrics and Gynecology	4	2	-	T	3	30			70			100
General Principal of Hospital Practice and Patient Care	4	2	-	T	3	30			70			100

Practical:

	Hrs Per Week	Practical Paper	Exam Hrs.	Maximum Marks						
				IA			Exam			Total
Anatomy & Physiology	3	P	3	A	B	Total	A	B	Total	50
				8	7	15	18	17	35	
Bio Chemistry, & Pathology, Micro Biology	3	P	3	8	7	15	18	17	35	50
Basic obstetrics and Gynecology	3	P	3	15			35			50
O.T. Instruments & Technique	2	P	3	15			35			50
Hospital Training 45 Days after final examination	Operation Theatre Departments, CSSD						100			100
										800

All theory paper carries a maximum of 100 marks out of which 30 marks are for internal Assessment and 70 is for Council exam. All practical paper carries a maximum of 50 marks out of which 15 is

for internal Assessment and 35 is for Council Exam. And hospital training each 100 hundred marks.

PAPER- I

A (ANATOMY) , B (PHYSIOLOGY)

I. The human body as a whole Definitions, Subdivisions of Anatomy, Terms of locations and position, Fundamental Planes, Vertebrate structure of man, organization of the Body Cells and Tissues.

II. Locomotion and support. ***The Skeletal system:*** Types of bones, structures and growth of bones, Divisions of the skeleton, Appendicular skeleton, Axial skeleton, Bones of Upper Limb – Clavicle, Scapula, Humerus, Radius, Ulna Lower Limb – Femur, Hipbone, Sacrum Tibia, Fibula Vertebral Column, Ribs, Sternum, joint-classification, types of movements with examples.

III. Anatomy of the nervous system. ***Central nervous system:*** Spinal Cord Anatomy, functions, reflex- arc, Meninges, ***The Brain-*** Hind Brain, Midbrain, Forebrain: Cerebrum, Cerebellum Brain Stem: Brief structure, location, functions, and Peripheral nervous system (structure of neuron)

IV. Anatomy of circulatory system: ***Heart*** size, location, coverings, chambers & valves of heart, Blood supply, Nerve Supply, blood vessels, General plan of circulation, pulmonary circulation, Names of major arteries and veins and their positions, lymphatic system: general plan.

V. Anatomy of the respiratory system: Organs of Respiratory System, Conducting portion, ***Nose:*** nasal cavity, Para nasal air sinuses, Larynx, trachea, bronchial tree. **Respiratory portion:** Pleurae and lungs, Brief knowledge of parts and position.

VI. Anatomy of the digestive system: Components of Digestive system, alimentary tube, Anatomy of organs of digestive tube, mouth, salivary glands, stomach, intestine, liver, Billary apparatus, pancreas, Names and positions and brief functions,

VII. Anatomy of excretory system and reproductive system. Kidneys: location, gross structure & function structure of nephron, excretory ducts, ureters, Urinary bladder, Urethra gross structure & function. Male Reproductive System: Testis, Duct system. Female Reproductive System:

VIII. Anatomy of the endocrine system. Name of all endocrine glands their positions, Hormones and their functions- Pituitary, Thyriod, parathyroid, Adrenal glands, Gonads & Islets of pancreas.

IX. Histology-Epithelium, connective tissue, gland.

Anatomy Practical:

- Demonstration of bones identification and side determination upper limb-clavicle, scapula, humerus, radius, ulna, lower limb-temur, Hip bone, Tibia, Fibula, Vertebral Column, Ribs, Sternum, Sacrum
- Demonstration of heart.
- Demonstration of different parts of respiratory system and normal X-rays- lungs.
- Demonstration of the part of digestive system and normal X-rays- stomach, small intestine, large intestine, liver.
- Embalming of human cadavers for teaching purposes & social/ funeral embalming.
- Surface anatomy on cadaver.
- Demonstration of major vessels of the body-Aorta, subclavian, carotid, brachial, radial, ulnar, femoral, renal.
- Demonstration of major muscles of the body-limbs
- Demonstration of other organs—spleen, testis, uterus.

(B) PHYSIOLOGY:

General Physiology: Cell: Structure and function of a cell, Transport across the cell membrane Active transport, Passive Transport: Diffusion & Osmosis, Tissues: Definition, types, Nerve Body water and body fluids: Distribution and Ionic composition of body fluids The Membrane Potentials: Resting membrane potentials and Action Potential

Blood: Composition and functions of blood, Blood Cells: RBC, WBC, Platelets, Hemoglobin, Coagulation of blood (Clotting factors), Blood groups, Immunity,: Anaemia, Jaundice, Hemophilia

Gastrointestinal Tract: Structure and Functions Oral Cavity: Composition and functions of saliva, Mastication (chewing), Swallowing Stomach: Structure and Functions, Gastric juice, Gastric motility and emptying Pancreas: Structure and Functions, Composition and functions of pancreatic juice Liver: Structure and Functions Gall Bladder: Functions of gall bladder Bile: Composition and functions Intestine: Intestine juice and movements Balanced diet Applied aspect

Respiratory System: Air Passages: Function and structure, Functions of respiratory system, Mechanism of respiration (Inspiration and Expiration), Lung volumes and capacities Alveolar Ventilation, Dead space (Anatomical and Physiological) Transport of gases: Oxygen transport [Carriage of oxygen in

blood; Dissolved form & combined with hemoglobin], Oxygen hemoglobin dissociation curve, Carbon-di-oxide transport [Carriage of Carbon-di-oxide in blood]. Regulation of respiration: Nervous Regulation [Automatic control via Medullary and Pontine centers, Voluntary control of respiration], Chemical Regulation of respiration [Peripheral chemoreceptors (Carotid bodies and Aortic bodies) and Central (Medullary) chemoreceptors]. Hypoxia (Types of hypoxia), Dyspnea

Cardiovascular System: Properties of Cardiac Muscle Physiological structure and function of CVS (Valves, Pacemaker tissue,Heart sounds) Cardiac Cycle Heart rate Electrocardiography, Cardiac Output Arterial blood pressure Regulation of cardiovascular system

Excretory System: Nephrons: Cortical and medullary Urine formation Micturition Functions of kidney: Endocrine functions, Water balance, Acid-base balance

Endocrine System: Definitions and properties of hormones Pituitary Gland Anterior Pituitary – Six Hormones (GH, PRL, TSH, ACTH, LH, FSH) Growth Hormone (GH): Action and control, Applied (Dwarfism and Acromegaly) Prolactin (PRL): Action and control Posterior Pituitary ADH (Anti diuretic hormone): Action and control, Applied Oxytocin: Action and Control Thyroid Gland: Types of hormones (T3 and T4), Regulation of hormone secretion, Actions of thyroid hormone: On carbohydrate metabolism, On lipid metabolism, On growth and development, Effect on nervous system, Applied (Goiter, Hypothyroidism, Hyperthyroidism) Parathyroid, Calcitonin and Vitamin-D: Role of calcium in physiological processes, Hormones regulating calcium metabolism (Vitamin-D, PTH, Calcitonin), Applied: Rickets Adrenal Cortex: Actions of glucocorticoids, : Actions of Mineralocorticoids, Applied: Cushing's syndrome, Addison's disease, Sex hormones Adrenal Medulla: Actions of catecholamines, Pancreas: Hormones: Glucagon and Insulin, Applied: Diabetes Mellitus

Reproductive System Sex determination, Sex differentiation and Puberty Male Reproductive System: Testis: Structure and functions, Spermatogenesis, Structure of the sperm, Seminal fluid (semen), Endocrine functions (Testosterone) Female Reproductive System.Structure and functions, Ovary, Ovarian hormones (Estrogen, Progesterone) Menstrual cycle: Menopause Contraceptive measures

Central Nervous System Organization and functions of nervous system Brain: Cerebrum, Thalamus, Hypothalamus Brain stem: Midbrain, Pons, Medulla, Cerebellum Spinal Cord: Structure and functions Autonomic Nervous system (ANS) Cerebrospinal Fluid
Special Senses: The Smell: Olfactory receptors, Olfactory pathway The Taste: Taste Receptors (Taste buds), Taste Pathway The Ear: External ear, Middle Ear, Internal ear (Cochlea), Mechanism of hearing, Applied (deafness) The Eye: Parts of eye: Sclera, Choroid, Retina, Crystalline lens, photoreceptors (Rods and cones), Visual Pathway, Image formation, Accommodation, Lacrimal gland, Applied (Cataract, Glaucoma, Blindness)
Skin and Temperature: Structure and function of skin Temperature Regulation

Practical:

- Collection of blood
- Study of haemocytometer. Haemoglobinometry white blood cell count, red blood cell count,
- Determination of blood groups.
- Leishman's staining and differentiate WBC counts.
- Determination of packed cell value
- Calculation of blood indices, fragility test for R.B.C.
- Erythrocyte sedimentation rate (ESR)
- Determination of bleeding time.
- Determination of clotting time
- Blood pressure recording auscultation for heart sounds, artificial respiration determination of vital capacity.

Recommended Books:

1. Text books of Physiology. Author: Guyton (Arthor C). Prism publishers Bangalore.
2. Human Physiology. Author : Chaterjee (cc). Medical allied agency
3. Concise Medical physiology. Author : Choudhary (Sujit km.). New central books Kolkata.
4. Review Medical physiology. Author : Ganang. Application and Lange.
5. Human physiology. Author : Pro. A.K. Jain. Avichal Publishing Company.
6. Practical Physiology : Author : Prof. A.K. Jain, Arya Publishers.

PAPER II – COMPUTER & COMUNICATIONS SKILLS
A- COMMUNICATION SKILL
COURSE OUTLINE

COURSE DESCRIPTION: This course is designed to help the student acquire a
Good command and comprehension of the English language through individual
Papers and conferences.

BEHAVIOURAL OBJECTIVES:
The student at the end of training is able to
1. Read and comprehend English language
2. Speak and write grammatically correct English
3. Appreciates the value of English literature in personal and professional life.

INTRODUCTION:
Study Techniques
Organization of effective note taking and logical processes of
Analysis and synthesis Use of the dictionary
Enlargement of vocabulary
Effective diction\
Unit -1

1. Parts of Speech (Definition of all the sight parts along with examples and their use in language) Articles : Definite and indefinite Articles (a. an and the) Definition and its uses along with examples and personal, Reflexive, Emphatic , Demonstrative, Relative, indefinite, Interrogative and distributive pronouns
2. The Noun (Defining Noun along with types and categories): Gender; Number Case, The Adjective: Comparison, adjective used as nouns, positions of the adjective and its correct use of adjectives. The Verb Definition. Its forms, Verbs of Incomplete Predication.
3. Phrases (Defining it along with examples) : Adjective, Adverb and Noun Phrase and Clauses (defining it along with examples) : Adverb, Adjective and Noun Clauses.
4. The Sentence and its types, Simple, Compound and Complex , Subject and Predicate (Parts of a sentence), Transformation of sentences : Active and Passive Voice, Mood and Narration (Direct and indirect Speeches)

Unit-II

1. Words and Phrases: Word Formation (Perfix, Suffix), Idioms, Synonyms and Antonyms

2. Phonetics: Speech Sound, the phoneme, the syllable and IPA transcription

Business Correspondence:

Unit -1

1. Paragraph Writing : Introductory Remarks, Principals, The Writing of Single Paragraphs and Precis Writing.
2. Letter Writing, Quotations, Orders and Tenders: Inviting and Sending quotations, Placing orders and inviting tenders.

Unit –II

1. Notices , Agenda and Minutes
2. Application Letter: Importance and function, drafting the application, elements structure, preparing CVs.

UNIT -III: **APPLIED GRAMMAR:**

3. Correct usage
4. The structure of sentences
5. The structure of paragraphs
6. Enlargements of Vocabulary

UNIT - IV: **WRITTEN COMPOSITION:**

Precise writing and summarizing

Writing of bibliography

Enlargement of Vocabulary

Suggested Reading: English Grammar and Composition Wren and Martin. S. Chand & Company Ltd.

(B) Computer:

1. Computer Application

Characteristic of computers.

a. Input, output, storage unites.
b. CPU, Computer system.

2. Computers Organization

a. Central Processing Unit.
b. Control Unit.
c. Arithmetic Unit.
d. Instruction Set.
e. Register.
f. Processor Speed.

2.2 Memory

a. Main Memory.
b. Storage Evaluation Criteria.
c. Memory Organization.
d. Memory Capacity.

e. Random Access Memories.
F. Read Storage Devices.
i. Magnetic Disk
ii. Floppy and Hard Disk.
iii. Optical Disks CD-ROM
iv. Mass Storage

2.3 Input Devices

a. Keyboard.
b. Mouse.
c. Trackball.
d. Joystick
e. Scanner
f. Optical Mark Reader
g. Bar-Code Reader
h. Magnetic ink character reader.
i. Digitizer.
ii. Card reader.
iii. Voice recognition.
iv. Web cam.
v. Video Cameras.

2.4 Output Devices

a. Monitors.
b. Printers.
i. Dot Matrix Printers.
ii. Inkjet Printers.
iii. Laser Printers.
c. Plotters.
d. Computers Output Micro Files (Com).
e. Multimedia Projector.

3. Operating System

a. Microsoft.
i. An overview of different version of windows.
ii. Basic windows elements.
iii. File management through windows.
iv. Using essential accessories : System took Disk cleanup. Disk defragmenter, Entertainment, Games, Calculator. Imaging - Fax, Notepad, paint, WordPad. Recycle

Bin, Windows Explorer, Creating Folders, Icons.

4. **Word Processing:**

a. Word processing concepts.
b. Saving, closing, opening an existing document.
c. Selecting text, editing text.
d. Finding and replacing text.
e. Printing documents.
f. Creating and printing merged documents, Mail merge.
g. Character and paragraph formatting, page design and layout.
h. Editing and proofing tools; checking and correcting spelling.
i. Handing graphics.
j. Creating tables and charts.
k. Documents templates and wizards.

5. **Presentation Package:**

a. Creating opening and saving presentations.
b. Creating the look of your presentation.
c. Working in different views, working with slides.
d. Adding and formatting text, formatting paragraphs.
e. Checking spelling and correcting typing mistakes.
f. Making notes pages and handouts.
g. Drawing and working with objects.
h. Adding clip art and other pictures.
i. Designing slides shows.
j. Running and controlling a slide shows.
k. Printing Presentations.

Unit-1 : Use at Internet and E-mail :

1. Internet.
2. Websites (Internet sites).
3. The Mail Protocol site.

Unit-2 : Hospital Management System : Types andUses.

1. Hospital Management and System Package.

REFERENCE BOOKS :

1. Foundations of computing first edition, 2002. *Author :* P.K. Sinha and P. Sinha.
2. Microsoft office 2000 for windows, second Indian pint, person education. *Author :* S. Sagman.

Paper 3 (A) Biochemistry & (B) Pathology, Microbiology 1st year:

(1) Acids and Bases. Definition. definition of pH and its interpretation.

(2) Water and Solutions. Osmosis, Molarity, Molality, Normality. Buffer solution and their importance. pKa of buffer solution.

(3) Chemistry of Carbohydrates: Definition, Classification, Structural Isomerism, Optical isomerism. reactions.

(4) Chemistry of Proteins and Amino Acids: Definition, Structure and classification of Amino Acids. Essential amino acids. Definition, Structure of proteins, Functional classification of proteins.

(5) Chemistry of Lipids: Definition of lipids, Classification of lipids, Phospholipids, Gangliosides, Cerebrosides, Glycolipids, Lipoproteins (definition, classification and functions) Chemical reactions of Lipids.

(6) Chemistry of Nucleic acids: Structure of DNA, RNA classification and structure of the various types of RNA.

(7) Nutrition and Basal metabolism: BMI and its calculation, Specific dynamic action (SDA) , Nutritional requirements and their calculations. Protein energy malnutrition.

(8) Vitamins: definition, Classification, Uses in the body and deficiency diseases.

(9) Clinical biochemistry:(for MLT course only)

(a) Photometry: Laws of Photometry, absorbance, transmittance, Structure and components of a photometer. Types of photometry: colorimetry, spectrophotometry, flurometry. Choice of filters etc.

(b) Electrophoresis Principal types and applications.

Practical:

- Introduction to apparatus, instruments and uses of chemical balance.
- Preparation of solutions, calculation of molecular weights and Equivalent weights preparation of normal solution, molar solutions, percent solution and reagents Dilution techniques.
- Measurements of hydrogen ion concentration qualitative Analysis. Identification of carbohydrates, proteins and substances of biochemical Importance.
- Demonstration of colorimeter, spectrophotometer, perimeter, single pan balance.

- Disposal regulations, workplace hazardous.
- Specimen collection, identification, transport, delivery and preservation.
- Patient preparation for tests.
- Anticoagulants and preservatives
- Regulations and precautions regarding transport of biological specimens
- Preparation of high quality water
- pH determination
- Preparation of buffers and determination of pH
- Measurement of radioactivity
- Practical related to solvent extraction, Partition coefficient, Dialysis, Concentration,
- Desalting and Ultracentrifugation.
- Calibration of equipments and laboratory wares.
- Familiarization and usage of Colorimetry, specterophotometry, fluorimetry,
- flame photometry, atomic absorption spectroscopy, nephelometry, osmometry,
- Chemiluminesence ,ion selective electrodes, flowcytometry.
- Chromatography : - Paper, Thin layer, Gel filtration, Ion exchange, HPLC, GLC,
- Separation of various sugars, amino acids, lipids, drugs toxins etc. Urine aminogram.

(B) Pathology, Microbiology:

1 YEAR 70 HRS

UNIT 1 The Cell in health and disease 10 HRS

a. Introduction of pathology
b. Cellular structure and metabolism
c. Inflammation – Acute and Chronic
d. Derangement of Body Fluids and Electrolytes
   - Types of shocks
   - Ischaemia
   - Infection

UNIT 2 Body Fluid 20 HRS

a) Urine :
   - Method of Collection
   - Normal Constitutents
   - Physical Examination
   - Chemical Examination

b) Stool Examination :
- Method of Collection
- Normal Constituents and appearance
- Abnormal Constituents (Ova, Cyst)

c) C.S.F. Examination
- Physical Examination
- Chemical Examination
- Microscopy
- Celll Count
- Staining

d) Semen Analysis
- Collection
- Examination
- Special Tests

Human blood group antigens and antibodies

b) ABO Blood group systems
- Sub. – group
- Source of antigens and types of antibodies

c) Rh Blood group System
- Types of Antigen
- Mode of Inheritance
- Types of Antibodies

d) Other Blood grup Antigens

e) Blood Collection
- Selection and screening of donor
- Collection of blood
- Various anticoagulants
- Sotrage of Blood.
- Changes in Blood on Sotrage

UNIT 3 HISTOPATHOLOGY 25 HRS

a) Fixation of tissues
- Classification of Fixatives

b) Tissue Processing
- Collection
- Steps of fixation

c) Section Cutting
- Microtome and Knives
- Techniques of Section Cutting
- Mounting of Sections
- Frozen Sections

d) Decalcification

- Fixation
- Declacification
- End Point

e) Staining Dyes and their properties, H & E Stain, Special Stains

Histo Pathology ,Clinical Pathology, Haematology and Blood Banking

HistoPathology - Theory

- Introduction to Histo Pathology
- Receiving of Specimen in the laboratory
- Grossing Techniques
- Mounting Techniques – various Mountants
- Maintenance of records and filing of the slides.
- Use & care of Microscope
- Various Fixatives, Mode of action, Preparation and Indication.
- Bio-Medical waste management
- Section Cutting
- Tissue processing for routine paraffin sections
- Decalcification of Tissues.
- Staining of tissues - H& E Staining
- Bio-Medical waste management

Clinical Pathology – Theory

- Introduction to Clinical Pathology
- Collection, Transport, Preservation, and Processing of various clinical specimens
- Urine Examination – Collection and Preservation of urine. Physical, chemical, Microscopic Examination
- Examination of body fluids.
- Examination of cerebro spinal fluid (CSF)
- Sputum Examination.
- Examination of feces

Haematology – Theory

- Introduction to Haematology
- Normal constituents of Blood, their structure and function.
- Collection of Blood samples
- Various Anticoagulants used in Haematology
- Various instruments and glassware used in Haematology, Preparation and use

of glassware
- Laboratory safety guidelines
- SI units and conventional units in Hospital Laboratory
- Hb,PCV
- ESR
- Normal Haemostasis

Bleeding Time, Clotting Time, Prothrombin Time, Activated Partial Thromboplastin Time.

Blood Bank
Introduction
Blood grouping and Rh Types
Cross matching

Practical:

7. Introduction: Aim, basis, interpretation, safety in clinical pathology laboratory.
8. 2. Laboratory organisation : Instruments, glassware's, sample collection and specimen labeling, routine test, anticoagulants, reagents, cleaning of glassware, isotonic solution, standardization of methods, preparation of solution and interpretation of result, normal values.
1. Basic requirements for hematology laboratory.
2. Complete Blood Counts.
3. Determination of Hemoglobin.
4. TRBC Count by Hemocytometers.
5. TLC by Hemocytometer.
6. Differential Leukocyte count.
7. Determination of Platelet count.
8. Determination of ESR by wintrobes.
9. Determination of ESR by Westergerent's method.
10. Determination of PCV by Wintrobes.
11. Erythrocyte Indices – MCV, MCH, MCHC.
12. Reticulocyte count.
13. Absolute Eosinophil count.
14. Morphology of Red Blood Cells.
15. BT and CT, PT (prothrombin) time.
16. Demonstration of (MP), malaria parasite.
17. Bone marrow smears preparation and staining procedure Demonstration.
18. ABO Blood grouping, RH typing and cross match.

19. Performance of direct and indirect combs test, red cell agglutination test (screening Paul bunnel test).
20. Blood donor selection and screening.
21. Blood collection and preservation, principal of clearing and preparing transfusion bottle and tubing sets – preparation and Transfusion reaction and their investigations.

PRACTICAL BLOOD BANK:

1. **Blood Bank Administration**
   a) Record Keeping
   b) Computerization in blood transfusion services.
   c) Blood grouping ABO
   d) PH typing various techniques.
2. **Cross Matching**
   a) Tube test
   b) Slide Test
   c) DU Test
   d) Sub Grouping Test
3. **Comb's Test**
   a) Direct comb's test
   b) Indirect comb's test
4. Compatibility Testing for blood transfusion cross matching test.
   a) 5% cell suspension and 10% cell suspensions.
   b) HIV and AIDS demonstration.

Clinical Pathology:

- Introduction: Aim, basis, interpretation, safety in clinical pathology laboratory.
- Laboratory organization : Instruments, glassware, sample collection and specimen labeling, routine test, anticoagulants, reagents, cleaning of glassware, isotonic solution, standardization of methods, preparation of solution and interpretation of result, normal values.
- Urine routine examination normal / abnormal constituents of urine.
- C.S.F. and other body fluid examination.
- Semen Analysis.
- Sputum test.
- Different types blood test.
- Stool routine examination.

Recommended text books and reference books (Latest Edition)

1. Hand book of Blood Transfusion Therapy. *Author* : J.A.F.

Napier. *Publisher* : John Wiley & Sons, Chichester, England
2. Blood Banking and Transfusion Medicine Basic Principles practice. *Author* : Christopher D., Hill Yeretal. *Publishers* : Churchile Livingstone, Philadelphia.
3. Test book of Blood Transfusion Banking and Transfusion Medicine. *Author* : Sallyv. Rhdman. *Publisher* : W.B. Sauders Company, Philadelphia.
4. Practical Haematology. *Author* : Sir John Dalie. *Publisher* : Churevill, London.
5. Test Book of Medical Laboratory Technology. *Author* : Praful Godkar & Ramnik Sood. *Publisher* : Bhaliani Publication House, Mumbai.
6. Test books of laboratory technology. *Author* : Praful Godkar.
7. Todd and Sanford Clinical diagnosis and management by laboratory methods. *Author* : Johan Bernard Henry.
8. Practical Pathology. *Author* : Harsh Mohan.
9. Medical laboratory technology a procedure normal for routine. *Author* : Ramnik Sood.

(B) Microbiology:

Theory

Unit I

General microbiology — **4 hrs**

- Introduction & history of microbiology
- Morphology and physiology of bacteria
- Sterilization and disinfection

Unit II

Immunology — **5 hrs**

- Antigen and antibodies
- Antigen – antibody reactions
- Structure and functions of immune system
- Immune response
- Hypersensitivity

Unit III

Systemic bacteriology — **15 hrs**

- Staphylococcus
- Streptococcus
- Pneumococcus
- Corynebacterium
- Neisseria
- Clostridium

- Enterobacteriaceae : Escherechia ,Kleibsella, Proteus
- Salmonella
- ShigellaPseudomonas
- Vibrio
- Mycobacterium
- Spirochete

Unit IV

Virology **11 hrs**

- Morphology and Replication of viruses
- Physiochemical characteristics of the viruses
- Classification of virus
- Laboratory diagnosis of viral infection
- Herpesvirus and adenovirus
- Picorna Virus- Polio
- Myxovirus- Influenza
- Arbovirus- Chickengunia & Dengue
- Hepatitis virus
- Rhabdovirus
- HIV

Unit V

Mycology **6 hrs**

- Morphology and structure of fungi
- Classification of fungi and Cultivation of fungi
- Laboratory diagnosis of fungal infection

Fungal infections

- Superficial mycosis
- Subcutaneous mycosis
- Systemic mycosis
- Opportunistic fungal infection

Unit VI

Parasitology **9 hrs**

- Introduction to parasitology with their classification

Protozoa

- Entamoeba histolytica
- Giardia lamblia
- Leishmania donovani (kala azar)

Helminthes

Cestodes

- Tenia solium & Tenia saginata

- Echhinococcus granulosus

Nematodes

- Ascaris lumbricoides
- Ancylostoma duodenale
- Wucheria bancrofti
- Enterobius vermicularis & Trichuris trichuria

Practical

Bacteriology **17 hrs**

- Universal precautions
- Collection and transport of clinical specimen
- Compound microscope (care and operation)
- Demonstration of sterilization of equipments- Hot air oven, bacterial filters
- Preparation of bacterial smear and staining- Gram's, Acid- fast, Staining of bacterial spores, flagella capsule, Albert stain, spirochaetes
- Preparation of commonly used culture media, nutrient broth, nutrient agar, blood agar, Chocolate agar, Mac conkey medium, LJ medium,SDA, Robertson cooked meat media,
- Study of clony charecters ,biochemical test for identification of bacteria, preservation of stock culture of bacteria
- Antibiotic susceptibility test – different in vitro methods for antibiotic sensitivity testing
- Visit to hospital for demonstration of biomedical waste management
- Anaerobic culture methods,
- Quality control of media and reagents etc.

Parasitology

Practical parasitology **4 hrs**

- Examination of stool for parasites
- Examination of blood & bone marrow for parasites
  Serological diagnostic methods, Skin test.

Immunology practical **6 hrs**

- Collection of blood by venepuncture, separation of serum and preservation of serum for short and long periods.
- Performances of serological tests

(a Bacterial slide agglutination
(b WIDAL,VDRL,CRP
(c Pregnancy test
(d ASLO, CRP and RF

(e ELISA
- Skin test

(a MT Test

Mycology practical: **3 hrs**
- KOH and LPCB preparation
- Staining techniques
- Culture of fungi
- Slide culture

Total theory hours 50 hrs
Total practical hours 40 hrs

Paper 4- BASIC OBSTERTRIC AND GYNAECOLOGY

To work as Operation Theatre Technician the introductory knowledge of Obstetrics & Gynaecologyh is essential hence this subject is introduced to give brief on introductory knowledge ; which helps the technician to take some precautionary measures to keep required operation tools ready accordingly in advance.

OBJECTIVE : Student should be able to :
1. Understand the type of delivery and disorder
2. Keep the instruments and tools required ready well in advance

SYLLABUS:
1. Pregnancy
2. Normal delivery forceps delivery twin pregnancy
3. Episiotomy caesarian delivery
4. Birth control methods and contraception
5. Medical termination of pregnancy
6. Anatomy of female sex organs
7. Gynecological examination and diagnosis
8. Disease of vulve disease of vagina STD in female
9. Disorders of menstruation
10. Prolapsed uterus Fibromyomas of uterus endometriosis various ovarian tumors
11. Gynae examination instruments speculum & dialator
12. Instrument of common gynecological and obstetrics procedures or surgery

Practical:
- Identification of instrument and their specific use in the surgery
- Surgical assistance in the Obstetrics & Gynaecological operations

Instrument for normal delivery & caesarian section MTP
Hysterctomy preparation of Physiological changes of pregnancy

- Anaesthesia in early pregnancy
- Antenatal assessment of the pregnant woman
- Medical diseases complicating pregnancy
- Pain relief in labour
- Anaesthesia for operative obstetrics
- Emergencies in obstetrics
- Neonatal resuscitation

Paper 6 General Principal of Hospital Practice and Patient Care

Suggested number of teaching hours 100 including tutorial and demonstrations. This section is intended to emphasis to the student technologist the importance of patient welfare. Many of the points included in this section may be considered during the teaching of other subjects also but it is strongly urged specific teaching and as much practical demonstrating and instruction as possible should be given in this section.

Modern hospital treatment is based on team work, it is essential that the student should appreciate the technologist role and that the importance of co-operation with wards and other departments.

The students should be attached to wards or the accident and emergency department for a definite training period the length of time being suited to the individual hospital.

Hospital procedure :Hospital staffing and organization records relating to patients and departmental statistic professional attitude of the technologist to patient and other members of the staff medico legal aspects accident in the department appointment organization minimizing waiting time out patient and follow up clinics stock taking and stock keeping.

Care of the patient First contact with patients in the department management of chair and stretcher patients and aids for this management for the unconscious patient elementary hygiene personal cleanliness hygiene in relation to patient (for example clean linen and receptacles nursing care temperature pulse and respiration essential care of the patient who has a tracheotomy essential care of the patient who has a colostomy bedpans and urinals simple application of a sterile dressing.

First aid : Aims and objective of first aids wounds and bleeding dressing and bandages pressure and splints supports etc Shock insensibility asphyxia convulsions resuscitation use of suction

apparatus drug reactions prophylactic measure administration of oxygen electric shock burns scalds hemorrhage pressure points compression band Fracture splints bandaging dressing foreign bodies poisons.

Infection: Bacteria their nature and appearance spread of infections auto infection or cross infection the inflammatory process local tissue reaction general body reaction ulceration aspects and antisepsis.

Principles of asepsis Sterilization methods of sterilization use of central sterile supply department care of identification of instruments surgical dressings in common use including filament swabs, elementary operating theatre procedure setting of trays and trolleys in the radiotherapy department (for study by radiotherapy students only)

Departmental procedures : Department staffing and organization records relating to patients and departmental statistic professional attitude of the technologist to patient and other members of the staff medico legal aspects accident in the department appointment organization minimizing waiting time out patient and follow up clinic stock taking and stock keeping.

Drugs in the department: Storage classification labeling and checking regulations regarding dangerous and other drugs units of measurement special drugs ant depressive antihypertensive etc.

BOOK FOR STUDY:

Deeley-A guide to Radiotherapy nursing Living stone

Care of patient in diagnostic Radiography Chesney & Chesney

Chesney's Care of the patient in Diagnostic Radiography Pauline J.Culmer.

Aid to Tray and Trolley Setting Marjorie Hougton

First Aid-Haugher & Gardner

A guide to Oncology nursing (Livingstone) Deeley

O.T. Instrument & Technique:

Armamentarium: Cox and storing in O.T, Sterlization and disinfections

GENERAL SURGICAL PRINCIPLES AND INSTRUMENTS

The surgical patient, operation

room technique .

INSTRUMENTS USED FOR PREPAIRING SURGICAL

Cheatles forceps,rampely,s sponge holding forceps mayo's towel chip,esmach's bandage,

Simple tourniquet, pneumatic tourniquet:

INCISION MAKING METHOD AND INSTRUMENTS : Bard parker knife handle, major abdominal
incision, artery forceps and their types instruments used in homeostasis, Kocher's forceps,
electric cautery.
RETRACTORS: Single hook retractors , Czerny's retractor, s, nerve hook
retractors, Morris retractors, deaver's, retractors.
WOUND MANAGEMENT Seissors and its types sucking material and techniques,disinfectants and
irritants, dressing procedures ,different types of bandages, surgical needle & needle holders,
various types of suture material
Identification & Demonstration of working of the equipment

Anesthesia Equipment

1 Boyle's Machine & it's functioning
2 Boyle's vaporizer
3 Magill's breathing circuit, Bains breathing circuit, pediatrics anesthesia circuit
4 Gas cylinders and flow meters
5 Carbon dioxide absorption contester
6 Suction apparatus-foot operated, electrically operated
7 Ambubag laryngoscope hndotracheatubes
8 Catheters,face masks, venti mask
4 Pre-anesthetic mediation
5 Local Anesthetic agents
6 Spinal Anesthetic agents
7 General Anesthetic agents
Identification & demonstration of the working of equipments

Second Year

Examination Scheme

Subjects	Hrs. Per Week			Theory Paper	Exam Hrs.	Maximum Marks		
	L	T	P			I.A.	Exam	Total
Entrepreneurship & Professional Management	2	1	-	T	3	15	35	50
Environmental &Bio Medical Waste Management	2	1	-	T	3	15	35	50
Patients Care	4	3	-	T	3	30	70	100

education and Intensive Care unit								
Introduction to Anesthesia Technology	3	2	-	T	3	30	70	100
Basic Anesthesia Technology	3	2	-	T	3	30	70	100
Applied Anesthesia Technology	3	2	-	T	3	30	70	100

Practical:

Subjects	Hrs Per Week	Practical Paper	Exam Hrs.	Maximum Marks		
				IA	Exam	Total
Patients Care education and Intensive Care unit	4	P	3	15	35	50
Introduction to Anesthesia Technology	4	P	3	15	35	50
Basic Anesthesia Technology	3	P	3	15	35	50
Applied Anesthesia Technology	1	P	3	15	35	50
O.T. Instruments & Technique	2	P	3	15	35	50
Hospital Training 45 Days after final examination	Operation Theatre Departments, CSSD				100	100
G. Total						**850**

Paper I Entrepreneurship & Professional Management
Common to All Branches of Para medical Programmers

As the opportunities for wage employment are reducing day by day, Govt. of India and State Govt. directed to develop entrepreneurship among the student. Entrepreneurship training is essential to make aware the student of different branches of diploma courses about the scope of employment outside the Govt. Sector. It will equip them the necessary skills and training for setting up a small scale enterprises in their own area of study. This course includes the procedure how to select proceed and start the small scale enterprises. To achieve the target and goal in a organization it is essential to ordinate the entire system. For this

the knowledge of principles of management personnel management and financial management is required

1. Entrepreneurship :

Definition basic concept need, scope and characteristics of entrepreneurship.

Women entrepreneurship

Assistance to small scale enterprises from national level organization like SIDO, NSIC NRDC KVIC

Assistance to small scale enterprises from State level organization like DOI,DIG RFC RHDC Pollution Control Board Rajasthan Khadi &

Facilities to omen entrepreneurs.

Schedule-6

[See regulation 41(2)]

Syllabus of Diploma in Dialysis Technology

The Course shall include the respective subject as given in the table below, the minimum number of hours to be devoted to each subject-lectures and practical shall not be than those noted against them

Sl No	Subject	Allotment of Marks in Theory	Oral & Practical
		(Including Clinical Assessment)	
1.	Paper I: Normal Renal Function and its derangement	100	25 + 75
2.	Paper II: Fundamentals of Dialysis Technique	100	25 + 75
3.	Paper III: Managing Dialysis Procedure	100	25 + 75
4.	Paper IV: Advances in Dialysis	100	25 + 75
	Total	**400**	**400**

all written examinations shall be of three hours duration.

3. Examinations:

Sl No	Subject	Allotment of Marks in Theory	Oral & Practical
		(Including Clinical Assessment)	
1.	Paper I: Normal Renal Function and its derangement	100	25 + 75
2.	Paper II:	100	25 + 75

	Fundamentals of Dialysis Technique		
3.	Paper III: Managing Dialysis Procedure	100	25 + 75
4.	Paper IV: Advances in Dialysis	100	25 + 75
	Total	**400**	**400**

First Year

Theory : 60 Teaching Hours:

Anatomy & Physiology
(Normal kidney structure and functions): 4 hours
Derangement of kidney functions
(aetiology, clinical manifestation, diagnosis of acute and chronic renal failure) : 8 hours
Dialysis - the concept
(Brief history, definition mechanism) : 4 hours
Components of Dialysis
(Access, blood flow, anticoagulant, dialsate) : 4 hours
Hemodialysis - Basics
(Blood circuit tubing pump, dialyzer, flow rate, dialysate circuit, concentrates, delivery systems, flow rate) : 12 hours
Anticoagulation (Heparin, alternatives to Heparin, regional no anticoagulation) : 8 hours
Vascular access (Temporary, Permanent) : 8 hours
Dialysis water and water treatment : 4 hours
Dialysis and Dialyzer (including reuse) : 4 hours
Hemodialysis machine : 4 hours

Practical : 180 Teaching Hours:

A. Demonstration : (20 x 30 = 60 Teaching Hours)
Demonstration of

- A Hemodialysis unit
- Demineralisation plant
- Machine
- Intiation of Dialysis
- Conduction of Dialysis
- Dialysis – closure
- Washing, cleaning, reuse
- Maintenance of Hygiene in Dialysis unit
- Access – core
- Anticoagulation

B. Actual participation in Dialysis Procedure : 120 Teaching Hours including clinical evaluation of patient

Second Year

A. Complications of Hemodialysis : 12 hours

- Access related complication
- Dialyzer related complication
- Dialysate related complication
- Anticoagulant related complication
- Machine/Blood Pump associated complication
- Special type of complication
- Maintenance of hygience in Dialysis unit
- Acces – core
- Anticoagulation

B. Doses of Hemodialysis : 8 hours

- Duration, index, clearance
- Middle colecules Ura reduction ration
- Urea kinetic modeling, Dialysis adeqacy

C. Doses of Hemodialysis : 8 hours

- Continuous Dialysis : 10 hours
- Continuous venovenous hemofiltration
- Continuous hemoduafiltration
- Continuous slow hemodialysis
- Component access, tubing, filter, replacement, fluid, Antigoagulation, flow rate

D. Peritoneal Dialysis : 30 hours

- History, Perotioneal physiology, kineties technique, catheter, dialysate fulid, insertion procedure, drainage, complication.
- Continuous peritoneal dialysis procedure, dose.

Practical : 160 Teaching Hours :

- Actual conduction of Hemodialysis : 140 hours
- Actual conduction of peritoneal Dialysis : 120 hours
- Clinical assessment of patients

List of Books Prescribed

- **Handbook of Dialysis**
  By John T. Daugirdas (Editor), Peter G. Blalke (Editor), Todd S. Ing (Editor)
- **Actual conduction of peritoneal Dialysis : 120 hours**
  By Judith Z. Kallenbach MSN RN CNN (Author)
- **Peritoneal Dialysis : From basic concepts to clinical excellence**

By C. Ronco, Carlo Crepaldi, Dinna N. Cruz

- **Basic Clinical Dialysis**
  By David Harris, Grahame Elder, Lukas Kairaitis, Gopala Rangan
- **Replacement of Renal Function by Dialysis**
  By John P Meher
- **Nutritional Considerations in Indian Patients on PD**
  By Aditi Nayak, Akash Nayak, Mayoor Prabhu and K S Nayak
- **Chronic Kidney Disease, Dialysis, and Transplantation**
  BY: Mohamed H. Sayegh (Author), Jonathan Himmelfarb (Author), Mohamed Sayegh (Author), Jonathan, M. D. Himmelfarb (Author), Mohamed H., M.D. Sayegh (Author)
  Publisher : W.B. Saunders Company

Schedule-7

[See regulation 41(2)]

Syllabus of Diploma in Orthopedic Technology

Paper Code	SUBJECTS
	1st Year
Paper I	Human Anatomy and Physiology
Paper II	Pathology of Muscle & Bones
Paper III	Orthopedics and traumatology
Paper IV	Physics of Orthopedic Instrument & its Maintenance
Paper V	Practical & Viva Voce
	2nd Year
Paper VI	Orthopedic Procedure & Implant Technology
Paper VII	Operation room techniques & its Management
Paper VIII	Patient Care
Paper IX	Biomechanics & Physiotherapy
Paper X	Practical & Viva Voce

1st Year

PAPER I - Human Anatomy and Physiology

Introduction to the body as a whole
The cells, tissues of the body
The cell: Structure, multiplication.
Tissue: Types, structure, characteristics, functions
Epithelium: Simple, Compound
Connective: Areolar, adipose, fibrous, elastic, Cartilage, blood and bone
Muscle: Striated (Voluntary), Smooth (Involuntary, Cardiac)
Nervous tissue
Fibrous tissue

Cell regeneration
Membranes: Mucous, Serous, Synovial
Osteology (including whole skelton, bones and joints)
Development of bone (ostogenesis) : Cells inv
Types and functions of bone, Types of joints and various movements.
AXIAL Skelton:
a. Skull: Cranium, face, air sinuses
b. Vertebral column: regions, movements and characteristics
c. Sternum
d. Ribs
Appendicular skelton: Bones involving -Shoulder girdle and Upper limb, Pelvic girdle and lower limb, Healing of bones: cellular activity, Factors that delay healing, Diseases of bones and joints.
Musculoskeletal System
Anatomy of Joints & its function.
The Respiratory System:
a. Organs: Position and structure
b. Nose and nasal cavities
c. Functions: respiratory, Olfactory
d. Pharynx
e. Larynx: Functions - respiratory, vocal
f. Trachea, Bronchi, lungs: lobes, lobules, pleura
Respiratory functions: External and internal respiration, common terms relating to disease and conditions of the system.

PAPER II -Pathology of Muscle & Bones Joint Conditions

Backache and Neckache
Orthopaedic Conditions in Childhood
Minor &Adult Disorders
Common Fractures

PAPER III -Orthopedics and Traumatology

Fractures and Dislocation:
definition,
fractures healing,
types of fractures,
General principles of treatment,
Common fractures of upper and lower extremities.Skull,Spine
Radiology - Basic Interpretation Skills

PAPER IV -Physics of Orthopedic Instrument & its Maintenance

General principles of Operative procedures and orthopedic appliances.
Surgical diathermy,
Suction machine,
OT table,
Various lightening systems,
Fumigation.
Orthopedic Instruments
OT table and attachments,
Autoclave instrument
Handling and care
C-Arm Image Intensifier (Conventional & Digital)

2nd Year

PAPER VI -Orthopedic Procedure & Implant Technology

History of plaster of Paris,
Properties of plaster of Paris,
Preparation of plaster of Paris bandages,
Different types of slabs and casts,
Correct method of Appling slabs and casts,
Special plasters – FCB, PTB etc.
Plaster removal,
Plaster cutter and associated instruments.
Casting & Splinting
Braces and Traction
Types of Plaster its advancement
Dressing and Dressing room techniques:
Introduction: general environment and cleanliness.
Dressing table and trolley, drums: preparation contents and maintenance,
Dressing material: types, preparation, use and sterilization.
Different types of solutions used for dressing viz hydrogen peroxide, providing
Iodine etc.
Medicated dressings vizSofratulley, collagen etc.
Basic principles of bandaging.
Principles involved in the design, fabrication and use of orthopedic implants.
Orthopedic Implant Mechanics and Materials
Biocompatibility, strength, lubrication and interfacing.
Hip Joint Replacement
Knee Joint Replacement

Ankle Joint Replacement
Fractures, Fracture Healing and Non-Surgical Fixation
Surgical Fracture Fixation

PAPER VII Operation room techniques & its Management

Reception of patients in OT premises,
Scrubbing, dressing,
Tourniquet and it's application,
Growing, painting and draping,
OT fumigation and UV lights,
Autoclaving.
Preparation for Anesthesia.
Reception of patient,
Shifting, positioning for anesthesia,
Check out procedure.
Sterilization:
Definition,
Classification of sterilizing agents,
Physical methods of sterilization,
Importance of sterilization.
Sutures:
Absorbable: Surgical catgut, collagen sutures, synthetic absorbable utures etc.
Nonabsorbable: Silks, cotton, polyamide, polypropylene, stainless steel etc.

PAPER VIII :-Patient Care

Fundamentals of patient care
Definition,
Introduction: general environment and cleanliness.
Proper disposal of ward waste,
Beds: bed making, posturing in bed, special beds viz pneumatic, waterbeds.
Hygienic care: care of skin, care of hairs and nails, oral hygiene, care of pressure
Points. Exercise and activity: Principles of good posturing and body behavior,
Moving and lifting patient, posture changes assisting patient in attaining .
Ambulatory status.
Promoting urinary and intestinal eliminations: offering urinal, bedpan,
Observations of urine and faeces.Maintaining nutrition.

Maintaining fluid and electrolyte balance.
Maintenance of input/output records.
Oral intake measures.
Management of acutely injured:
First aid,
Transport,
Resuscitation methods.
Infection Control Procedures
Legal & Ethical Responsibilities
Medical Errors

PAPER IX Biomechanics& Physiotherapy

Biomechanics:-Mechanics of the human musculoskeletal system. Biomechanics of Skeletal: - basic properties and mechanics of bone, articular cartilage, tendons and ligaments. Biomechanics of the Lower Limb, major joints of the lower limb,
Including the bio-mechanics of walking.
Upper Limb and Spine: - detailed examination of the forces acting on the spine during lifting.
Physiotherapy of Spine, Upper Limb (Shoulder Joint, Elbow joint, wrist Joint) ,Lower limbs (Knee Joint, Ankle Joint,Phalynges etc.) Rehabitalation of Patient after recovery from
.trauma/injury/operative procedure.

Schedule-8

[See regulation 41(2)]

SYLLABUS OF DIPLOMA IN ECG TECHNOLOGY

1st Year

S. No.	Course Title	Theory (duration/ hours week)	Practical (duration/ hours week)
1	Communication skills in English	2	2
2	Computer Application	2	2
3	Human Anatomy & Physiology	4	-
4	Clinical Cardiology	4	-
5	Pathology & Terminology	4	-
6	ECG instrument & Maintenance	-	15
7	Hospital Training or 45 days (After the final exam)		

4 Delivering short discourses :

- About oneself
- Describing a place, person, object
- Describing a picture, photo

5 Group discussion:

- Developing skill to initiate a discussion (how to open)
- Snatching initiative from others (watch for weak points etc.)

6 Expand a topic- sentence into 4-5 sentence narrative:

Computer applications:

Fundamentals of Computer Science

Unit	Contents
1	Computer Application- Characteristics of computer, input, output, storage units. CPU Computers system.
2	Computer organization – Central Processing unit, Control unit, Arithmetic unit, Instruction set, register, Processor speed
3	Memory – Main Memory, Storage evaluation criteria, memory organization, memory capacity. Random Access memories, Read Only Memory, Secondary storage devices, Magnetic Disk, Floppy and Hard Disk, Optical Disks CD-ROM, Mass storages devices.
4	Input devices- Key Board, Mouse trackball, Joystick, scanner, optical mark reader, barcode reader, magnetic ink character reader, digitizer, Card reader, voice recognition, Web cam, Video Cameras.
5	Output- monitors, printers, dot matrix printers, inkjet printers, inkjet printers, laser printers, plotters and computers out micro files (Com), Multimedia Projector,.
6	Operative System – Microsoft Windows, An overview of different version of windows, Basic windows elements, File managements through windows, using essential accessories: system tools disk cleanup disk defragmenter, Entertainment Games, Calculator, Imagine-Fax, Notepad, Paint, Word Pad, Recycle bin, windows Explorer, Creating folders icons.
7	Word processing – Word processing concepts, saving, closing opening and existing documents, Selecting text, edition text, Finding and replacing text, printing documents, Creating and printing merged documents, Mail merge, character and paragraph formatting, page designs and layout, Editing and proofing tools checking and correcting spelling, Handling graphics, Creating tables, and charts, Documents templates and wizards.
8	`Presentation package- creating opening and saving presentation, creating the look of your presentation, working in different views working with slides, adding and formatting text, formatting paragraphs, Checking spelling and correcting typing mistakes, making notes pages and handouts, Drawing and working with objectives, adding clip art and other picture, Designing slides

	shows, Running and controlling a slide show, Printing Presentations.
9	Use of internet and Email, Internet, Websites (Internet sites), The Mail protocol suite.
10	Hospital Management – Types and Uses, Hospital management & System Package, Advanced Hospital management System X O Hospital management System, LCS Hospital Management information System, NVISH Hospital Management System, CSPM- Hospital Management system.

Human Anatomy & Physiology

Unit	Contents
1	The Human Body- Definitions, Sub-divisions of Anatomy, Terms of location and position, Fundamental planes, vertebrate structure of man, organization of the body cells, Tissues.
2	The Skeletal System – Types of bones, structure and growth of bones, Division of the skeleton Appendicle skeleton, axial skeleton name of all the bones and their parts, Joints classification, types of movements with examples.
3	Anatomy of Circulatory System- Hearts Size, position coverings, Chambers, Blood supply, never supply, the blood vessels, general plan of circulation, pulmonary circulation, names of arteries and veins and their position – lymphatic system general plan.
4	Anatomy of the Respiratory System – organs of respiratory, larynx, trachea, bronchial tree, Respiratory portion, pleurae and lungs, Brief Knowledge of parts and position.
5	Anatomy of the Digestive system- Components of Digestive system, Alimentary tube, anatomy of organs of digestive tube, mouth, tongue, tooth, salivary glands, liver, bleary apparatus, pancreas. Names and position and brief functions.
6	Anatomy of the Nervous System – Central nervous system, the brain, hind brain, midbrain, forebrain, brief structure, locations, and peripheral nervous system, spiral card, anatomy, functions, reflex – Arc, ménage, injuries to spinal card and brain.
7	Anatomy of the endocrine system – name of all endocrine glands their position, hormones, and their functions – pituitary, thyroid, parathyroid, adrenal glands, gonads & islets of pancreas.
8	Anatomy of Excretory System and reproductive system – Kidneys location, gross structure, excretory ducts, urethras, urinary bladder, urethra male reproductive system, Testis, duct system, Females reproductive system, ovaries Duct System, accessory organs,
9	Blood – Definition, composition, properties and function of blood, haemogram (RBC, WBC, Platelet count, HB concentrations), function of plasma proteins haemopoiesis, blood Group – ABO and

	RH grouping, coagulation & Anticoagulants, Anemia causes effects & treatment, Body fluid compartments, composition, Immunity Lymphoid tissue, clotting factors, mechanism of blood clotting, Disorders of white blood cells, Disorders of platelets, Disorders of clotting.
10	Cardio vascular system – function of cardiovascular system, structure of cardiovascular system, Cardiac cycle, functional tissue of heart & their function, Cardiac output, E.C.G. Blood pressure, Heart Rate.
11	Respiratory system – Function of respiratory system, functional (physiological), Anatomy of Respiratory system, mechanism of respiration, lung volumes & capacities, transport of respiratory gases.
12	Digestive system – function of digestive system, functional anatomy of digestive system, composition and function of all digestive juices, movements of digestive system (intestine), Digestion & absorption of carbohydrate, proteins & fats.
13	Function of nervous system – neuron – conduction of impulses, factors effecting, synapse transmission, reception, reflexes, ascending tracts, descending tracts, function of various parts of the Brain, cerebro spinal fluid (CSF), composition, function & circulation, lumbar puncture, Autonomic nervous system-and its types function of (ANS)
14	Special Senses – Vision – Structure of Eye, Function of different parts Refractive errors of and correction. Visual pathways, color vision & tests for color blindness. Hearing, structure and function of ear, mechanism of hearing, test for hearing (deafness).
15	Muscle Nerve Physiology – Type of muscle, structure of skeletal muscle, sarcomee, neuromuscular junction & transmission, excitation & contraction coupling (mechanism of contraction)
16	Structure and function of skin – body temperature, fever regulation of temperature.
17	Excretory system – excretory organs, kidneys, function, nephorn, juxta glomerclar apparatus, renal circulation, mechanism of urine formation, mechanism of maturation, cystomatrogram, diuretics, artificial kidney.
18	Structure and function of reproductive – Male reproductive system, spermatogenesis, testosterone, female reproductive system, ovulation, menstrual cycle, cogenesis, test for ovulation, estrogen & progesterone, pregnancy test, parturition, contraceptive, lactation, Composition of milk, advantages of breast feeding.

Clinical Cardiology

Unit	Contents
1	Introduction & History of ECG.

2	Cardiac Electrical Activity – ECG (Electrocardiogram), Anatomy orientation of heart, Cardiac cycle, Cardiac impulse formation & Conduction, Recording long axis cardiac electrical activity, recording short axis cardiac electrical activity.
3	Recording the Electrocardiogram, evolution of frontal plant leads, Transverse plane leads, correct & incorrect lead placement, Electrocardiography lead placement, Display of 12 standard electrocardiogram leads.
4	In perpetration of normal ECG, Electro- cardio- graphic features, Rate & regularity, P wave, PR interval, QRS complex, ST segment, T wave, U wave, QTC interval, Cardiac rhythm.
5	Interval measurement, horizontal measurement, vertical measurement, ECG wave's interval & segments.
6	Heart Rate – Introduction, Measuring of heart rates using caliper.
7	Electrical Axis – Determining electrical axis, normal axis, RAD, LAD, Methods of electrical axis estimation.
8	Assessment of arrthymias, Supraventricular v/s ventricular rhythms, Rhythmic Disorders.
9	CAD (Coronary Artery Deases), effects of MI injury & infraction on ECG, manifestation of Q wave infarction, manifestation of non-Q wve infarction, anteriord infarction, Antero-Lateral infarction, inferior infarction.
10	Chamber Enlargement & Hypertrophy, Conduction defect, AV block First degree, AV block second degree, AV block third degree, AV block bundle, Branch Block, RBBB, LBBB chamber enlargement, RAE LAE, Hypertrophy, Right ventricular hypertrophy Left ventricular hypertrophy Biventricular hypertrophy.

Clinical Cardiology – (Practical)

Unit	Contents
1	Basic Principals of instruments, Recording the electro cardiogram, Correct & incorrect lead placement, chest leads, Lims leads, Display of 12 standard lead ECG, Recognition & interrelation of ECG, Equipment, usage (Pediatrics/Adults.)
2	Indication, Contraindication, Repair & maintrnatcle, (operations, calibrations) and servicing, ECG Monitoring in ICCU patient, Recording of holter/stress ECG, Ambulatory BP. Monitory, operation of 2-D Echo/M. mode Doppler and CFM system to its maintenance, operation of TEE and its maintenance, ICCU monitoring, practicable in assisting Temporary- pace-maker/ permanent pace maker, coronary Angiography, Coronary Angio Plasty, Balloon Plasty, CRT, CRTD etc.

Pathology & Terminology

Unit	Contents
1	Introductory Pathology – Cellular adaptation and cell death, inflammation and repair, infection, circulatory disorders, immune defense, genetics of disease, neoplasia, Cell injury and adaptation, Atrophy, hypertrophy, metaphase, hyperplasia, classification of tumors, premalignant lesion, Type of inflammation & system manifestations of inflammation, Disorders of vascular flow & shock (Brief introduction), Oedema, hyperemia or congestion, thromboses, embolism, infarction shock, ischemia, Over hydration, Dehydration, The Response to infection, Categories of infectious agents, host barriers to infection, how disease is caused, inflammatory response to infectious agents, Hematopoietic and Lymphoid System, hemorrhage, various type of Anaemia, leucopenia, leucocytosis, bleeding disorders coagulation mechanism.
2	Fundamentals of Medical Terminology – Common Disease & Procedures, Castro intestinal, Chelecystitis, Cholelithiasis, Appendicitis, Intestinal Obstruction, Hernia, Peritonitis, Gastro copy, Endoscopy, Laparotomy, laparoscopy, Common Disease & Procedures, Respiratory Tuberculosis, Bronchial Asthma, Respiratory Failure, Pulmonary Emboli Son, Pneumonia, Bronchoscope, Pulmonary Function test, Cardio- Pulmonary, Resuscitation.
3	Circulatory – Hypertension, Coronary Artery Disease, Arrhythmias, Cardiac Arrest, Shock, Deep Vein thrombosis (DVT), ECG, 2D Echo Cardiogram, Coronary Angiography, Cardiac Catheterization, Stress test, Pacemaker, Renal, Nephrotic Syndrome, Urinary Tract Infection Renal/Bladder Stones, Intravenous Pylography, Cystoscopy, Urinalysis, Hoemodialis, Peritoneal Dialysis, Nervous, Stroke (Cerebro Vascular Accident), Brain Tumor, Brain Injuries, Spinalr Cord Injuries, LUmbar Puncture, Myelography, CT Scan. MRI, EEG, EMG Oncology, Investigations, tumor markers, RECIST Criteria for response evolution.
4	Pathology of the Cardiovascular System – Understands common pathological terms used in the description of heart disease and where applicable, associated electrocardiographic features, Knows the meaning of the terms, Atherosclerosis, atheroma, Ischaemia, Angina pectoris, Unstable angina, Prinzmetals angina, ST- elevation and non-ST elevation myocardial infraction, Acute coronary syndrome, necrosis, hypertension, Atrial and Ventricular septal defects, Cyanosis, Coarctations of the aorta, Valvular stenosis and regurgitation, Pericarditis.

ECG Instrument and Maintenance (Practical)

Unit	Contents
1	ECG Recording, pediatric/adults patient, Operations calibrations and servicing of ECG, Recording of Holter/stress ECG Monitoring patient in ICCU, Ambulatory B.P. Monitoring, Operations of 2-D Echo/M.Mode Doppler and CFM system its maintenance, Operations of TEE and its Maintenance, ICCU Monitoring, Other practical in assisting in Temporary Pacemaker/Permanent pace maker.
2	Introduction to equipment, Simple usage, Indication & Contraindication use, Repair and Maintenance of equipments, Operations of 2-D Echo/M.Mode doppler and CFM system its maintenance, ICCU Monitoring.

Hospital Training for 45 days after the final examination

IInd Year

S. No.	Course Title	Theory (duration/ hours week)	Practical (duration/ hours week)
1	Pharmacology	4	-
2	Electrocardiography & Techniques	2	15
3	Electricity & Electrocardiogram	-	15
4	General Principal of Hospital Practice and patient care	-	5
5	Hospital Training for 45 days (After the final exam)		

Pharmacology:

A knowledge of concern disease and drugs where after the structure and funciton of the heart is essential for instrument technician.

- Cardiac Drugs
- Effect of drugs and ECG Changes
- Toxicity of Drugs and ECG Changes.

Electrocardiography & Techniques:

Unit	Contents
1	Introduction to Electrocardiography – History psychological basis of E.C.G. conduct Velocity Electrophysiology Central of Wilson

	Augmentation Esophagea lead Pathway of Activation Vector Concept.
2	Normal Electro gram – Atrial Complexes, P-R interval, QRS Complex S.T. Segment T- Wavw U-wave Q-T- interval, Electrical Axis, Heart Position Interpretation of an ECG, How to record and ECG.
3	Abnormal Electrocardiogram – Abnormal P-Wave Intraventricular Conduction Defct, RBBB, LBBB, Incomplete, LBB, LAHB, LPPHB, Non Specific Interventricular Condition, Defect Bilateral Bundle, Branch Block, Trifasicular Block, WPW Syndrome, LLawn Ganogn, Levine Syndrome, Mahim by pass hypertrophy, Right Ventricular Hypertrophy (RBH), Pulmonary embolism, Chronic Obstructive lung Disease (COLD), Biventricular Hypertrophy, Overload Concept, Diastolic Overload.
4	Coronary artery disease – Ischemia Injury infracting subtle atypical non specific Pattern conduction defects and infraction localization of infraction wpm and acute myocardial infarction atrial infraction, VCG in myocardial, infraction atrial infraction, VCG in myocardial, infraction coronary insufficiency.
5	Exercise test – Type of exercise test, termination exercise, guanidine effect, phenothiazine, Anthracylines, cerebrovascular accident, hypothermia, pericarditis, myocarditis neuromuscular disease, heart trauma malignancy involving heart electrical alter nana negative vales, liquid protein diet, anemia etc.
6	Disorder of cardiac rhythm – Disturbance of impulse formation disturbances of impulse conduction secondary disorders of rhythm, physiology of cardiac rhythm, Automacity conductivity A-V nodes sinus rhythm sinus tachycardia sinus bradycardia sinus arrhythmia sino atrial block partial sa block complete SA block causes of Exit block atrial extraystoles Blocked atrial premature beats cause of Atrial Tachyeardia (PAT) Chaotic Atrial Rhythm, Atrial flutter atrial fibrillation Supraventricular tachycardia (SVT) ventricular rhythm ventricular tachy cardia (VT) Ventricular fibrillation proarrhythmia; parasystole, group beatig; AV – Disoocation torsade de points sick sinus syndrome.
7	ECG as a clue to clinical diagnosis, Pulmonary stenoriss tricuspid tatresia atrial spetal defect ventricular sptal defect ebstein anomaly correct trtransporation of great vassel mirro image dextrocards;m anomalous brigin of left cornaro artery Rheumatic fever mitrial value prolapsed athetetes cardiac pacing act.

Electricity & Electrocardiogram

Unit	Contents
1	Simple electron theory of conductions, Resistane, The Joule the watt, Properties of electric charge, Capacitor, Electronic potential/ potential difference (PD), Type of AC/DC, Basic of AC Circuits.

2	Magnetism/Electro Magnetism/Electromagnetic Induction, Magnetic Poles/fields/ flux and influx density, magnetic field due to a straight and circular coil wire, Relationship of the electrocardiogram to the electrical events of the heart, Relationship of the electrical events to the mechanical events of the cardiac cycle, Waveform components (P,Q,R,S,T and U), Definitions and normal ranges of PR interval and QRS duration, Measurement, of QT Interval and calculation of corrected QT Interval (QTc) by Bazett.s formula, Calculation of the heart rate from the electrocardiogram.
3	The appearance of the normal resting electrocardiogram, Recognizes the normal variations of the electrocardiogram in relation to age, State of activity, body build, ethnic, origin, Recognizes the normal electrocardiogram and some common abnormalities:- Rhythms arising from the sinus node, normal sinus rhythm, sinus arrhythmia, sinus tachycardia, sinus bradycardia, sinus arrest, Supraventricular tachyarrhythmias, Atrial premature contractions (ectopics), Atrial tachycardia, Atrial flutter, atrial fibrillation, Supraventricular tachycardia, Accelerated AV nodal (Junctional rhythm), Conduction abnormalities, Ventricular pre-excitation, Left and right bundle branch block, 1st degree AV block, 2nd degree AV block: (Wenkebach), Mobitz II and 2:1 block, 3rd degree (complete) AV block.
4	Rhythms arising from the ventricles, Ventricular escape beats, Ventricular premature beats (estopics) Ventricular tachycardia, Ventricular flutter, ventricular fibrillation, ventricular standstill (asystole), The electrocardiogram associated with an artificial cardiac pacemaker, Identification of pacemaker stimulus on the electrocardiogram, differentiation between atrial and ventricular pacing, Interpretation of changes in the electrocardiogram arising from abnormal cardiac conditions, Myocardial ischaemia, Myocardial infarction, Left ventricular hypertrophy, Pericarditis, Dextrocardia, Essential ECG Interpretation.
5	This section will comprise of three 12 – lead ECG.s taken from the following list – Complete heart block, Left bundle branch block, Right bundle branch block, ventricular fibrillation, Atrial fibrillation, Ventricular tachycardia, Narrow complex tachycardia, Acute ST elevation myocardial infarct.
6	Aims and objective of first aids wounds and bleeding dressing and bandage pressure and splints supports etc, shock insensibility, asphyxia convulsions resuscitation, use of suction, apparatus, drug reaction, prophylactic, measure administration of oxygen, electric shock burns, scalds, hemorrhage, pressure points, compression band, Fracture splints, Bandaging, dressing, foreign bodies poisons.
7	Infection – Bacteria their nature and appearance, spread of infections, spread of infections, auto infection or cross infection, the inflammatory process, local tissue reaction, general body reaction,

	ulceration aspects and antisepsis.
8	Department procedures, Department staffing and organization records relating to patients and departmental statistic professional attitude of the technologist to patient and other members of the staff medico legal aspects accident in the department appointment organization minimizing waiting time out patient and follow up clinic stock taking and stock keeping.
9	Drugs in the department – Storage classification labeling and checking regulations regarding dangerous and other drugs units of measurement special drugs and depressive antihypertensive.

General Principal of Hospital Practice and patient care

Unit	Contents
1	Hospital Procedure – Hospital staffing and organization, records relating to patients departmental, statistic professional attitude of the technologist to patient and other members of the staff, medico legal aspects, accident in the department, appointment, organization, minimizing waiting time, outpatient and follow up clinics, stock taking and stock keeping.
2	Care of patient – First contact with patients in the department management of chair and stretcher patients and aids for this management for the unconscious patients elementary hygiene personal cleanliness hygiene in relation to patient (for example clean linen and receptacles nursing care temperature pulse and respiration essential care of thee patient who has a tracheotomy essential care of the patient who has a colostomy bedpans and urinals simple application of a sterile dressing.
3	Aims and objective of firs aids – wounds and bleeding dressing and bandages pressure and splints supports etc. Shock insensibility asphyxia convulsions resuscitation use of suction apparatus drug reaction prophylactic measure administration of oxygen electric shock burns scalds hemorrhage pressure points compression band Fracture splints bandaging dressing foreign bodies poisons.
4	Infection – Bacteria their nature and appearance spread of infections auto infection or cross infection the inflammatory process local tissue reaction general body reaction ulceration aspects and antisepsis.
5	Principles of asepsis Sterilization methods of sterilization use of central sterile supply department care of identification of instruments surgical dressings in common use including filament swabs, elementary operating theatre procedure setting of trays and trolleys in the radiotherapy department.
6	Departmental procedures – Department staffing and organization records relating to patients and departmental statistic professional attitude of the technologist to patient and other members of the staff medico legal aspects accident in the department appointment

	organization minimizing waiting time out patient and follow up clinic stock taking and stock keeping.
7	Drugs in the department – Storage classification labeling and checking regulations regarding dangerous and other drugs units of measurement special drugs ant depressive antihypertensive etc.

Electricity, Cardiography & Technique (Practical)

Unit	Contents
1	Introduction, Instrumentation, Understands instrumentation and the basic principles of lead theory needed for the effective and safe practice of electrocardiography, understands the function of the controls of the E.C.G. machine, Paper speed, Gain Filters, Lead selector, Manual/automatic operation, understands care of the equipment, Care of recording paper.
2	Battery maintenance, Care of leads and cables, understands electrodes. Application and connection to Electrode positions. Understands lead system Unipolar and bipolar leads, Einthoven's theory and its application, Wilson's central terminal, Has language or communication difficulty, is infectious or is in isolation.
3	Evaluation of the recording to assess the need for re-recording, SCST Certificate of Electrocardiography – Syllabus 2010. Re-recording as appropriate, Recognition and elimination or reduction of artifacts, Labeling of completed recordings as appropriate, cleaning, preparation and storage of equipment ready for subsequent, Recordings, including correct sterilization and disposal procedures.

Electricity, Electrocardiogram (Practical)

Unit	Contents
1	Introduction to equipment, Simple usage, indication & Contraindication use, Repair and Maintenance of equipments, ECG Recording pediatric/adults patient, Operations calibrations and servicing of ECG, Recording of holter/stress ECG.
2	ECG Monitoring of patient in ICCU, Ambularoty B.P. Monitoring, Operation of 2-D Echo/M.Mode doppler and CFM system its maintenance, operation of TEE and its Maintenance, ICCU Monitoring.
3	Other practical in assisting in Temporary Pacemaker/Permanent Pacemaker, Operation of 2-D Echo/M.Mode Doppler and CFM system its maintenance, operation of TEE and its maintenance, ICCU Monitoring, Other Practical in assisting in Temporary pacemaker/Permanent Pacemaker.

Hospital Training for 45 days after the final examination

Schedule-9

[See regulation 41(2)]

SYLLABUS DIPLOMA IN BLOOD BANK TECHNOLOGY

COURSE CURRICULUM:

Paper Code	SUBJECTS
	1st Year
Paper I	MICROBIOLOGY & BIOCHEMISTRY
Paper II	HEMATOLOGY
Paper III	GENERAL IMMUNOLOGY
Paper IV	BLOOD COMPONENTS&BLOOD DONATION
Paper V	Practical & Viva Voce
	2nd Year
Paper VI	TRANSFUSION THERAPY
Paper VII	IMMUNOHAEMATOLOGY
Paper VIII	QUALITY CONTROL IN BLOOD BANKING & LEGAL ASPECTS.
Paper IX	RECENT ADVANCES IN BLOOD BANKING TECHNIQUES
Paper X	Practical & Viva Voce

FIRST YEAR

PAPER - I - MICROBIOLOGY & BIOCHEMISTRY

1. Introduction to Microbiology, Fundamentals of microscopy, sterilization and disinfection
2. Groups of Micro organisms, Micro organisms staining techniques
3. Bacteriological media, Pure cultures and cultural characteristics, Bacteria of medical importance
4. Transfusion transmitted infections, HCV, HBV, malaria, syphilis

5. ELISA, rapid and other tests for diagnosis of transfusion transmitted infections
6. Nucleic acid testing
7. Biosafety,Management of Biomedical waste
8. Instrumentation principles: PH meter, colorimeter, Spectrophotometer,

Electrophoresis equipment

PAPER - II - HEMATOLOGY

1. Collection of blood samples, types of anticoagulants
2. Complete hemogram, Different methods of haemoglobin screening/estimation:

Copper sulphate, haematologyanalysers, Sahli's, Cyanmethhemoglobin and

Hemocue methods, Red cell indices

3. Normal erythropoiesis, Leucopoiesis, Formation and function of platelets
4. Classification of anaemia, their laboratory diagnosis, Hemoglobinopathy:

Beta Thalassemia and Sickle cell disease, G6PD deficiency, polycythemia

5. Autoimmune hemolytic anaemia, classification, diagnosis, specificity

of autoantibodies

6. Coagulation Mechanism, Hemostasis, laboratory tests for coagulation, Platelet

Disorders

7. Haematological malignancies
8. Bone marrow transplantation, peripheral stem cells, cord blood stem cells, cord

blood banking

PAPER - III. GENERAL IMMUNOLOGY

1. Introduction to Immunology, History, Immunity
2. Antigens :Immunogen, allo-antigen, soluble antigen, Red cell antigen, Epitopes
3. Antibodies: Polyclonal antibodies, development of antibodies, structure

ofimmunoglobulins, characteristics of immunoglobulins

4. Monoclonal antibodies: Hybridoma technology, Human monoclonal antibodies, Applications of MAb
5. Antigen antibody reaction: Antigen concentration, antibody concentration, enhancing media, other factors influencing antigen

antibody reaction,
Immunoassays: ELISA,
6. Cells of immune system: Phagocytic cells, Antigen presenting cells,
T cells, T cell subsets, B cells, CD Markers, Flowcytometry for counting T& B cells
7. Autoimmune disorders
8. Complement System
9. HLA antigens, HLA antibodies, HLA Serology, Histocompatibility matching: Molecular methods
10. Molecular methods in Immunology

PAPER - IV- BLOOD COMPONENTS&BLOOD DONATION

1. Selection of blood bags for component preparation, preparation of red
cell concentrate, Fresh Frozen plasma, platelet concentrate, cryoprecipitate,
washed red cells, Frozen red cells
2. Plasma Fractionation: Principles, manufacturing of different plasma derivatives
3. Component Testing, Labeling,
4. Transportation and storage of blood components.
5. Preparation of leukoreduced blood products, Leukocyte filters, component extractors.
6. Metabolic changes in blood components during storage, release of cytokine
during storage.
7. Inventory management and maintenance of blood stock.
8. Irradiated blood components
9. Blood substitutes
10. Measurement of factor VIII level in FFP
11. Measurement of fibrinogen level in FFP
12. Sterility test on platelet concentrates.
13. Sterility test on Whole blood
14. Measurement of pH and other platelet parameters.

1. Donor Motivation, Motivational Techniques, Social Marketing, Preparation of IEC Materials
2. Donor recruitment & Retention: Types of blood donors, Donor selection,

medical interview and medical examination, screening for haemoglobin
estimation, Managing rejected blood donors, technique for conversion of first
time donor into regular voluntary donor, donor felicitation
3. Blood collection room equipment, their principles, and use, emergency
medicines, Pre donation counselling, Bleeding of the donor, post donation care, post donation counselling
4. Screening of blood units for mandatory tests, Discarding infected units,
5. Blood Donation drive: Awareness programs prior to blood donation drive,
Camp site, staff requirement, management of camp, transportation of blood
units from camp site to blood bank
6. Preservation of donated blood, blood preservation solutions, Additive solutions
7. Apheresis procedures, Apheresis products, preparation of multiple products on cell
separators, Maintenance of cell separator equipment
8. Autologous blood donation

PAPER -VI - TRANSFUSION THERAPY

1. Management of Blood Bank Issue Counter, Criteria for acceptance of
requisition form, inspection of blood component prior to issue.
2. Blood administration, transfusion filters, post transfusion care, Therapeutic plasma exchange
3. Judicious use of blood; management of different types of anemia,
management of bleeding patient, Neonatal transfusion, Transfusion practices in surgery, Transfusion therapy for oncology and trans plantation
patents.
4. Hemolytic transfusion reaction immediate and delayed; immune and non
immune reaction path physiology; Clinical signs and symptoms Laboratory
invigilation for HTR Tests to defect bacterial Contamination in blood,

5. Non- hemolytic transfusion reactions Immediate and delayed, febrile
reaction, allergic reaction, clinical signs and symptoms.
6. Acute transfusion related lung injury, alloimmunization, Iron overload, Graft
versus host disease.
7. Strategies to prevent transfusion reactions

PAPER - VII - IMMUNOHAEMATOLOGY

1. Basic Principles of immunohaematology, Application of Blood groups:
Population Genetics, Forensic medicine, Transfusion medicine
2. ABO Blood of Group Systems: History, Genetics, ABH antigens, Biochemical
Synthesis of blood group antigens, Antigenic sites, weaker variants, Bombay
Phenotype, ABO antibodies,
3. Rh Blood Group System: History, Genetics, Molecular Genetics, Nature of Rh
Antigens, Partial D, Week D, other variants of Rh, Rh Null, Rh antibodies,
factors influencing Rh immunization, Functional role of Rh antigens
4. Other Blood Group Systems: Lewis, P, Ii, MNSs, Kell, Duffy, Celano, In, Private
antigens, Public antigens.
5. Antenatal Serology, Hemolytic disease of the newborn due to ABO
Incompatibility, Rh Incompatibility and other allo-antibodies
6. Red cell serology techniques, their advantages and disadvantages, Cell and serum
grouping, detection of weak A and B antigens and weak D/Partial D cases,
Trouble shooting in red cell serology
7. Pre transfusion testing, Different methods of cross matching, cross matching in
special circumstances, emergency cross matching, electronic cross matching
8. Principles of Direct and indirect antiglobulin test, enzyme technique, albumins
technique, Detection of blood group antibodies, identification of their

Specificity, clinical significance of antibody detection, differentiation between
auto and allow-antibodies
9. Gel Technology, Micro plate technique

PAPER - VIII - QUALITY CONTROL IN BLOOD BANKINGAND LEGAL ASPECTS

1. Quality control of blood grouping reagents, QC of anti-human globulin
reagent, bovine albumin, Normal saline
2. Quality control of blood bags
3. Quality control of different blood bank Components, sterility test on component.
4. Automation in blood banking
5. Calibration, validation and maintenance of blood bank equipment, QC of
blood bank techniques, internal and external QC.
6. Organization of blood bank services, Blood Bank premises and infrastructure,
Regional blood transfusion centre and blood storage centres, Blood bank
management system
7. Regulations for blood bank operation: Drugs and cosmetics Law, National
blood policy, standards in Blood Banking, licensing procedures.
8. Recruitment and training of blood bank personnel, Proficiency testing.
9. Blood Bank Accreditation.

PAPER - IX - RECENT ADVANCES IN BLOOD BANKING TECHNIQUES

1. Automation in Blood Banking
2. Nucleic Acid Testing
3. Apheresis
4. Stem Cells

Reference Books:

1. Modern Blood Banking and Transfusion practices by Denise M Harmening, 5th edi
2. Transfusion Medicine technical manual-DGHS, Ministry of Health and Family
Welfare, Govt. of India, Second edition, 2003
3. Blood transfusion in clinical medicine by PL Mollison
4. AABB Technical Manual, 17th ed, AABB

5. Compendium of transfusion medicine, RN Makroo
6. Practical Hematology, J A Dacie and S M Lewis
7. Basic Immunology, A K Abbas and A H Lichtman. Second ed, Saunders Elsevier.
8. Essential Immunology. I Roitt, 8th ed, Blackwell scientific publications
9. Basic molecular and cell biology. David Latchman. BMJ Publishing group, 1997.
10. Voluntary blood donation program NACO, Ministry of Health and Family Welfare, Govt.
of India, New Delhi, 2007.
11. National guide book in blood donor motivation. NACO, Ministry of Health
and Family Welfare, Govt. of India.
12. Standards for blood banks and blood transfusion services, NACO, Ministry of
Health and Family Welfare, Govt. of India, New Delhi 2007.

Schedule-10
[See regulation 41(2)]
Syllabus of Diploma in Endoscopy Technology

Paper Code	**SUBJECTS**
	1st Year
Paper I	ANATOMY & PHYSIOLOGY
Paper II	PATHOLOGY AND MICROBIOLOGY FOR GIT
Paper III	PHYSICS OF ENDOSCOPIC INSTRUMENTS & ITS MAINTENANCE
Paper IV	PREPRATION FOR ENDOSCOPIC PROCEDURE
Paper V	Practical & Viva Voce
	2nd Year
Paper VI	PATIENT CARE
Paper VII	**Basic Endoscopic Procedure**
Paper VIII	Advanced Endoscopic Procedure
Paper IX	Endoscopy OT administration, design, documentation, medico legal, record keeping, IT
Paper X	Practical & Viva Voce

PAPER I ANATOMY & PHYSIOLOGY:
Introduction to the body as a whole

The cells, tissues of the body
The cell: Structure, multiplication.
Tissue: Types, structure, characteristics, functions
Epithelium: Simple, Compound
Connective: Areolar, adipose, fibrous, elastic, Cartilage, blood and bone
Muscle: Striated (Voluntary), Smooth (Involuntary, Cardiac)
Nervous tissue
Fibrous tissue
Cell regeneration
Membranes: Mucous, Serous, Synovial
Musculoskeletal System
The Respiratory System:
a. Organs: Position and structure
b. Nose and nasal cavities
c. Functions: respiratory, Olfactory
d. Pharynx
e. Larynx: Functions - respiratory, vocal
f. Trachea, Bronchi, lungs: lobes, lobules, pleura
Respiratory functions: External and internal respiration, common terms relating to disease and conditions of the system.
Anatomy of the esophagus, stomach, duodenum, small bowel.
Anatomy of abdomen, omentum, colon, rectum and anal canal.
Physiology & Mechanism of stomach and intestinal secretion.
Function of stomach, duodenum and gallbladder.
Physiology & function of liver, spleen, colon and rectum.Physiology of defecation.

PAPER II PATHOLOGY AND MICROBIOLOGY FOR GIT:

General lectures on micro-organisms- Classification/ shapes/ Sterilisation and asepsis.
Infection- source of infection, , spread of infection, various pathogenic bacteria, viruses and diseases caused by them (gastritis, enteritis, enterocolitis,colitis, etc)
Pathology – General- Cell injury and adaptation, inflammation and repair, fluid and hemodynamic derangement in vomiting and diarrhoea.
Pathology of the gastrointestinal tract and genital system. IBS, IBD, koch's abdomen.

Common Diseases of Upper GI Tract, Dysphagia,Achalasia, Cancer of the esophagus, Diverticulae, T-OFistulas, Bleeding lesions of the esophagus (Varices,Mallorie Weis Tears)

Polyps of stomach, gastric cancer, duodenal ulcers, Bleedinglesions, Helicobacter Pylorie infection and Antral Gastritis

Common diseases of the colon, cancer colon, polyps,diverticulae, granulomatous colitis, Ulcerative colitis,

Crohn's Disease, Functional diseases, benign strictures ofthe colon,

Diseases of Billiary tract, Stones Tumors, Gall Bladder stone and Cancer sequelae

Pancreatic diseases needing the ERCP procedure

PAPER III -PHYSICS OF ENDOSCOPIC INSTRUMENTS &ITS MAINTENANCE:

Layout of Endoscopy theatre

Principle & Working of GI Scope,

Principle& Working of Colonoscopy.

Principle& Working of Bronchoscope,

Principle& Working of esophagoscope

Principle& Working of Fibre optic laryngoscope.

sinoscope, basic laparoscope

Use, care, &maintenance of the common types of

Instruments, needles, suture and ligatures used in operation theatre

Basic endoscopy unit – forward viewing, single channel and double channel endoscopy and Specific instruments used in endoscopic and colonoscopy procedures

Bio hazards and safety in medical devices

Basics of Video endoscopy Instrumentation, Mechanics,

Mechanics, Magnification etc.

C-Arm Image Intensifier

PAPER IV PREPRATION FOR ENDOSCOPIC PROCEDURE:

Cleanliness and sterilization of ER/ operation theatre and annexes

Fumigation, Asepsis in endoscopy rooms

Fumigation continued

Principles of sterilization, modes of sterilization including autoclaving,

Pressure sterilization, boiling, dry heat, gas chemical sterilization,Gamma ray sterilization.

Lighting in E.T. including emergency lighting
Helping endoscopist and others to wash up and drape for operation.
holding out cap, mask, gown and gloves for endoscopist and others and handling of sterilized articles.
Washing, cleaning, testing and repairing of gloves and sorting – themout for packing and sterilization
Preparation of dressings, swabs and packs packing of drums and sterilization.
Use, care, and sterilisation of the common types ofinstruments, needles, suture and ligatures used in operation theatre.
Procedure for sending specimen for biopsy and fluid for culture.
Identification of instruments for common Endoscopic procedures operations and examinations, such as:- GI Scopy, Colonoscopy, Bronchoscopy, esophagoscopy, Fibre optic laryngoscopy,sinoscopy, basic laparoscopy
Setting up of tray/ trolleys for various endoscopic procedures /surgeries.
Assisting the scrub surgeon
Scrubbing, gloving & gowning
Laying tables for endoscopie
Endoscopy OT Stores – Indenting, storekeeping, accounting and audit.
Inventory Management.
Setting up of table for various diagnostic and therapeutic procedures

PAPER VI PATIENT CARE:
Patient Preparation for different endoscopic examination
Special Precaution in handlings patients with sepsis, blood borne infection – Hep.B, HCV, HIV etc - Cleaning and disinfection of the articles and endoscopy room (with special reference to HIV, HBV & HCV)Terminal disinfection of endoscopy room
Preparation of patient including transfer & positioning of the patient
Elective and emergency procedures.
Observation & monitoring the patient in recovery room

PAPER VII Basic Endoscopic Procedure :
Assisting the endoscopist in various endoscopic and colonoscopicproecduresLike :-Herniorrhapy: inguinal, epigastric, femoral, paraumbilical Abdominal Laparotomy

Laparoscopy: cholecystectomy, appendicectomy
Vagotomy and Pyloroplasty , Gastrostomy, lleostomy,Colostomy
Appendicectomy
Colonoscopy – Endoscopy
Diagnostic endocopic procedure- giving oral anaesthetic agent,.Diagnostic colonoscopic procedure- Assisting the anesthesiologist for induction of anaesthesia and positioning the patient.Biopsy, Injection Sclerotherapy
Gastric Biopsy
Basics of Laparoscopy, Instrumentation, Technique
Introduction to rigid scope, mechanicsETC
Common Laparoscopic procedures, Appendix,Cholecystectomyetc

PAPER VIII- Advanced Endoscopic Procedure :

Assisting the endoscopist in various endoscopic and colonoscopicproecdureslike Introduction to ERCP suite Management: Organisation of Hospital - Organisation of ERCP rooms - Single and Multiple units - Elective and emergency procedures.

Principles of Surgical Asepsis and ERCP Room: - Preparation of tables, equipments, instruments for the procedure - Care of ERCP room – before, during & after the procedure –Special Precaution in handlings patients with sepsis, blood borne infection – Hep.B, HCV, HIV etc - Cleaning and disinfection of the articles and ERCP room (with special reference to HIV, HBV & HCV).

ERCP Room equipments,Instruments and Maintenance: Basic ERCP unit – side viewing scope. C-arm facility- recording and documentation of interesting procedure. Specific instruments used diagnostic and therapeutic procedures- various sphincterotomes, guide wires, balloon dilators, baskets, lithotripsy handling,- various types of stents- plastic and metal.

Diagnostic ERCP procedures- preparation of patient including transfer & positioning of the patient. Assisting the anesthesiologist for induction of anaesthesia and positioning the patient.Assisting the endoscopist in various diagnostic ERCP procedures.

Therapeutic ERCP procedures- Assisting endoscopist for CBD stone removal, CBD and CHD stricture management, plastic and metal stent placement, getting tissue biopsy and brush cytology. Pancreatic stent placement.Maintaining Patient Safety and Comfort in ERCP room: Prevention of physical, electrical, chemical

injuries/hazards to patient - Maintenance of interpersonal relationship.

Pancreatectomy, Drainage of pancreatic Cyst(pseudocyst), Resections of Small Bowel, Sigmoid Colon andrectum; Hemi & total Colectomy; Colostomy: Closure of colostomy,Rectopexy&abdominoperineal resection, Drainage of abscess(es) in

the region of the liver, Hepatic Resection, liver transplant,Splenectomy; L-R Shunt,

Esophageal Varices, Gastric Varices,

Indications of Treatement of Bleeding lesions in the esophagus, Glue

Injection and EVL

Gastric Polyp resection, Percutaneous Endoscopic Gastrostomy, PercuataneousJejunostomy

Dilatation of strictures of esophagus, Balloon, bougies, CRE Balloons ETC

Basic ERCP Procedure, Premedication, position, stone retrieval and

placement of stent, removal of stones form PD and CBD

Gastroduodental stenting

Double balloon enteroscopy, capsule endoscopy, Differnet types ofcapsules

ColonoscopicPolypectomy Colonic dilatation of strictures by Balloon

Placement of Expansile stents in colo-rectum

Emergency de-rotation of colon in sigmoid volvulus

Advanced lap Surgery, Lap Liver resections etc

Therapeutic endoscopic and colonoscopic procedure- initial resustation of the patient- knowing about EVL and EST and assisting the endoscopist .assisting the endoscopist in endoscopic and colonoscopicpolypectomy, APC and FB removal.Maintaining Patient Safety and Comfort in ER: Prevention of physical, electrical, chemical injuries/hazards to patient - Maintenance of interpersonal relationship, Orientation to legal & ethical issues involved in endoscopic room technique

Paper IX – Endoscopy OT administration, design, documentation, medico legal, record keeping, IT:

Organization of Hospital - Organization of Endoscopy rooms - Single and Multiple theatre units - Elective and emergency endoscopies, ambulatory surgery.

Admission & Transfer procedure; maintenance of Operative Records

Communication and health care provider – patient relationship, Methods of Effective Communication, Attending skills, Rapport building skills, Empathy skills, Barriers to effective communication

Management, need for scientific managements, delegation, decision making

Supervision –techniques

Assignments-Individual and team function

Human relations, public relations, planning of courses block

Ethical and legal issues in Operation theatre and anesthesia

REFERENCE BOOKS:

1. Williams PL, Warwick R, Dyson M, Bannister LH (eds) Gray's Anatomy. 36th edition.Churchill Living stone, New York, 1980.
2. Human anatomy Regional and applied Volume – 1 - B.D Chaurasia's, 3rd CBS Publishers and distributions New Delhi, 1995.
3. Text book of Medical Physiology - Arthur C. Guyton, John E. Hall, 9th edition W.B.
4. Saunders Company U.S.A 1996.
5. Essentials of Medical physiology - Anil Baransinghamahapatra, 1st edition current Books international Mumbai. 1998.
6. Clinical Anatomy for Medical students - Richard s. Snell, 5th edition Little, Brown and
7. company. U.S.A 1992.

Pathology:

1. Fletcher: Diagnostic Histopathology of Tumours – Christopher DM Fletcher 2007 (3rd edition)
2. Lakhani: Basic Pathology: An Introduction to the Mechanisms of Disease – Sunil R
3. Lakhani, Susan A Dilly, Caroline J Finalyson and AhmetDogen 2003 (3rd ed),
4. Appleton & Lange's Review of Microbiology & Immunology – Dr William W Yotis,
5. Tadayo Hashimoto, Harnold J. Blumenthal – 1997.
6. Medical Microbiology – Michael A. P Faller, Patrick R.Murray, Ken S. Rosenthal
1. Practical gastrointestinal endoscopy the fundamentals – Peter B Cotton

2. Introduction to Operating room Technique - Kandaswami
3. Theatre Technique - Dixon Eileen
4. Fundamentals of Operation Theatre Service - T.K.Datta
5. SAGES manual perioperative care in minimally invasive surgery. Richard l. Whelan, James w. fleshman, Dennis L. fowler. Springer edition
1. Practical gastrointestinal endoscopy the fundamentals – Peter B Cotton
2. Introduction to Operating room Technique - Kandaswami
3. Theatre Technique - Dixon Eileen
4. Fundamentals of Operation Theatre Service - T.K.Datta
5. SAGES manual perioperative care in minimally invasive surgery. Richard l. Whelan, James w. fleshman, Dennis L. fowler. Springer edition

Schedule-11
[See regulation 41(2)]
Syllabus of Diploma in E.E.G. Technology
FIRST YEAR

PAPER FIRST

1.Study of General Anatomy and Physiology of Human Body

PAPER SECOND

1. CLINICAL:

(A) Seizure disorder and its differential diagnosis

(B) i) Normal EEG pattern in children and adult, awake and sleep.

(ii) Neonantal EEG

(iii) Normal variants

(iv) Artifacts : Eye movements, muscle pulse

(v) Activation methods: Hyperventilation, photic stimulation, sleep deprivation,
others

(vi) Abnormal EEG records, definition-spike, sharp, slow waves, other
abnormalities

(vii) Abnormal EEG in neurological diseases

viii) Brain death

2. TECHNICAL ASPECTS:

(i) Different parts of EEG machine and its functions, i.e. montage, electrodes, filter,
calibration, sphenoidal electrode, depth electrodes.

(ii) Electroencephalographic monitoring (in patients and ambulatory), Video
Electroencephalography, Intraoperative records, Quantitative electroencephalography,
Brain mapping and others (in brief).
(iii) Electroencephalographer's reporting
(iv) Record keeping.

SECOND YEAR

PAPER FIRST

1. NEURO-ANATOMY:
Muscle : Origin, i8nsertion, nerve supply, structure
Nerve : Course-cranial and peripheral, structure
2. NEURO-PHYSIOLOGY :
Muscle :
i) Functions of muscles
ii) Muscle contractions
iii) Electrical properties of muscles
Nurve:
i) Functions of nerve
ii) Electrical properties of nerve.Near filed potential and Far field potential
iii) Nerve conduction
iv) Neuromuscular junction and neurotransmitters
3. NEURO-PATHOLOGY:
Muscle : Pathological changes in muscles
i) Primary muscle disease
ii) Injury
iii) Metabolic
iv) Inflammatory
v) Others
vi) Neurogenic muscle involvement
vii) Neuromuscular junction abnormalities
Nurve:
i) Demyelination
ii) Axonopathy

PAPER SECOND

CLINICAL:
1 Nerve:
(a) Disease affecting cranial and peripherals
(i) Bells play
(ii) Peripheral neuropathy

(iii) Entrapment neuropathy
(b) Basic principles of nerve conduction study (NCS)
(i) Motor NCS
(ii) Sensory NCS
(iii) F-ware
(iv) H-reflex
(v) Blink reflex and others
(vi) Repetitive nerve stimulation
(vii) Abnormalities in disease
(viii) Central motor conduction

2 Muscle:

(a) Disease of muscle and neuromuscular junctions
(b) Normal EMG recording-Resting/Insertional activity/Volitional recruitment pattern, Interference pattern.
(c) Abnormal EMG –

(i) Myopathies
(ii) Neurogenic muscle involvement
(iii) Involuntary muscle contractions
(iv) Neuromuscular transmission disorder

(d) Needle EMG – Conventional, Macro EMG, Surface EMG, Single fibre EMG
3 Evoked potential studies:

(i) Visual evoked potential
(ii) Brainstem auditory evoked potential
(iii) Somatosensory evoked potential
4 Instruments:

(i) Basic knowledge about the machines
(ii) Electrodes
(iii) Electrode impedance
(iv) Identification of wave pattern
(v) Artifacts
(vi) Normal laboratory values
(vii) Electromyography reporting
(viii) Record keeping

5. Polysomnographic studies – Normal sleep and sleep disorder (in brief)

Schedule-12
[See regulation 41(2)]
Syllabus of Diploma in Cath Lab Technology

Ist year

SI No	Subject to be taught	No. of lecturers including demonstration
1.	Basic Anatomy	20
2.	Physiology& Pathology	15
3.	Pharmacology	10
4.	Preventive Cardiology	05
5.	Microbiology	10
Total		**60**
Practical Training		**150**

II nd year

SI No	Subject to be taught	No. of lecturers including demonstration
1.	Radiology	20
2.	ECG	30
3.	Defibrillation	15
4.	Diseases of Heart	25
5.	Catheters and Instruments	20
Total		**110**
Practical Training		**150**

Ist year Examination:-

The Examination will be conducted according to the following table:

SI No	Subject of Examination	Total Marks for Theory	Total Marks for Oral	Total Marks for Practical
1.	Anatomy	100	25	75
2.	Physiology	100	25	75
3.	Pharmacology	100	25	75
4.	Preventive	100	25	75

	Cardiology			
5.	Microbiology	100	25	75

3. All written examinations shall be of three hours duration and the number of papers in each subject shall be as mentioned above.

4. II nd year Examination:

Sl No	Subject of Examination	Total Marks for Theory	Total Marks for Oral	Total Marks for Practical
1.	Radiology	100	25	75
2.	ECG	100	25	75
3.	Defibrillation	100	25	75
4.	Diseases of Heart	100	25	75
5.	Catheters and Instruments	100	25	75

SYLLABUS

1st year

ANATOMY:

01 Basic cells and tissues
02 Heart: Pericardium, chambers, valves, conduction systems great vessels
03 Circulation: Major arteries and veins
04 Lungs and pleura, diaphragm
05 Liver, Spleen, Kidney, Brain

PHYSIOLOGY:

01 Circulatory systems
02 Autonomic nervous system
03 Action potential muscles contraction
04 Gas exchange
05 Thrombosis, platelet function
06 Renin angiotensin system
07 Kidney: Physiology

PHARMACOLOGY:

01 General Pharmacology
02 Sedatives
03 Anaesthetics agents

04 Analgesics
05 Drugs used for heart disease: Antianginal, Antiarrhythmic, anti failure, vessopressor, vasodilators, cardiac imaging agents, anti thrombotics

PREVENTIVE CARDIOLOGY (Patient care & Hospital Practice):
01 Diat and Nutrition
02 Smoking
03 Exercise and heart

MICROBIOLOGY:
01 Specimen collection: Blood, urine sputum, etc.
02 Bacteria and viruses in CVS
03 Serology and immunology

SYLLABUS

IInd year

RADIOLOGY (Basic phy of radiology)
01 Principles of X-ray
02 Protection form radiation
03 Description and recognition of Chest X-Rays
04 Different yiews of chest for identification of cardiopulmonary structures
05 Ultrasonography: Principles
06 Basic of Echocardiography

ECG:
01 ECG machine: Parts
02 Technical of taking an ECG
03 Pitfalls in taking ECGs
04 Recognition of normal ECG waves
05 Abnormal ECG

DEFIBRILLATION:
01 Technique
02 Indication
03 Complications

DISEASES OF HEART:
01 Congenital
02 Rheumatic
03 Myocardial and pericardial
04 Coronary artery diseases
05 Hypertension

06 Pulmonary thromboembolism and pulmonary hypertension
07 Respiratory failure

CATHETERS AND INSTRUMENTS:

01 Arterial Blood Gases: Technique and interpretation
02 Haemodynamic monitoring Technique, recognition, indication, complications.
03 Fluid and electrolytes
04 X-ray imaging in lab
05 Intra Aortic Ballon Pulsation: Indication, Technique and complications
06 Artifician ventilation
07 Extra corporeal Membrane Oxygenator
08 afferent views of cardiac catheterization
09 fransducer, outline of C-arm, cineangio machine oxymetry

List of Books prescribed

- Invasive Cardiology: A Manual for Cath Lab Personnel - Jones & Bartlett
- Invasive Cardiology: A Manual for Cath Lab Personnel – Watson
- The Cardiac Catheterization Handbook- Morton J. Kern
- The Interventional Cardiac Catheterization Handbook- Morton J. Kern
- Complications in the Cath Lab: Risk Factors, Management and Bailout Techniques – Mauro Moscucci
- Cardiac Catheterization in Congenital Heart Disease: Pediatric and Adult – Charles E. Mullins

Schedule-13

[See regulation 41(2)]

Syllabus of Diploma in Emergency and Trauma Care Technology

TEACHING AND EXAMINATION SCHEME – Ist Year

S.No.	Subject	Distribution of time			Distribution of Marks			
		Hours Per Week			Exam			
		Th	PR	T	Th	PR	Viva voce	Total
1.	Anatomy, Physiology, Pathology & Pharmacology	1	-	1	100	-	-	100

2.	Medical Emergencies I	1	-	1	100	-	-	100
3.	EMS Environment I	1	-	1	100	-	-	100
4.	Emergency in body systems	1	-	1	100	-	-	100
5.	Ambulance Simulator I	-	32	32		75	25	100
6.	Clinical Rotations I (Sessional)	-	-	-	100	-	-	100
	Total	**4**	**32**	**36**				**600**

TEACHING AND EXAMINATION SCHEME – IInd year

S. No.	Subject	Distribution of time			Distribution of Marks			
		Hours Per Week			Exam			
		T	PR	T	Th	PR	Viva-voce	Total
1.	EMSEnvironmentII	1	-	1	100	-	-	100
2.	MedicalEmergenciesI	1	-	1	100	-	-	100
3.	Management of Medical Emergencies	1	-	1	100	-	-	100
4.	AwarenessinMedical Emergencies	1	-	1	100	-	-	100
5.	Ambulance Internshipand Ambulance SimulatorII	-	32	32		75	25	100
6.	Clinical Rotations II	-	-	-	100	-	-	100
	Total	**4**	**32**	**36**				**600**

Course Components-First Year(Cognitive and Psychomotor)

Preparatory:

- EMT Core Trainin
- EMS Systems, Roles and Responsibilities (EMT and PARAMEDIC)-The Well-Being of the Paramedi
- Illness and Injury Prevention-Medical and Legal Issues
- Ethical Issues
- Pathophysiology-Pharmacology

- Vascular Access and Medication Administration-Human Development
- Patient Communication

Airway:

- Airway Management and Ventilation Patient

Assessment:

- Patient History
- Physical Examination-Patient Assessment
- Critical Thinking and Clinical Decision making-Communications and Documentation Trauma:
- Trauma Systems and Mechanism of Injury-Bleeding and Shock
- Burns
- Head and Face Injuries-Spine Injuries
- Thoracic Injuries-Abdomen Injuries
- Musculo

Skeletal

Injuries

Medical:

- Respiratory Emergencies
- Cardiovascular Emergencies-Neurologic Emergencies
- Endocrine Emergencies
- Gastrointestinal Emergencies
- Renal and Urologic Emergencies-Allergic Reactions
- Toxicology(Substance Abuse and Poisoning)-Hematologic Emergencies
- Environmental Emergencies
- Infectious and Communicable Disease-Behavioral Emergencies
- Gynecologic Emergencies-Obstetrics

-ClinicalRotations1

-Ambulance Simulator1

Course Components-Second Year(Cognitive and Psychomotor)

Special Considerations:

- Neonatology-Pediatrics
- Geriatrics
- Abuse, Neglect and Assault-Patients With Special Needs
- Acute Interventions for the Chronic Care Patients

Operations:

- Ambulance Operations
- Medical Incident Command

- Terrorism and Weapons of Mass Destruction-Rescue]
- Awareness and Operations
- Hazardous Materials Incidents-Crime Scene Awareness

Surgical Knots and Suturing Techniques:

- Basic Sterile Technique
- Two-Handed Square Knot\
- Instrument Tie Square Knot-Suture materials
- Surgical Needles
- Suturing Methods-Suture Patterns
- Removing Sutures

Sonography Ultrasound)

- Basic Operation and Interpretation AHA Basic Life Support
AHA Advanced Cardiac Life Support

AHA Pediatric Advanced Life Support

Pre-Hospital Trauma Life Support/Combat and Tactical Medicine Concepts

CEVO-Coaching Emergency Vehicle Operator (Ambulance)

Hazardous Materials Awareness

Vehicle Extrication Concepts

Technical Rescue Awareness

ClinicalRotations2

-Ambulance Ride Along/Internship Part I and Part II

-Ambulance Simulator2

Skills proficiency assessments:

EMT/Basic Core Proficiency Skills:

Baseline Vital Signs with SAMPLE history & radio report BVM ventilation–adult, child, infant

Oral suctioning–adult, child, infant

CPR–one rescuer with atleast 90% proficiency in ventilations/compressions Oxygen administration–NC, NRB,

pulse oximetry (SpO2 monitoring), and capnography (etCO2 monitoring)
Bleeding/Hemorrhage management (Quik Clot and CAT) LSB, KED, Traction Splint

Patient Assessment: Medical Assessment Trauma Assessment

Airway Management Skills:
ETT–adult, pediatric (child and infant) King Airway–adult LMA–adult
I Gel-adult and pediatric Tracheal suctioning Surgical cricothyrotomy Transport ventilator
Needle chest decompression

IV/Medication Skills:
Blood draw with vaccutainer device Blood draw with butter fly needle Blood draw with syringe/OTN catheter
IV start–peripheral
IV medication administration–piggy back in fusion IV medication administration– 3□ ways to pcock
Medication administration–subcutaneous, intramuscular, IV bolus,nebulizer

Advanced/Specialized Skills:
Sutures Ultrasound
Accident Vehicle Patient Extrication (AVET/PHTLS)

FIRSTYEAR-SUBJECTS DIVISION

1.	Human Systems & Assessment	**P-I**	**Anatomy,Physiology,pathology&pharmacology**
2.	Pharmacology		
3.	EMT Core Training (incl. AHABLS, CEVO, and PHTLS)EMS Environment I	**P-II**	EMS Environment I
4.	Shock and Fluid Therapy	**P-III**	Emergency in

5.	Emergency Cardiac Care		body systems
6.	Emergency Respiratory Care		
7.	Traumatology	**P-IV**	Medical Emergencies I
8.	Medical Emergencies I		
9.	Ambulance Simulator I	**PRS**	
10.	Clinical Rotations I		

SECONDYEAR□SUBJECTSDIVISION:

1.	EMS Environment II	**P-I**	EMS Environment II
2.	ACLS,PALS,AMLS,EPC, and PHTLS (Review)		
3.	Medical Emergencies II	**P-II**	Medical Emergencies I
4.	Wilderness and Rescue Medicine		
5.	Assessment Based Management	**P-III**	Management of Medical Emergencies
6.	Suture Techniques		
7.	Ultrasound (Basic)		
8.	Hazardous Materials Awareness	**P-IV**	Awareness in medical emergencies
9.	Technical Rescue Awareness		
10.	Clinical Rotations II	**PRS**	
11.	Ambulance Internship		
12.	Ambulance Simulator II		

MANUALS/BOOKS:

"Emergency□Care and Transportation of the Sick and Injured", Tenth Edition, AAOS Emergency Medical Technician□Transition Manual, AAOS Nancy Caroline's Emergency Care in the Streets, AAOS, Sixth Edition Hole's Human Anatomy & Physiology, Thirteen Edition AHABLS for the Health care Provider Wilderness and Rescue Medicine, Sixth Edition, Jones & Bartlett Learning

"Basic Ultrasound" by
Hylton B 'Meire and Pat
Farrant
"Surgical Knots and Suturing Techniques ", F.D. Giddings,
Second Edition

FIRSTYEAR-SUBJECTS DIVISION:

EMT Core Training (incl. AHABLS, CEVO, and PHTLS)

Basic Emergency Medical Technician Course based on"Emergency-Care and Transportation of the Sick and Injured", Tenth Edition, AAOS

EMS Environment I

An overview of Emergency Medical Systems in the US and around the world; focusing on professionalism, responsibility, development, improvement and community involvement; and also emphasizing the ethical and legal aspects of Emergency Medical Systems including mal practice, consent, and contracts.

Human Systems & Assessment

Patienthistory, charting, and physical examination skills, with emphasis on directing, defining, and describing normal and pathological human body conditions.

Shock and Fluid Therapy

Understandingandmanagementofthebodysystem'sreactiontodecreasedcellularoxygenation.Bodyfluids,osmosis,andpathophysiologyofinadequatetissueperfusion.Shocktherapyandintravenous/intraoseoustechniquesareemphasized.

Emergency Cardiac Care

Etiology, pathophysiology, clinical features, cardiac disease processes, and assessment of patients with cardiac disorders (ACLS algorithms, skills, and techniques), with focus on the interpretation of cardiac dysrhythmia, clinical signs and symptoms of cardiac conditions, indications and administration of emergency cardiac therapy along with defibrillation, synchronized cardio version, and transcutaneous pacing skills.

Pharmacology

Clinical pharmacology, classification and use of medications. Emphasis on the proper indications, precautions, dosages, and

methods/routes of administration. Includes dosage calculations, metric conversions, and infusioncal culations.

Emergency Respiratory Care

Care of patients with respiratory disorders; the etiology and pathophysiology of the respiratory system, normal respiratory function and mechanics of respirations. Assessment, pathophysiology of respiratory disease, evaluation and management of respiratory distress due to medical and trauma-related problems, with emphasis on the uses and techniques of supra-glottic, endotracheal, and surgical airways.

Traumatology

Management and treatment of traumatic injuries including of tissues, musculo skeletal structures, neurologic and CNS (Central Nervous System). Anatomy and pathophysiology, assessment, and management of traumatic injuries involving these human systems (including principles of PHTLS).

Medical Emergencies I

Recognition, management, and pathophysiology of patients with medical emergencies. This module will focus main lyondiabetic emergencies, an aphylaxis and an aphylactic shock, exposure to environmental extremes, alcoholism, poisoning, acute GI problems, genit our in ary problems, andmedical emergencies of the geriatric population.

Clinical Rotations I

Supervised rotations through hospital clinical areas. Emphasis on airway management, IV therapy, and patient assessment skills.

Ambulance Simulator I

Introduction to *Sim-Man* (mannequin) and to the ambulance simulator; basic and intermediate scenarios, working with ALS(Advanced Life Support).

SECONDYEAR-SUBJECTSDIVISION:

EMS Environment II

Guided practice with emphasis on disaster management, MCI (Multi Casualty Incidents) & triage, EMS telemetry and communications, stress management, and emergency rescue

extrication techniques (applied concepts of Accident Victim Extrication Techniques and PHTLS).

Medical Emergencies II
Recognition, pathophysiology, proper implementation of protocols, and management of patients with medical emergencies.This module will include infectious disease,OB-GYN, pediatrics, and behavioral emergencies.
ACLS, PALS, AMLS, EPC, and PHTLS
(Review) American Heart Association and
NAEMT Wilderness and Rescue Medicine
"Wilderness and Rescue Medicine"Jeffrey E. Isaac, PA□C and David E. Johnson, MD Sixth Edition

Assessment Based Management
Integrates the principles of assessment- based management. This module will emphasize general approach, assessment, differentials (diagnostics), and management priorities for patients commonly encountered by the paramedic.

Suture Techniques
"Surgical Knots and Suturing Techniques",F.D. Giddings, Second Edition, Giddings Studio Publishing, Fort Collins Colorado, 2002
Ultrasound (Basic)
Suggested manual:"Basic Ultrasound "by HyltonB' Meire and Pat Farrant

Clinical Rotations II
Supervised rotations through clinical settings. Rotations will emphasize the Emergency Department and its correlation to the Emergency Medical Services system. Labor and Delivery, New born Nursery, and ICU/CCU.

Ambulance Internship Part I
Supervised experience in the pre-hospital care setting that will help the student develop and implement the concepts and principles of the Advanced Life Support system. The student will practice skills as a team member, at Basic and Advanced EMT level, under the direct supervision of a field preceptor
Ambulance Internship Part II

Supervised experience in the pre-hospital care (ambulance), which will allow the student to apply all principles concepts, and skills learned in the classroom, at the Paramedic level. The student will practice skills as the team leader under the direct supervision of a field preceptor.

Ambulance Simulator II
Scenario based training; ALS (Advanced Life Support) performance and leadership.

Hazardous Materials Awareness
Eight contact hours training; familiarization and identification of common chemical products/hazardous materials transported via roadway, railway, and maritimroutes; hazardous materials classification; personal protective equipment, decontamination process; Haz Mat Team; Emergency Response Guide.

Technical Rescue Awareness
8 contact hours of training; Accident Vehicle Extrication; Railroad/Train accidents; High Angle and Low Angle Rescue; Urban Search and Rescue.
Response to Terrorism
Incidents Awareness 4
contact hours training
Accident Victim
Extrication Techniques 12-16
contact hours training

CEVO-Coaching Emergency Vehicle
Operator (Ambulance) 10□12 contact
hours of training

Schedule-14
[See regulation 41(2)]
Syllabus of Diploma in Ophthalmic Technology
DIPLOMA PART 1

OP-1	Basic Ocular Science
OP-2	Ophthalmic Instruments
OP-3	Basic Optics
OP-4	Community Ophthalmology-I
OP-5	Instrumental Handling & Application

DIPLOMA PART 2

OP-6 Common Ocular Disorders
OP-7 Ophthalmic Techniques
OP-8 Refraction
OP-9 Community Ophthalmology-II
OP-10 Clinical Skill Training

TEACHING AND EXAMINATION SCHEME
For Diploma Ist Year Ophthalmic

S. No.	Subject	Distribution of time			Distribution of Marks			
		Hours Per Week			Exam			
		Th	PR	T	Th	PR	Viva-Voce	Total
OP-1	Basic Ocular Science	1	-	1	100	-	-	100
OP-2	Ophthalmic Instruments	1	-	1	100	-	-	100
OP-3	Basic Optics	1	-	1	100	-	-	100
OP-4	Community Ophthalmology-I	1	-	1	100	-	-	100
OP-5	Instrumental Handling & Application	-	32	32	-	75	25	100
OP-PRS	Sessional Assessment (PRS)*	-	-	-	50	25	25	100
	Total	**4**	**32**	**36**				**600**

BASIC OCULAR SCIENCE
RATIONALE

This paper introduces eye as the primary organ of vision & its surrounding structures. It gives in detail the anatomy (structure) & physiology (functions) of the various parts of visual system.

CONTENTS

1. Anatomy of the Eye:

Orbit, its relations & vascular communications, Eyelids & its glands, Conjunctiva, Lacrimal apparatus, Extra-ocular muscles, Cornea & sclera, Iris. Ciliary body & Choroid, Lens & Vitreous, Retina & Optic nerve, Visual pathway, Circulation of the eye, Cr. Nerves, Para-sympathetic & sympathetic nerves in relation to eye, Embryology of the eye, Pituitary gland and cavernous sinus.

2. Physiology of The Eye:

Functions of parts of eye, structure and functions of the eyelid, functions of lacrimal apparatus and tear film dynamics, aqueous humour & intraocular pressure, pupil and pupillary

reflexes, pathways, pupil abnormalities, eye movements, extra and intra-ocular muscles: functions and control, light sense & night vision, colour sense (colour vision), visual pathways & fields, visual cortex, uni-ocular & bin-ocular vision, accommodation & convergence, electro-retino-gram & adaptation, visual acuity & testing.

3. Ocular Microbiology:

Normal flora of eye, fungi & protozoa, bacteria (aerobic/anaerobic), viruses, Laboratory techniques. Sterilization.

4. Ocular Pharmacology:

General routes of drug administration & osmotic agents. Miotics. Mydriatics and Cycloplegics. Ocular Hypotensives. Local anaesthetics & Analgestcs., Sedatives and tranquilizers. General anaesthetic agents. Antiseptics. Anti-viral & Anti-fungal agents. Ocular anti-inflammatory agents., Chemo-therapeútic agents. Misc. drugs used by ophthalmologist.

Reference Books

1. Ophthalmic Assistant – Vol. I (Anatomy) – Dr. L.P. Agarwal.
2. Physiology of the eye: Arvind Eye Hospital.

Ophthalmic Instruments

RATIONALE

Ophthalmic instruments are used in diagnosis and treatment of eye diseases. These instruments are delicate and costly; require regular servicing of these equipments. This appendix presents general guidelines for the care of instruments, including special cautions to observe and techniques to employ for their handling, cleaning and maintenance.

CONTENTS

& B Scan, Field Examination / Charting, Ophthalmic Photography, Fundus Photography & Fundus . Flourescein Angiography.

Reference Books:

1. Text book of Ophthalmology — Dr. A.K. Khurana
2. Essentials of Ophthalmology — Dr. L.P. Agarwal

Basic Optics

RATIONALE

This paper gives a basic knowledge of Optics, Lenses and the nature of refractive errors.

CONTENTS

- Physical Optics

  General properties of light, Principles of Reflection of light, Principles of Refraction of light, Lenses & their combinations.

2. Physiological Optics

   General concepts of eye as a refracting apparatus

Reference Books:

1. Principles of optic & Refraction 6th Ed — Dr. L.P. Agarwal
2. Theory and Practice of Squint & Orthoptics — Dr. A.K. Khurana

Community Ophthalmology-I

RATIONALE

He/She is able to assist in early detection of visual impairment and control of blindness as a part of health man power development.

CONTENTS

Eye screening programme, school clinics and surveys; Blind person aid and his problems. Rehabilitation of the blind, Health education in the field of eye care, Functioning of mobile eye health care units, Causes of visual impairment and blindness.

Organising Eye Camps: Reach In & Reach Out Concept. Permission, site selection, publicity, asepsis, Operative and post-op care, follow-up. Role of authorities and local body funding.

Reference Books:

1. Ophth. Assistant Vol. V (Community Ophth.) — Dr. L.P. Agarwal

Instrumental Handling & Application

RATIONALE

The students at the end of training shall be able to render assistance to Ophthalmologists/doctors in eye institutions.

PRACTICALS

1. Practical As an Ophthalmic Assistant:
   - 1.1 Initial patient contact and reception & Ethics
   - 1.2 Office manners, Secretarial assistance, Record & their retrieval.
   - 1.3 Ophthalmic equipments.
   - 1.4 Examination of eye
2. Sterilization & Theatre:
   General Aspects, Sterilization & Disinfection, Theatre Setup and preparation, Autoclaving & hot air oven, Eye instruments, Operating room equipment & supplies,
3. Practical Training Programme:
   - 3.1 Reception / Record Keeping Rotational duty, Receiving patients phone calls, making appointments, making OPD/Indoor tickets, consent taking, vision (Distance /Near), history taking.
   - 3.2 Refraction:
     Vision recording – Distance/Near 250 Cases
     Colour Vision (Ishihara) Recording 25 Cases
     Identification of Lenses (Spherical, Cylindrical, and Prisms & their Neutralization 25 Cases

TEACHING AND EXAMINATION SCHEME

For Diploma IInd Year Ophthalmology

S.No.	Subject	Distribution of time			Distribution of Marks			
		Hours Per Week			Exam			
		Th	PR	T	Th	PR	Viva-Voce	Total
OP-6	Common Ocular Disorders	1	-	1	100	-	-	100
OP-7	Ophthalmic Techniques	1	-	1	100	-	-	100
OP-8	Refraction	1	-	1	100	-	-	100
OP-9	Community Ophthalmology-II	1	-	1	100	-	-	100

OP-10	Clinical Skill Training	-	32	32	-	75	25	100
OP-PRS	Sessional Assessment (PRS)*	-	-	-	50	25	25	100
	Total	**4**	**32**	**36**				**600**

COMMON OCULAR DISORDERS

RATIONALE

This paper makes the student aware about the general concepts of disease and the processes by which diseases evolve. He/she will be able to understand the disorders that occur in various parts of the eye and & ocular adnexa. He/she learns the causes of these disorders, their effects on vision & the procedures used to treat them.

CONTENTS

Common Eye Diseases:

Diseases of Eyelids, orbit, adnexa, conjunctiva, cornea, sclera, uvea, lens, retina, injuries of eye, optic nerve. Glaucorna.

Reference Books

1. Ophthalmic Assistant – Vol. I (Anatomy) – Dr. L.P. Agarwal.
2. Physiology of the eye: Arvind Eye Hospital.

Ophthalmic Techniques

RATIONALE

This appendix presents general guidelines for the care of instruments, including special cautions to observe and techniques to employ for their handling, cleaning and maintenance.

CONTENTS

1. Ophthalmic Techniques
   - 1.1 Examination of eye
   - 1.2 Special investigations.

   Conjunctival smear. Flourescein Staining and pH testing, colour vision.
2. Sterilization & Theatre:

   General Aspects, Sterilization & Disinfection, Theatre Set-up and preparation, Autoclaving & hot air oven, Eye instruments, Operating room equipment & supplies, Surgical scrub. laying operating trolley for surgery, Pre & Post operative instructions, care and dressing.
3. Surgical Assistance in Operative Procedures on:

Lids, Lacrimal apparatus, Extra ocular muscles, cornea, lens, Glaucoma, Enucleation, Trauma, Retina & Vitreous, Laser applications.

Reference Books:

1. Text book of Ophthalmology — Dr. A.K. Khurana
2. Essentials of Ophthalmology — Dr. L.P. Agarwal

Refraction

RATIONALE

This paper gives a basic knowledge of the nature of refractive errors. Thus he / she will be able to understand the basic principles and elements of procedures used to discover, measure and correct refractive errors.

CONTENTS

Physiological Optics

General concepts of eye as a refracting apparatus, Cornea! and lenticular system, Optical resolution of the eye, Visual Angles, Visual Acuity & Axis, Optical Aberrations of the eye, Introduction to refractive errors (myopia, Hypermetropia, Astigmatism, Anisometropia and Anisiekonia, Accommodation, Convergence, Presbyopia, Retinoscopy, Subjective Examination, Ophthalmoscopy, Principles of Eye Procedures: Slit Limp, Tonometry, Contact lenses, LVA.

Reference Books:

1. Principles of optic & Refraction 6th Ed. — Dr. L.P. Agarwal
2. Duke Elder's Practice of Refraction — Abram
3. Theory and Practice of Squint & Orthoptics — Dr. A.K. Khurana
4. Practical Orthoptic in Treatment of Squint — Keith Lyle

Community Ophthalmology-II

RATIONALE

He/She will be able to assist in implementation of national programme for control of blindness. He/She should impart health education regarding ophthalmic disorders.

CONTENTS

1. Eye screening programme, school clinics and surveys, Causes of visual impairment and blindness.

   Organising Eye Camps: Reach In & Reach Out Concept. Permission, site selection, publicity, asepsis, Operative and

post-op care, follow-up. Role of authorities and local body funding.

2. Nutrition and Eye Diseases
3. Industrial Hazards and Their Prevention.
   Industrial injuries, accidents and foreign bodies. U.V., Infrared & other radiation injuries. Thermal & chemical injuries.

Reference Books:

1. Ophth. Assistant Vol. V
   (Community Ophth.) Dr. L.P. Agarwal

Clinical Skill Training

RATIONALE

The students at the end of training shall be able to assist in the estimation and treatment of errors of refraction and common disorders of eye. He/she shall be able to render, assistance to Ophthalmologist/doctors in eye institutions.

PRACTICALS

1. Practical As an Ophthalmic Assistant:
   - 1.1 Initial patient contact and reception & Ethics
   - 1.2 Office manners, Secretarial assistance, Record & their retrieval.
2. Sterilization & Theatre:
   General Aspects, Sterilization & Disinfection, Theatre Setup and preparation, Autoclaving & hot air oven, Eye instruments, Operating room equipment & supplies, Surgical scrub, laying operating trolley for surgery, Pre & Post operative instructions, care and dressing.
3. Surgical Assistance in Operative Procedures on:
   Lids, Lacrimal apparatus, Extra ocular Muscles, Cornea, Lens, Glaucoma, Enucleation / Eye Banking, Trauma, Retina & Vitreous, Laser applications.
4. Practical Training Programme:
   - 4.1 Reception / Record Keeping Rotational duty, Receiving patients phone calls, making appointments, making OPD/Indoor tickets, consent taking, vision (Distance /Near), history taking.
   - 4.2 Refraction:

Vision recording – Distance/Near	250 Cases
Colour Vision (Ishihara) Recording	25 Cases

   Identification of Lenses (Spherical, Cylindrical,

	and Prisms & their Neutralization	25 Cases
	Lensometry and vertex refraction meter	25 Cases
	Retinoscopy & prescription of glasses	150 Cases
	Subjective verification & P.M.T.	150 Cases
	Auto-Refraction	50 Cases
4.3	Visual Fields:	
	Central	10 Cases
	Applanation Tonometry	5 Cases
4.4	Treatment Room & Minor Surgical procedures:	
	Instillation of drops	50 Cases
	Sub conjunctival Injection	5 Cases
	Laying the trolley for minor surgery.	15 Cases
	Syringing	30 Cases
	Tonometry (& Tonometer care)	25 Cases
	Epilation	25 Cases
	Eye OPD:	
	History taking	50 Cases
4.6	Indoor Cases (Including record Keeping)	50 Cases
	History taking, Preparation of eye (Pre-op.), Blood pressure, Urine & Smear examination, Laying of trolley & post-operative care	
	Dressing rotational duty	
4.8	Operation Theatre:	
	Preparation of Theatre	3 times
	Carbolisation & fumigation	3 times
	Autoclaving/Sterilisation of instruments.	
	Swabsticks, pads, drums	3 times
	Laying of trolley for surgery (Cataract, Glaucoma, Sac, Squint)	
	Maintenance of O.T. equipments/surgical instruments	25 Cases:

Schedule-15

[See regulation 41(2)]

Syllabus of Diploma in Perfusion Technology

FIRST YEAR

PAPER-I

Section-A- Brief and General Knowledge about

1. General Human Anatomy & Physiology

2. Anatomy of Heart Lung Blood Vessel, Kidney, liver, Nervous system, Endocrine system, circulation, Physics, factors endolgy, blood supply of visual organs.
3. Heart as Pump & Cardiac cycle
4. Blood, its components and Haemostatic
5. Pharmacology of commonly used medicine e.g. Inotropes, antiarrythmics
6. Conduction system of the Heart.
7. Excretory function and Acid Base Balance (Electrolyte balance)

PAPER-II

1. Heart blocks and Pacemaker
2. Respiration, Gas Exchange & Diffusion
3. E.C.G and Defibrillation
4. Rheumatic heart disease pathology and surgery
5. Ischemic heart disease –(Pathology and Surgical Management)
6. Acyanotic Congenital Heart Disease-(Pathology and Surgery)
7. Cyanotic Congenital Heart Disease-(Pathology and Surgery)
8. Method of Sterilization –Definitions, Types, Methods, Central Sterilization
9. Asepsis and Theatre techniques
10. Liver function tests.
11. Endocrine system, catecho lamine, adrano cotical Hormones
12. Pharmacology- Intropes +Vasoprssin
    Vasodilators+ Hypotehsive agents
    Treatment of HT
    Plasma expanders-volume expanders
    Anti-arrgythmic agent
    Anesthetic agent+muscle relaxant
    Anticoagulant
    Drugs affecting coagulation
    Thramobolytics
    Steroids
    Buffers
    Diuretics
    Insulin, Antiboitics

SECOND YEAR

PAPER-I

1. Types of Oxygenators and some common Oxygenators.
2. Heat Exchangers, Filters and Resevoirs

3. Aortic and Arterial Cannuae.
4. Venous Cannulae and techniques.
5. Priming fluids, PCV
6. Calculation of BSA, Circulating PCV, SVR.
7. Myocardial preservation+Cardioplegia
8. Safety devices
9. Complication during CPB+management
10. Blood conservation + Perfusion
11. Oxygen Preservation, ECMO

PAPER-II

1. Technique of Cardiopulmonary Bypass
2. Cardioplegia, additives & techniques.
3. Hypothermia, Circulatory arrest and Homeostatics Management.
4. Body reponse of extracorporeal circulation and complication of C.P.B.
5. Ultra filtration during Cardiopulmonary Bypass.
6. Emergency during Cardiopulmonary Bypass.
7. Perfusion Technology for Minimally Invasive Cardiac Surgery
8. Perfusion for aortic surgery.
9. Comlication during CPB+ Management.

DIPLOMA IN PERFUSION TECHNOLOGY PRACTICAL

Maximum Marks-100
Minimum Marks-50

Division of Marks
Log Books of cases
(Procedures- Observe, Assist & under supervision) -10 Marks
Internal Assessment -30 Marks
Viva-
a) Internal -30 Marks
b) External -
30 Marks

Syllabus for practical Cardio Thoracic Perfusionist

1. Handling of sterile components/ Maintenance of sterile environment in OT
2. Priming of circuit
3. Assembly of circuit

4. Leakage detection
5. Air bubble removal
6. Roller pump calibration
7. Wet runs
8. Monitoring parameters
9. sampling and data recording
10. Drug management during cardiopulmonary Bypass
11. Equipment maintenance
12. Coordination with Surgeon and Anesthetist
13. Technique of Cardiopulmonary By pass
14. Blood Gas Analyzer
15. Ventilation and Termination of CPB
16. Cardiac Support- IABP, Pacemaker, degibrillator, Infusion Pump, Central monitor, ECG machine
17. Sterilization and disinfection of Operation Theatre, ICU, Instruments.
18. Positioning of patients in various operations
19. Preparation of instruments on trolley for Cardio thoracic Surgery operations.

a) Cardiac Surgery
b) Thoracic Surgery
c) Vasuclar Surgery

20. In order of eligible candidate should

Observe	50 procedures
Assist	20 procedures
Perform under supervision	15 procedures

21. Machines used in Cardio thoracic Operation Theatre- Their uses and maintenance

a) Monitor
b) Operation Table
c) Electro Surgical Unit(Cautery)
d) Operation Lights
e) Bronchoscope
f) Esophagoscope
g) TEE
h) Fiber optic scopes

i) Sterilizers

Schedule-16
Charges and Fees
[See regulation 45,47,52 & 54]

Various charge and fees:-

S No.	Fees for	Charges
1.	Application fees for Recognition (Non refundable) (One time only)	5000/-
2.	Recognition Fees per course (Non refundable) for first year	30,000/-
3.	Inspection by third Inspector or Registrar	25,000/-
4.	Recognition Fee for subsequent year per course (Non refundable)	25,000/-
5.	Registration fee for Trained Personnel	2,000/-
6.	Registration fee on Reciprocal Basis	
	(i) For all the candidates registered with other State Councils.	3,000/-
	(ii) For all the candidates qualified from other Countries.	10,000/-
7.	Fee for Renewal after every five years of Registration	1,500/-
8.	Tuition Fees (to be charged from students by the institution per year)	35,000/-
9.	Enrolment fee per Candidate	500/-
10.	EXAMINATION FEES per student (including marks sheet)	1,000/-
11.	Revaluation fee per paper	500/-
12.	Re-Totaling for one Subject	200/-
13.	Re-Appearing of failure Candidates	250/-
14.	For documents-	
	(i) Fee for issue of Duplicate Mark Sheet	200/-
	(ii) Issue of Duplicate Registration Certificate	500/-
	(iii) Issue of Duplicate Diploma Certificates	500/-
	(iv) Urgent Fees	1,000/-
15.	Late fee for Examination	250/-
16.	Late fee for Registration	1,000/-
17.	Late fee for Renewal of Registration	500/- (Per Year)

Schedule-17

[See regulation 53(1)(E)]

Equipments required for Diploma in Medical Laboratory Technology

Refrigerator	-- 01
Centrifuge	-- 02
Microscope	-- 10
Hand lens	-- 02
microtome	-- 01
Histokinetic	-- 01
Spirit lamps	-- 10
Sahli's Hemoblobinometer	-- 10
Hot air oven working	-- 01
Stabilizers	-- 01
Analytical balance	-- 01
Chemical balance	-- 01
Certified weight box	-- 01
pH meter	-- 01
Hot plates	-- 02
Dessicator	-- 01
Incubator (2' x 3')	-- 01
Timers	-- 01
Thermostatic water bath	-- 02
Improved Triple ruled neubauer Counting chamber	-- 10
Safety spectacles	-- 02
Charts and Models	
Chemicals and Stains	-- as per standard
Tripod stand and burner	-- 05
Autoclave	-- 01
VDRL Shaker	-- 01
VDRL Slide	-- 05
Loviband comparators	-- 01
Bacterial loop	-- 10
Thermometer up to 200^0 C	-- 02
Candle Filter	-- 01

Charts: Models showing regions / parts of human body.

2 sets of Histological slides and which are mentioned in the syllabus.

Skeleton	-- 01
Sets of individual bones	-- 01
Blood group antigens: anti-A, anti-B, anti-D	
lancets	-- 01 boxes
Westergrins tubes	-- 05
Wintrobe's tubes	-- 05
Capillary tubes	
(Heparinised & Plain)	-- 03 boxes each
Petridishes (diff. sizes)	-- 50
Pauster pipettes	-- 50
Adjustable micro pipettes	-- 01
Funnels - different sizes	-- 10
Beakers - different sizes	-- 10
Measuring jars - different sizes	-- 10
Conical flasks	-- 10
Round bottom flask	-- 10
Watch glass	-- 50
Volumetric flask	-- 10
Test Tube holder	-- 20
Centrifuge Tubes	-- 50
Folin Wu Tubes	-- 10
Test tube racks	-- 20
Serological Pipettes	-- 20
Glass rods (Diff. sizes)	-- 20
Rubber gloves	-- 01 box
Surgical gloves	-- 01 boxes
Rubber teats (diff. sizes)	-- 10 Nos.
Dropper bottles	-- 20

Schedule-18
[See regulation 53(1)(E)]
Equipments required for Diploma in Radiation Technology

Mobile X-Ray machine – one
Fixed 500 MA X-Ray machine – one
Fixed 300 MA X-Ray machine – one
CR/DR system – one
Cassettees and Hangers in adequate number
Automatic file processor
Ultrasound Machine

CT Scan Machine will recording system

Schedule-19

[See regulation 53(1)(E)]

Equipments required for Diploma in Dental Mechanics Technology

1. Mean value articulators
2. Semi-adjustable articulators
3. Dental flasks with clamps
4. Acrylisers
5. Vacuum – mixer
6. Vibrator
7. Cast -drying oven
8. Centre grinder / palatal trimmer
9. Lab hand piece with micro motor
10. Hanging motors
11. High speed lathe
12. Casting machine with crucible
13. Casting furnace
14. Casting rings
15. Sandblaster
16. Model trimmer
17. Electrolytic polishing unit
18. Micro motors
19. Agar conditioner and duplicating flasks
20. Surveyors
21. Ceramic firing unit
22. Pindex die pin attaching unit
23. Die cutting unit
24. Denture finishing kit
25. Metal finishing kit
26. Ceramic restoration finishing kit
27. Dental Chair

Schedule-20

[See regulation 53(1)(E)]

Equipments required for Dental Hygiene Technology

A Laboratory / Dental Clinic / Dental Workshop well equipped with Dental Equipments, instruments and Materials used during the course of the study with adequate Patient inflow for training.

a. Chairs
b. Ultrasonic scalers

c. Han instruments
d. Autoclave
e. Details of IOPA amchine
f. Panoramic machine
g. Extra oral machine
h. Automatic processor
i. Mannual processing facilities

Schedule-21
[See regulation 53(1)(E)]
Equipments required for Diploma in Operation Theater Technology

OT tables –hydraulic / electronic with lithotomy, kidney bridge facilities - 01
Ceiling mounted O.T. light - 01
Suction apparatus - 01
Autoclaves - 01
Sterilization bin - 01
Cautery machine - 01
Fumigation equipment for OT - 01
Boyles anesthetic machine - 01
OT instruments for all specialties - 01 set each
Pulse oximeter - 01
ECG monitors - 01
Defibrillators - 01
Ambo bags Ventilator - 01
Central oxygen, nitrous oxide from manifold rooms
C-arm with image intensifier and necessary protective equipment

Schedule-22
[See regulation 53(1)(E)]
Equipments required for Diploma in Dialysis Technology

A dialysis unit consisting of a hall to accommodate the 5 HD machines and the following:

(a)Complete water treatment system comprising of Pre-filter, Carbon filter, Softener, R.O. unit and storage tank — 1 full system to run 5 HD machines

ITEM	NO.	USAGE
a) H.D. Machines	02	for regular patients
b) H.D. Machines	01	for Isolation patients

c) CRRT Machine	01	for ICU dialysis

SL. NO.	EQUIPMENTS	QTY.
	HAEMODIALYSIS UNIT	
1.	Cardiac Monitor	01
3.	Defibrillator	01
4.	Humidifier	04
5.	Glucometer	02
6.	Weighing Machine	01

Schedule-23
[See regulation 53(1)(E)]
Equipments required for Diploma in Orthopedic Technology

1. Plaster Cutter
2. fracture table
3. P.O.P. – Plaster
4. P.O.P. Bandage
5. Fibre Caste
6. Plaster Technique Manual
7. Plaster Spreader
8. Steel Bowel
9. Plaster Bowel Stand
10. View Box
11. X-Ray Machine/ C Arm

Schedule-24
[See regulation 53(1)(E)]
Equipments required Diploma in E.C.G. Technology

ECG machines complete with leads - 2
Cardiac defibrillator
Pulse Monitor
Helter ECG, TMT

Schedule-25
[See regulation 53(1)(E)]
Equipments required Diploma in Blood Bank Technology

S. No.	Name of the Equipment	Specifications	Qty
1	Donor Chair	Fully upholstered and cushioned to provide comfortable position	2

		Variable position and heights for either arm as well reclining body position Smooth shifting from head-low feet high position to any intermediate position with push button provision. Mobile on wheels with single break lock system and foot control. Better model for demonstration and approval.	
2	Bedside Locker	405 X 405 X 820 mm. M S body power coated -- S S Top. One drawer, One locker box 2 rear twin type casters 50 mm diameter 2 pedestal Stands in front.	4
3	Sphygmomanometer	ISI standard 3390 99.9% pure mercury Error tolerance ± 3 mm Hg. Micro filter for long life Precision air release valve Cuff with 2 tubes, rubber bladder Metal face plate with easy to read upto 300 mm Hg, Yellow scale Mercury lock for storage, transport, maintenance. Cleaning device for glass tube PVC zipper case	4
4	Stethoscope	Multiplicity Adult	

		chest piece Ultrasensitive diaphragm for greater amplification.. Color co-ordinated non-chill bell and snap on ring to retain diaphragm for patient comfort. Suitable case for protection with 2 spare diaphragms and air tips. Extra thick tubing wall with ID Tag 3 years warranty.	
5	Recovery bed	Semi fowler bed. 3 Section Mattress. (HDP – 40 density, 100 mm thick foam covered with cloth backed Rexene of superior quality). M S powder coated main frame 1 fixed foldable crank handles. ABS head and foot boards, with Indian Rubbished castors, two with brake, without IV Bottle rod.	1

Schedule-26

[See regulation 53(1)(E)]

Equipments required Diploma in Endoscopy Technology

Well equipped operation theater
gastroduodenoscope ,
colonoscope ,
bronchoscope , drugs used in these procedures ,
accessories for various procedures like biopsy forceps , bending instruments , dilators etc.

Emergency tray with all medicine and primary emergency equipment.
Oxygen Cylinder
cautary machine to prevent massive bleeding from any vessel.
C arm IITV

Schedule-27
[See regulation 53(1)(E)]
Equipments required Diploma in E.E.G. Technology

1. EEG Machine (Analogue) -01
2. EEG Machine (digital) -01
3. EMG/NCV/EP Machine -01
4. Video EEG -01

Schedule-28
[See regulation 53(1)(E)]
Equipments required Diploma in Cath lab Technology

Cath lab machine complete with all accessories installed as per BARC norms in A.C. room.

Schedule-29
[See regulation 53(1)(E)]
Equipments required Diploma in Emergency & Trauma Care Technology

S. No.	Name of Equipment
1	C-Arm Image Intensifier
2	3 D Ultrasonography
3	500 MA X-ray
4	CT Scan
5	100 MA portable X-ray
6	O.T. Table
7	Cautery Machine
8	O.T. ceiling light
9	High Vaccum Suction Machine
10	Anaesthesia Machine with Monitor
11	Standard Ventilator
12	Pneumatic tourniquet
13	General surgical instrument
14	Spinal surgical instrument
15	Thoracotomy instrument
16	Faciomaxillary instrument

17	Power drill and power saw
18	Craniotomy instrument
19	Splints and traction
20	ABC Machine
21	Automatic bio-analyser
22	Defibrillator
23	Operating Microscope
24	Operating headlights
25	Fowler's bed
26	Rehabilitation equipment
27	Blood equipment
28	Ventilator
29	Monitor
30	Laminar air flow
31	Manifold system
32	Electricity back-up
33	Bed Matress + Linen
34	E.C.G. Machine
35	Well equipped ambulance

Schedule-30

[See regulation 53(1)(E)]

Equipments required for Diploma In Opthalmic Technology

Snellen's Charts
Torches
Indirect Ophthalmoscope
Keratometer
Sterilization Unit / Autoclaves
Boyles apparatus
Tonometer schiots
Operating microscopes
Refraction units
Direct Ophthalmoscopes
Slit Lamp
O.T. Lights
O.T. Tables / Trolleys
Dressing Bins
A Scan Biometry
Autorefractometer

Furniture for Out-patient room, offices, class rooms, Library, Wards etc.

Schedule-31

[See regulation 53(1)(E)]

Equipments required Diploma in Perfusion Technology

Heart lung machine complete with all accessories.

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By order of the council,
Dr. Niraj K. Pawan,
I.A.S.
Chairman.

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