

MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION, MUMBAI .

1	Name of Course	Diploma Course in Dialysis Technology (W. E. F. 2017-18)									
2	Course Code	201421									
3	Max.No.of Students Per Batch	25 students									
4	Duration	2 years									
5	Type	Full time									
6	No.Of Days / Week	6 Days									
7	No.Of Hours /Days	7 hrs									
8	Space Required	Theory Class Room – 200 sqft, Lab Sub.– 400 sqft, Lab Elective - 400 sqft Total = 200 sq.ft + 400 sq.ft. + 400 sq.ft. = 1000 Sq.Ft. 1) Hemodialysis Lab – 400 sqft (either at hospital or at institute) 2) MOU with Dialysis Lab having minimum 5 Machines is required Distance between Dialysis Lab and Institute Should not be more than 20 Km.									
9	Minimum Entry Qualification	S.S.C Pass									
10	Objective Of Course	1) Function as a Dialysis professional under the supervision of the physician or Nephrologist in a dialysis center. 2) Understand the process of operating dialysis equipment & alternate dialysis procedures. 3) Apply knowledge & skills to give safe & effective care to the individual undergoing Hemodialysis treatment. 4) Understanding complication during dialysis & reporting to the physician or nephrologist. 5) Understand operation, Routine maintenance, Identification of malfunction in equipment, troubleshooting in dialysis machine,water treatment plant, dialyzer reprocessing machine etc.									
11	Employment opportunity	1) Technician at Hemodialysis centers / kidney care centers 2) In charge Kidney Care Centers									
12	Teachers qualification	For Vocational Subject - MBBS, MD Nephrology Guest Faculty for other subjects									
13	Teaching Scheme -										
	Sr	Subject	Subject Code	Clock Hours/Week							
				Theory	practical	Total					
	1	English (Communication skill)	90000001	2 hrs	1 hrs	3 hrs					
	2	Elective-I	--	2 hrs	1 hrs	3 hrs					
	3	Elective-II	--	2 hrs	1 hrs	3 hrs					
	4	Hemodialysis- I	20140045	3 hrs	8 hrs	11 hrs					
	5	Hemodialysis- II	20140046	3 hrs	8 hrs	11 hrs					
	6	Renal Dialysis Replacement Therapy	20140047	3 hrs	8 hrs	11 hrs					
		Total				42 hrs					
14	Internship	Four Month Summer Internship from 1st April to 30th July is Compulsory.									
15	Examination Scheme- Final Examination will be based on syllabus of both years.										
		Subject	Subject Code	theory			Practical			Total	
				Duration	Max	Min	Duration	Max	Min	Max	Min
	1	English (Communication Skill)	90000001	3 Hrs	70	25	3 Hrs	30	15	100	40
	2	Elective-I	--	3 Hrs	70	25	3 Hrs	30	15	100	40
	3	Elective-II	--	3 Hrs	70	25	3 Hrs	30	15	100	40
	4	Hemodialysis- I	20140045	3 Hrs	100	35	3 Hrs	100	50	200	85
	5	Hemodialysis- II	20140046	3 Hrs	100	35	3 Hrs	100	50	200	85
	6	Renal Dialysis Replacement Therapy	20140047	3 Hrs	100	35	3 Hrs	100	50	200	85
		Total								900	375
16	Teachers –Three Teachers per batch for vocational component. For English,Elective-I & II guest faculty on clock hour basis.										
17	Student have to choose any one subject for Elective-I and Elective-II from below given subjects										
18	a) For Elective I – Student can choose any one subject						b) For Elective II – Student can choose any one subject				
		Code	Subject Name				Code	Subject Name			
		90000011	Applied Mathematics				90000021	Applied Sciences (Physics & Chemistry)			
		90000012	Business Economics				90000022	Computer Application			
		90000013	Physical Biology (Botany & Zoology)				90000023	Business Mathematics			
		90000014	Entrepreneurship								
		90000015	Psychology								

Theory & Practical - I - Haemodialysis - I – 1st year
(Subject Code – 20140044)

Subject	Theory	Practicals
Haemodialysis-I	<ul style="list-style-type: none"> •Basic Understanding of Healthcare Service Providers (primary, secondary & tertiary) • Basic Understanding of Hospital Functions • Basic Understanding of Dialysis centers • Understanding of Dialysis unit at different level (National / State / District) 	<ul style="list-style-type: none"> •Study the role & functions of various departments, professionals & supportive staff of the hospital •Prepare a chart depicting the role & function of departments/professionals/supporting staff •Study the role & functions of various supporting departments & prepare a chart showing chain of commands in various departments •Classification of hospitals on the basis of different criteria (internet search on hospitals) •Common causes of diseases, their source of infection & casual agents
	<ul style="list-style-type: none"> • Basic Understanding of anatomic definitions, cells and tissues of human body. • Basic Understanding of all the body systems and its functions. • Basic Understanding of different fluid compartments in human body. • Basic understanding of various membrane transport mechanisms in human body. 	<ul style="list-style-type: none"> •Study of biological parts of human body •Identification of different parts of body •Draw a diagram of lungs, urenary systems, hearts & kidney & demonstration of roles & functions of human body •Study the anatomy & physiology of kidney in detail
	<ul style="list-style-type: none"> • Understand macroscopic anatomy of Kidneys. • Understand microscopic anatomy of kidneys. • Understand major physiological functions of kidneys. 	<ul style="list-style-type: none"> •Procedure For Care And Cleaning Of Medication Refrigerator •Procedure For On Call Dialysis Coverage •Stock Management
	<ul style="list-style-type: none"> • Basic understanding of pharmacodynamics and pharmacokinetics. • Understanding classification of drugs. • Understanding different routes of drug administration. • Understanding commonly used emergency drugs. • Describe SALA medicines, precautions and ADR. 	<ul style="list-style-type: none"> •Procedure For Administration Of Intravenous Dialyzable Antibiotics After Dialysis • Procedure For Medication Reactionss •Procedure For Erythropoietin Administration •Procedure For Blood And Blood Products Administration During Dialysis
	<ul style="list-style-type: none"> To develop understanding of the concept of Healthy Living • To develop understanding & procedures of Hand Hygiene To develop techniques of Grooming • To be equipped with Techniques of Use of PPE • To be vaccinated against common infectious diseases 	<ul style="list-style-type: none"> •Identification of common places in the hospital wuth highest rate of infection & common places of the body where microbes are commonly found •Enlist the name of bacteria & viruses causing dieaseas in human body •Procedure for physical method of sterlisation •Enlist the common disinfectant use in the hospitals along with chemical use for disinfecting glassware •Procedure For Sterilisation And Hygiene •Procedure For Reuse Of Dialyser And Tubing

	<ul style="list-style-type: none"> • Describe necessary steps taken to ensure safety and comfort to the patient during the procedure • Describe importance and methodology of cleanliness, and hygiene environment in collection space • Understand sensitivities involved in patient's right and responsibilities • Learn dialysis technician's role in maintaining patient's rights 	<ul style="list-style-type: none"> • Demonstrate hand washing • Demonstrate trimming of nails • Preparation of check list of health parameter • Perform various physical activities & explain their advantages & limitations • Hand on practice section on grooming & hand washing, hygiene practices followed in the hospitals
	<ul style="list-style-type: none"> • Understand need for customer service and service excellence in Medical service • Understand work ethics in hospital set up • Learn Goal setting, team building, team work, time management, thinking and reasoning & communicating with others 	
	<ul style="list-style-type: none"> • To learn about the general lay out of a dialysis facility/ unit. • To learn about general conditions required for a dialysis unit. • To learn about personnel required for the smooth operation of dialysis unit. • To learn about standards of dialysis unit. 	<ul style="list-style-type: none"> • Procedure For Location, Storage, And Procurement Of Equipment And Supplies • Procedure For Storage Of Dialyser And Tubing • Procedure For Preparation, Storage And Testing Of Bicarbonate Solution:
	<ul style="list-style-type: none"> • To understand acute renal failure. • To understand chronic renal failure characteristics and management. • To understand the importance of Dialysis as a therapeutic measure for CRF. 	<ul style="list-style-type: none"> • Procedure For Starting And Closing Dialysis
	<ul style="list-style-type: none"> • To develop understanding about history of Hemodialysis. • To develop understanding of evolution of dialyzer. 	

Theory & Practical - I - Haemodialysis - I – 2nd year
(Subject Code – 20140044)

Subject	Theory	Practicals
Haemodialysis-I	<ul style="list-style-type: none"> • To learn about arterial and venous vasculature of the upper arm. • To learn about temporary vascular access in detail. • To learn about permanent vascular access in detail. • To learn about monitoring and surveillance of vascular access 	<ul style="list-style-type: none"> •Procedure For Access Site Preparation For Initiating Dialysis With Av Fistula •Procedure For Initiating Dialysis In Patient With Double Lumen Catheter •Procedure For Termination Of Hd Procedure With Double Lumen Catheter •Procedure For Termination Of Dialysis In Patient With Av Fistula Or Access •Procedure For Accessing New Fistulas •Procedure For Early Identification Of Fistula Stenosis •Procedure For Needle Displacement/Infiltration
	<ul style="list-style-type: none"> • To learn about hemostasis and steps involved in hemostasis. • To learn about various anticoagulant drugs used during hemodialysis. • To learn about alternative anticoagulation measures. • To gain broad understanding of heparin free Haemodialysis 	<ul style="list-style-type: none"> •Procedure For Anticoagulation For Dialysis • Procedure For Clotting Of Dialyzer, Blood Lines, Drip Chambers •Procedure For Recognition And Management Of Hemolysis During Dialysis.
	<ul style="list-style-type: none"> To learn about characteristics of urea. • To learn about dialysis adequacy. • To learn about various methods used to measure dialysis adequacy. • To learn about fractional clearance index of urea or Kt/V. • To learn about urea reduction ratio(URR). 	
	<ul style="list-style-type: none"> • Understand the importance and method of observing and reporting while dealing with patients during pre and post dialysis • Understand the importance and method of Observing and reporting while assisting the nephrologist and other members of the team during the dialysis • Understand the importance and method of observing and reporting the adverse reactions/events. • To learn about effective communication system in order to inform the person in authority 	<ul style="list-style-type: none"> •Procedure For Scheduling

	<ul style="list-style-type: none"> • Understand guidelines for documentation • Understand Guidelines for Collecting documentation • Learn various types of records in Dialysis set up • Understand use and importance of record maintenance in Dialysis set up • Understand abbreviations and symbols • Enter, transcribe, record, store, or maintain information in written or electronic/magnetic form 	<ul style="list-style-type: none"> • Identifiacation of documents in analysing the need of patient • Demonstration of knowledge of maintaing confefidentiality of patients records/documentation • Procedure of correction & ommission in documents • The procedure to arrange various records in propaer sequence & maintain the records in proper documentation format • Enlist the document maintain by the hospotal in MLC & RTA cases.
	<ul style="list-style-type: none"> • How to maintain restful environment • Learn General and Specific etiquettes to be observed on duty • Understand need for compliance of organizational hierarchy and reporting • Understand the legal and ethical issues • Understand importance of conservation of resources in dialysis unit 	

Theory & Practical - II - Haemodialysis - II – 1st year
(Subject Code – 20140045)

Subject	Theory	Practicals
Haemodialysis II	To gain broad understanding of solute, solvents and semipermeable membrane. • To learn Diffusion and Osmosis process. • To gain broad understanding of Ultrafiltration, Adsorption and convection. • To gain understanding of Electrolytes.	•Procedure For Isolated Or Sequential Ultrafiltration •Procedure For Change System While Patient On Haemodialysis
	• To learn about types of dialyzer, components of dialyzer and characteristics of dialyzer. • To learn about different membrane materials. • To learn priming of dialyzer and extra corporeal circuit. • To learn dialyzer reprocessing techniques(Both manual and automatic).	•Procedure For First Use Syndrome (New Dialyzer Syndrome)
	• To learn about dialysate. • To learn about the chemical composition of dialysate solutions.	•Procedure For Dialysate Chemistry Testing •Procedure For Description Of The Water Purification System •Procedure For Dialysate Temperature Alarm
	• To learn about various components of Dialysis machine. • To learn functions of dialysis machine. • To learn about the operation and maintenance of HD machine.	•Procedure For Medical Equipment Maintenance •Preventive Maintenance Of Dialysis Machines •Procedure For Air Detector Alarm (If Machine Alarms) •Procedure For Emergency Water Outage •Procedure For Venous Pressure Alarm During Dialysis
	• To learn about terminologies used in the dialysis water treatment system operation. • To learn about mechanical components of a dialysis water treatment system. • To learn about the operation and maintenance of a water treatment plant. • To learn about microbiological monitoring of water treatment plant	•Procedure For Regeneration Of DM Plant •Procedure For Obtaining Water Cultures Samples From Dialysis Machines •Procedure For Water Quality Monitoring •Procedure Of Water Supply

Theory & Practical - II - Haemodialysis - II – 2nd year
(Subject Code – 20140045)

Subject	Theory	Practicals
Haemodialysis-II	To develop broad understanding of the Role of DT • To identify Dialysis maintenance needs to be taken care by DT • To develop Understanding of Patient Comforts and Safety • To exhibit Ethical Behaviour	•Procedure For Patient Safety During Dialysis •Procedure For Total Power Outage
	• To learn about infection, mode of transmission and standard precautions in the dialysis unit (Pre, during & post procedure) • To learn safe injection practices. • To learn aseptic AVF/AVG cannulation and decannulation procedure. • To learn aseptic catheter care procedure.	•Procedure For Aseptic Technique •Procedure For Subclavian/Femoral Catheter Insertion
	• To learn about extra corporeal detoxification and it's complications. • To learn about Plasmapheresis • To learn about Plasma Exchange • To learn about various toxins which can be removed by extra corporeal detoxification • To learn about different modalities for extra corporeal detoxification.	•Procedure For Emergency Return Of Blood •Procedure For Recirculating Extracorporeal Blood
	• To learn about Acute Renal Failure(ARF) • To learn about principles behind continuous dialytic techniques or Continuous Renal Replacement Therapy (CRRT). • To learn about different modalities and complications of CRRT.	•Procedure For Fluid Overload Management •Procedure For General Policy For Medical Complications During Dialysis
	• To learn about pre dialysis patient assessment. • To learn about pre dialysis vascular access care. • To learn about intra dialysis patient care. • To learn about post dialysis patient care. • To learn about pre, intra, post dialysis patient care in different settings.	•Procedure For Access Care For The Haemodialysis Patient •Procedure For General Guidelines For Laboratory Testing/Consults In The Dialysis Unit

	<ul style="list-style-type: none"> •Entrepreneurial Pursuits and Human Activities: •Nature, Purpose and pattern of Human Activities: Economic and Non-Economic, Need for innovation. • Rationale and Relationship of Entrepreneurial pursuits and Human Activities 	<ul style="list-style-type: none"> • Preparation of a brief report based on the observations made during study visit to an enterprise.
	<ul style="list-style-type: none"> •Acquiring Entrepreneurial Values and Motivation •Entrepreneurial Values, Attitude and Motivation- Meaning and concept. • Developing Entrepreneurial Motivation and Competency – concept and process of Achievement Motivation, Self-efficacy, Creativity, Risk Taking, Leadership, Communication and Influencing Ability and Planning Action. • Barriers to Entrepreneurship • Help and support to Entrepreneurs 	
	<ul style="list-style-type: none"> •Project work •Understand the concept of making projects and preparing the project reports. •Preparation of a project using the software skills learned during the course 	<ul style="list-style-type: none"> •Project Work • Making a working model/project using MS Excel/Power Point

Theory & - III - Renal Dialysis Replacement Therapy – 1st year
(Subject Code – 20140047)

Subject	Theory	Practicals
Renal Replacement Therapy	<ul style="list-style-type: none"> • To develop understanding and precautions to ensure Patient’s Safety • To develop basic understanding and precautions to ensure sample preservation while Transporting • Describe common emergency conditions and what to do in medical emergencies • Describe basics of first aid • To develop understanding and precautions to ensure self-safety 	<ul style="list-style-type: none"> •Procedure For Laboratory Studies •Procedure For Arterial Blood Gases On Dialysis •Procedure For Air Embolism • Procedure For Cardiac Arrhythmias •Procedure For Chest Pain During Dialysis •Procedure For Headaches On Dialysis •Evaluation And Management •Procedure For Hypotension During Hemodialysis •Procedure For Management Of Hypertension In Patients Undergoing Hemodialysis •Procedure For Oxygen Therapy •Procedure For Handling Of Positive Patients On Dialysis •Procedure For Dialysis In Seropositive Patients
	<ul style="list-style-type: none"> • To gain understanding of importance of proper and safe disposal of bio-medical waste & treatment • To gain understanding of categories of biomedical waste • To learn about disposal of bio-medical waste – colour coding, types of containers, transportation of waste, etc. • To gain broad understanding of standards for bio-medical waste disposal • To gain broad understanding of means of biomedical waste treatment •Explanation of autoclaving & shredding • Description of transportation process of bio medical waste •Importance of color coding criteria recommended by WHO •Identification of role of various personnel in bio medical waste management in hospitals 	<ul style="list-style-type: none"> •Identification of waste according to their category •Identification & Enlisting the roots of transmission of infection in hospitals •Procedure for disposing microbiological & bio technological waste in hospitals •The procedure for treatment of general waste & bio medical waste in hospitals •The procedure for color coding, segregation, packaging, transportation & storage process of bio medical waste •Identification of roles of various health personnel in bio medical waste management

Alternative Therapies as help in Dialysis

- 1. Morphinum Therapy:** Morphin is an alkaloid of Opium; particularly can be indicated in Acute Renal Failure when the patients are in shock and terrorised with severe headache, most of them are in profound depression and irritable complaining of vertigo in least movement.

Administration: Internally in form of homeopathic dilution.

- 2. Eel-Serum Therapy:** Eels are elongated fish, snake like. They carry energy to antidote actions of toxic proteins whether from drugs, snake poison or some viral particles, which may also cause renal failure. This is helpful in chronic cases and will prove as an alternative to a mechanical dialysis.

Administration: is in form of molecule, molecule is a subtlest form of a substance.

- 3. Homeopathy: (i)** One drug of homeopathy 'Calcarea Arsenicum' has laurels in kidney failure, can be used in chronic cases when urine is scanty but frothy. The mental condition of patient will be in anger and anxiety with headache and vertigo. This can be used in acute, sub-acute and chronic renal failure. In this kidney region is sensitive on pressure, BP is high, urine possesses albumins, patient becomes breathless on slightest exertion.

(ii) One more drug of homeopathy is 'Cuprum Arsenitum' (the arsenic of copper) also known as Seheel's Green Therapy.

This is indicated in chronic cases when patient gets uraemic convulsions in spite of dialysis, has headache, vertigo and becomes unconscious because of brain oedema.

- 4. Nosode Therapy:** A nosode (Maul Halib) from cancer tissues may be helpful in correcting the enhancing parenchyma of kidney into control, particularly in a young individual.
- 5. Acupressure & Yoga, meditation:** This is auto energy boosting therapy, which may also include auto urine therapy.

Theory & - III - Renal Dialysis Replacement Therapy – 2nd year
(Subject Code – 20140047)

Subject	Theory	Practicals
Renal Replacement Therapy	<ul style="list-style-type: none"> • Basic sensitization about Renal Transplantation • To learn about pre-requisite of renal transplant • To learn about various investigations required for transplantation. • Introduction to graft failure, graft rejection and their management. 	
	<ul style="list-style-type: none"> • To learn principles of PD. • To learn aseptic PD procedure. • To learn aseptic PD catheter care. • To learn about PD complications and management. • To learn about PD adequacy measuring protocols. 	
	<ul style="list-style-type: none"> • Demonstrate the knowledge of different types of drug delivery system operated in the hospital • Maintain patients safety & effectiveness in drug delivery system • Different routes of administering the drug in patients body • Criteria for selection of drug doses form, types & formulation • Novel drug delivery system • Control drug delivery system, osmotic pressure control system • Types of drug delivery systems during dialysis 	<ul style="list-style-type: none"> • Prepare a comparative charts of various drug delivery methods including their advantages & disadvantages • Identify the sources of hazards of patients safety in drug delivery system • Identification common example of novel drug delivery system in hospital • Identification of controlled drug delivery system in hospital & prepare a report of observation
	<ul style="list-style-type: none"> • Types of disinfection, cocurrent & terminal disinfection, process of fumigation with sulphur • Management of isolation unit • Importance of care of rubber goods, procedure to undo the contaminated gloves, procedure of removing different kinds of stains • Care of syringes & needles • Disinfection of wards in the hospitals 	<ul style="list-style-type: none"> • Demonstrate knowledge of good housekeeping practices, observe the material used in cleaning of wards & prepare a report • Care of articles in the hospitals, identification of disinfectant used, removing different kinds of stains • Identification of various levels of cleaning techniques, chemical used • Role of GDA in managing disinfection of ward
	<ul style="list-style-type: none"> • Emergency Admission & discharge procedure • Safety & Security procedure • Techniques of handling & monitoring patients • Principle of transportation, internal-external transportation, care required before transportation of kidney patient 	<ul style="list-style-type: none"> • Draw a flow chart of discharge process of patient • Report on staff in controlling & commanding during the handing of patients • Report on logistic & supply management of the hospital

Infrastructure and Tool, Equipment required to be available in Institute

Sr.No.	Name	Required Quantity
1	Clinical activities	1
2	Internet facility	1
3	Teaching aids – models, charts, videos.	As per requirement
4	Administrative office	1
5	Library for institute	1
6	One classroom with a capacity for 25 students	1
7	Common room for boys	1
8	Common room for girls	1
9	MOU with Hospital having relevant facility	As per requirement
10	Chair & Desk	25 Nos.
11	Projector	01 No.
12	Computer with accessories	02 No.
13	Reuse of dialyzers	As per requirement
14	Dialyzer size and efficiency	As per requirement
15	Membrane flux and beta-2-microglobulin amyloidosis	As per requirement
16	Membrane flux and outcome	As per requirement
17	Dialyzer	As per requirement
18	Water system	As per requirement
19	Stethoscopes	10
20	Cushcush speculum	05
21	Sims speculum	05
22	Tongue depressor	05
23	Scissors '7'	10
24	Scissors '5'	10
25	Thumb forceps – toothed	10
26	Thumb forceps – non toothed	10
27	Test tube holders	10
28	Cheatle forceps	10
29	Paracentesis sets	02
30	Towel clips	25
31	Kneehammer	05
32	Needle holder	25
33	Bar speculum	05
34	Artery forceps	10
35	Bandage roller (16 cm x 100 cm)	25
36	Suction tube 10cm	05
37	Blade with handle	25
38	Hypodermic Needles B.P. handle (pkt of 10)	25
39	Intradermal Needles (pkt. Of 10)	25
40	L.P. needles	25
41	C.D. set	25
42	B.P.Apparatus	02
43	Round Bodied anaroid	02
44	Inch tape	02
45	Torch light (with cells)	02
46	First aid box (big)	02
47	Procedure Follow up CAPD Preparation Procedure	As per requirement
48	CAPD machines working Principles	As per requirement
49	Record keeping in dialysis room Patient record keeping in dialysis room Disinfection machines	As per requirement
50	Water quality and hardness check records Appointment schedules	As per requirement
