Indicative Syllabus for Various Group B non-faculty posts advertised vide Advt. No: AIIMS Bpl/Rectt. Cell/Gr. B/Non- Faculty/ 2018 /03 Date: 31/03/2018

Sl. No 1.	Name of Post	Eligibility	Proposed Scheme	No. of Questions	Syllabus
	Medical Social Service Officer Grade I	Essential Qualification & Experience: (i) MA (Social Work) / MSW, with specialization in Medical Social Work, from a recognized University / Institution And (ii) 5 Years' Experience in a government or private sector hospital of minimum 200 beds Desirable: Ability to use computers - Hands on experience in office applications, spread sheets and presentations.	a) Nature and development of social work	10	a) Nature and development of social work
			b) Sociological concepts and contemporary concerns	10	b) Sociological concepts and contemporary concerns Urban community development Human rights and social work practice, social policy,
			c) Human behavior and social environment	10	c) Human behavior and social environment, state, political economy and governance, social work with communities, social work with individuals, social work with group research in social work: quantitative approaches
			d) Social action and social movements	10	d) Social action and social movements, social work with the elderly, environment and social work, social work with families and children, occupational social work
			e) Research in social work	10	e) Research in social work, qualitative approaches
			f)Administration of welfare and development services	10	f) Administration of welfare and development services, organizational behavior and employee development, social defense and correctional services, rural community development
			g) Social justice and empowerment	10	g) Social justice and empowerment, social development, management of development organizations Social work with persons with disabilities, aspects of applied social work in hospitals etc. Human rights and social work practice Social work practice in mental health settings
			h) Social work and disaster management	10	h) Social work and disaster management, conflict mitigation and peace building, gender and development.
			i) Counselling	10	i) Counselling theory and practice
			j) HIV/AIDS		j) HIV/AIDS and social work practice,

			and social work practice	10	health care social work practice
2	**Dietician**	Essential Qualification & Experience: (i) M.Sc. (Home Science – Food and Nutrition)/M.Sc. (Clinical Nutrition and Dietetics)/ M.Sc. (Food Science & Nutrition)/M.Sc. (Food and Nutrition Dietetics)/M.Sc. (Food Service Management and Dietetics) from a recognized University/Institution. (ii) 3 years' experience in the line preferably in 200 bedded Hospital	a) Human Physiology	10	General principles of Physiology. The Skeleton – General Account .The Muscular System – General Account -Types of muscles, characteristics of each, Similarities and Differences. .Blood and Circulatory System – Blood and its composition, Functions of each constituent of blood, Blood groups, Blood transfusion and its importance, Coagulation of blood, Blood vessels, Structure and functions of heart, Blood pressure, heart rate, Cardiac output and their regulation. .Lymphatic System – Lymph, Lymph glands and functions, Spleen – Structure and Functions. • Respiratory System – Organs, Structure and Functions, Mechanism of Respiration, Chemical Respiration. • Digestive System – Structure and Functions of Alimentary tract. Functions of various secretions and juices – Saliva, Gastric, Bile, Intestinal, Pancreatic. Functions of enzymes in digestion. Digestion of nutrients – Proteins, Fats, Carbohydrates. Common problems of Digestive tract – Vomiting, Constipation, Diarrhoea. • Excretory System – Structure and Functions of (a) Kidney (b) Ureter (c) Bladder (d) Skin. Urine -Formation of urine, Composition of normal and abnormal urine. Role of excretory system in homeostasis, fluid balance, Regulation of body temperature. • Nervous System – Structure of Nerve Cell, Fibre, Classification of Nervous System, Central Nervous System – Brain, Lobes of brain, Cerebrum, Cerebellum, Medulla oblongata, Hypothalamus. Pituitary Gland – structure, Functions, Spinal Cord – structure and functions, Autonomic and Sympathetic nervous system. • Reproductive System – Female reproductive system – organs, structure and functions Male reproductive system – structure and functions, Menstruation,

					menstrual cycle, Puberty, Menarche, Menopause, Fertilization of ovum, Conception, Implantation • Sense Organs – Eye – structure and function, Ear – structure and function, Skin -structure and function • Glands and Endocrine System – o Liver – structure and function o Gall Bladder – structure and function o Enterohepatic circulation o Pancreas – structure and function o Endocrine system o Endocrine glands – structure and function. Hormone – types and functions, role in metabolism. Endocrine disorders o Regulation of Hormone Secretion
			b)Biochemistry	10	1. Introduction to Biochemistry – Significance of pH, Acid-Base Balance, Cell Structure, Composition, Organelles, Membrane and Function-Alterations and Significance. 2. Carbohydrates – Structure and properties of Mono-saccharides, Di-saccharides, Poly-saccharides. Study of intermediary metabolism of carbohydrates, Glycolysis, Aerobic, Anaerobic, Tricarboxylic acid cycle, Significance of TCA cycle integrating metabolism of carbohydrates protein and lipid, Gluconeogenesis, Glycogenesis, Glycogenolysis, Hexose monophosphate shunt. 3. Proteins – Structure, composition Classification and Function, Structure of important proteins with special reference to Insulin, myoglobin, and hemoglobin, Binding proteins and their functions – nutritional implications, Chemistry of amino acids, Metabolism of Proteins and amino acids – Build up of amino acid pool. Urea Cycle, Creatinine and Creatine Synthesis, Biochemical parameters and alterations in disease states and Protein malnutrition, Pregnancy, Inborn errors of metabolism. 4. Lipids – Definition, Composition, Classification, Structure and Properties, Lipoproteins, Metabolism of Lipids,

					Oxidation of fatty acids, Unsaturated fatty acids, Metabolism of ketone bodies, Biosynthesis of fatty acids, Phosphoglycerides, Biosynthesis of cholesterol and regulation, Bile acids and their metabolism, Plasma lipoproteins – Synthesis and Metabolism, Biochemical profile, alterations and significance, Prostaglandins. 5. Enzymes – Definition, Classification specificity of enzymes -Intracellular distribution, kinetics, inhibition, Factors affecting enzyme activity, Enzymes in clinical diagnosis. 6. Nucleic Acids – Composition, Functions, Classification, Structure and properties of DNA and RNA, Replication and transcription of genetic information, Mechanics of DNA replication, transcription, translation, Genetic code – Protein biosynthesis, Regulation of biosynthesis recombinant DNA Technology. Breakdown of purine and pyrimidine nucleotides. 7. Biological Oxidation, Electron Transport Chain, Oxidative Phophorylation. 8. Hormones – Mode of Action, Regulation of Metabolism Biochemical parameters. Endocrinological abnormalities and clinical diagnosis.
			c) Food Microbiology, Sanitation And Hygiene	10	1. Introduction to Microbiology – Mold, Yeast, Bacteria, Viruses, Protozoa, General Classification Family, Genus, Species. Study of their morphology, cultural characteristics and biochemical activities. Important microorganisms in foods, general. 2. Growth curve of a typical bacterial cell – Effect of intrinsic and extrinsic factors on growth of organisms, pH, water activity, 0- R potential, nutritional requirements, temperature, relative humidity and gaseous environment. 3. Primary sources of micro-organisms in foods – Physical and chemical methods used in the destruction of micro-organisms, pasteurization, sterilization. 4. Fundamentals of control of micro-

					organisms in foods – Extrinsic and intrinsic parameters affecting growth and survival of organisms. Use of high and low temperature, controlling moisture as water content, freezing, freezing-drying, irradiation, and use of preservatives in food. Storage of food-correct handling and techniques of correct storage, Temperatures at which growth is retarded and bacteria are killed, Storage temperatures for different commodities to prevent growth or contamination and spoilage. 5. Food spoilage and contamination in different kinds of foods and their prevention – Cereal and cereal products, pulses and legumes, Vegetables and fruits, Meat and meat products, Eggs and poultry, Milk and milk products. 6. Public health hazards due to contaminated foods – Food poisoning and infections -Causative agents, symptoms, sources and mode of transmission, foods involved, Method of prevention, Fungal toxins, Investigation and detection of food-borne disease outbreak. 7. Microbes used in biotechnology – Useful micro-organisms, Fermented foods – raw material used, organisms and the product obtained, Benefits of fermentation. 8. Indices of food, milk and water sanitary quality. Microbiological criteria of food, water and milk testing. Food standards, PFA, FPO, BNS, MPO, Agmark, Codex Alimentarius. 9. Hygiene and its importance and application – Personal hygiene – care of skin, hair, hands, feet, teeth, Use of cosmetics and jewellery, Grooming, Uniform, Evaluation of personal hygiene, Training staff. 10. Safe handling of food – Control measures to prevent food borne diseases and precautions to be taken by food handlers. Reporting of cold, sickness, boils, septic wounds etc. 11. Rodents and Insects as carriers of food-borne diseases. Control techniques. 12. Disinfectants, sanitizers, antiseptic

					and germicide. Common disinfectants used on working surfaces, kitchen equipment, dish washing, hand washing etc. Care of premises and equipment, cleaning of equipment and personal tools immediately after use, use of hot water in the washing process. 13. Waste disposal, collection, storage and proper disposal from the premises. 14. Legal administration and quality control, laws relating to food hygiene.
			d) Human Nutrition And Meal Management	10	1. Concept and Definition of terms – Nutrition, Malnutrition, Health, Brief history of Nutritional Science. Scope of Nutrition. 2. Minimum Nutritional Requirements and RDA. Formulation of RDA and Dietary Guidelines – Reference Man and Reference Woman. 3. Body Composition and Changes through the Life Cycle. 4. Energy in Human Nutrition – Energy Balance, Assessment of Energy Requirements. 5. Proteins – Protein Quality (BV, PER, NPU), Digestion and Absorption, Factors affecting protein bio-availability including Anti nutritional factors. Requirements. 6. Lipids – Digestion and Absorption, Intestinal resynthesis of triglycerides – Types of fatty acids, Role and nutritional significance (SFA, MUFA, PUFA, W-3) • Carbohydrates – Digestion and Absorption. Blood glucose and Effects of different carbohydrates on blood glucose, glycemic index. • Dietary Fibre – Classification, Composition, Properties and Nutritional status significance. • Minerals and Trace Elements – Physiological role, Bioavailability and Requirements. • Vitamins – Physiological role, Bioavailability and Requirements. • Water – Functions, Requirements. • Nutritional requirements for different age groups with rationale. Factors affecting these requirements. • Effect of cooking and home processing

					on digestibility and nutritive value of foods. • Improving nutritional value through different methods – germination, fermentation, combination of foods. • Basic principles of meal planning. • Nutritional considerations for planning meals for • Adults – male and female, different levels of physical activity. • Pregnancy and Lactation • Feeding of young children 0 -3 years • Old age • Athletes • Nutritional considerations in brief for the following: • Military, naval personnel • Astronauts and food for space travel • Emergencies such as drought, famine, floods etc.
			e) Community Nutrition	10	1. Concept and Scope of Community Nutrition. 2. Food availability and factors affecting food availability and intake. Agricultural production, post harvest handling (storage & treatment), marketing and distribution, industrialization, population, economic, regional and socio-cultural factors. Strategies for augmenting food production. 3. Q. Assessment of Nutritional status – meaning, need, objectives and importance. Use of clinical signs, anthropometry, biochemical tests, and biophysical methods. Assessment of food and nutrient intake through recall, record, weighment. o Food security and adequacy of diets. 4. Use of other sources of information for assessment. o Sources of relevant statistics. o Infant, child and maternal mortality rates. o Epidemiology of nutritionally related diseases. 5. Nutritional problems of communities and implications for public health. Common Nutritional Problems in India. Incidence – National, Regional.

			f) Diet Therapy	10	Causes: Nutritional and Non-Nutritional signs, symptoms, effect of deficiency and treatment o PEM o Micronutrient Deficiencies o Fluorosis o Correction/Improvements in Diets 6. Schemes and Programs in India to combat Nutritional Problems in India. Role of International, National and Voluntary agencies and Government departments. 7. Hazards to Community Health and Nutritional status O Adulteration in food O Pollution of water, air O Waste management O Industrial effluents, sewage O Pesticide residue in food O Toxins present in food – mycotoxins etc. 8. Nutrition Policy of India and Plan of Action. 9. Health and Nutrition Education – Steps in planning, implementation, and evaluations. Use of educational aids – visual, audio, audio-visual, traditional media etc. a. Diet Therapy and Nutritional Care in Disease i. The Nutritional Care Process ii. Nutritional Care Plan iii. Assessment and Therapy in Patient Care iv. Implementation of Nutritional Care b. Nutritional Intervention – Diet Modifications i. Adequate normal diet as a basis for therapeutic diets ii. Diet Prescription iii.Modification of Normal Diet iv. Nomenclature of Diet Adequacy of Standard Hospital Diets v. Psychological factors in feeding the sick person c. Interactions between Drugs, Food Nutrients and Nutritional Status i. Effect of drugs on Food and Intake, Nutrient Absorption, Metabolism, and Requirements.

					ii. Drugs affecting intake of food and nutrients iii. Absorption iv. Metabolism and excretion v. Nutritional status vi. Summary of action of some common drugs vii. Effect of food, nutrients and nutritional status on absorption and metabolism of drugs d. Disease of the G. I. System – Nutritional Assessment i. Pathogenesis of G.I. Disease with special reference to upper G. I. Tract and ulcers. 1. Diseases of esophagus and dietary care 2. Diseases of stomach and dietary care 3. Gastric and duodenal ulcers 4. Predisposing factors and Treatment 5. Brief medical therapy, rest, antacids, other drugs and dietary care 6. Food acidity, foods that cause flatulence, factors that damage G. I. Mucosa 7. Foods stimulating G. I. Secretion 8. Diet and Eating Pattern 9. Diet Recommendations 10. Liberal Approach Vs Traditional Approach 11. Possible nutritional and dietary inadequacies 12. Gastrectomy ii. Intestinal Diseases 1.Flatulence, Constipation, Irritable Bowel, Hemorrhoids,. Diarrhoea, Steatorrhoea, Diverticular disease, Inflammatory Bowel Disease, Ulcerative Colitis. 2. Treatment and Dietary Care in the above mentioned conditions. iii. Malabsorption Syndrome 1. Celiac Sprue, Tropical Sprue 2. Intestinal Brush border deficiencies (Acquired Disaccharide Intolerance) 3. Protein Losing Enteropathy 4. Dietary Care Process
			g) Diet Therapy	10	• Diet in Diseases of the Liver, Pancreas and Biliary System • Nutritional care in Liver disease in the

					context of results of specific Liver Function Tests. • Dietary Care & Management in Viral Hepatitis, Cirrhosis of Liver, Hepatic Encephalophathy, Wilson's disease. • Dietary care and management in diseases of Gall Bladder and Pancreas. • Biliary Dyskinesia, Cholelithiasis, Cholecystitis, Cholecystectomy, Pancreatitis, Zollinger- Ellison Syndrome. • Diet in Disease of the Endocrine Pancreas Diabetes Mellitus and Hypoglycemia Classification Physiological symptoms and disturbances, diagnosis (FBG and OGTT) • Management of Diabetes Mellitus • Clinical Vs Chemical control • Hormonal Therapy • Oral Hypoglycemic Agents • Home Glucose Monitoring • Glycosylated Hemoglobin • Urine Testing • Exercise • Dietary care and Nutritional Therapy – The Diet Plan, Meal planning with and without Insulin, Special Dietetic Foods, Sweeteners and Sugar Substitutes • Diabetes in Pregnancy, Elderly, Surgery, Diabetic diets in Emergency, Illness, Diabetic coma, Insulin reaction, Juvenile diabetes, Patient Education in Diabetes • Hypoglycemia -classification, symptoms, fasting state hypoglycemia, Postprandial or reactive hypoglycemia, Early alimentary and late reactive hypoglycemia, Idiopathic hypoglycemia, Dietary treatment in reactive hypoglycemia. • Dietary care in diseases of the Adrenal Cortex, Thyroid gland and Parathyroid gland. • Functions of the gland and hormones and their insufficiency, metabolic implications, clinical symptoms. • Dietary treatment as supportive to other forms of therapy • Adrenal cortex insufficiency, Hyper and Hypothyroidism (goitre),

			h)Diet Therapy	10	Hypoglycemia. Nutritional care for Weight Management Regulation of energy intake and balance of body weight Control of appetite and food intake– Neural control, hormonal control, insulin, estrogen and other peptides and hormones. Identifying the obese Types of obesity, Health risks Causes, Psychology of obesity, Theories of obesity, Physiology of the obese state Thermogenesis, Thyroid hormones Treatment of Obesity Dietsin Obesity – Starvation, Fasting Evaluation of some common diets, Protein-sparing modified fast, High protein diets Balanced Energy Reduction Foods to include, fibre foods allowed as desired, alcohol, snacks and beverages Psychology of weight reduction Behavioural Modification – Psychotherapy, pharmacology, exercise & physical activity, Surgery, prevention of weight gain & obesity. Underweight – Etiology and Assessment, High calorie diets for weight gain, Diet plan, Suggestions for increasing calories in the diet, Anorexia Nervosa and Bulimia 1. Diseases of the Circulatory System Atherosclerosis – Etiology, risk factors, diet Hyperlipidemias Brief review of Lipoproteins and their metabolism Clinical and nutritional aspects of Hyperlipidemias Classification and Dietary care of Hyperlipidemias Nutritional care in Cardiovascular disease (Ischemic heart disease Pathogenesis of sodium and water retention in Congestive Heart Disease. Acute and Chronic Cardiac Disease, Acute –

					Stimulants, food & consistency, Chronic – Compensated and decompensated states, Sodium Restriction in Cardiac Diseases, Diet in Hypertension – Etiology, Prevalence, Renin-Angiotensin mechanism, Salt and Blood pressure, Drugs and Hypertension, Cerebrovascular diseases and diet in brief) 2. Anemia Resulting from Acute Hemorrhage Nutritional anemia Sickle cell anemia Thalassemia Pathogenesis and dietary management in the above conditions 3. Renal Disease Physiology & function of normal kidney – a brief review Diseases of the kidney, classification Glomerulo nephritis – Acute and Chronic – Etiology, Characteristics, Objectives, Principles of Dietary Treatment and Management Nephrotic syndrome – objectives, principles of Dietary Treatment and Management. Uremia and Renal Failure History, General Principles of Protein Nutrition in Renal Failure and Uremia. Acute Renal Failure– Causes, dietary management fluid, sodium and potassium balance, protein and energy requirements Chronic renal failure medical treatment, Renal transplants. Dialysis and types hemodialysis, Peritoneal Dialysis & Continuous Ambulatory Peritoneal Dialysis (CAPD). Dietary Management in conservative treatment, dialysis and after renal transplantation. Use of Sodium and Potassium Exchange lists in Renal (diet planning). Chronic renal failure in patients with diabetes mellitus Chronic renal failure in children Nephrolithiases – Etiology, types of stones, Nutritional care, alkaline-ash diets 4. Allergy Definitions, symptoms, mechanism of food allergy

					Diagnosis– History, Food record Biochemical and Immunotesting (Brief) Elimination diets Food selection Medications (brief) Prognosis food Allergy in infancy – Milk sensitive enteropathy; Colic, Intolerance to breast milk, prevention of Food Allergy. 5. Diseases of Nervous System, Behavioural Disorders and Musculo Skeletal System Neuritis and polyneuritis Migraine, headache Epilepsy Multiple sclerosis Hyperkinetic Behaviour Syndrome Orthromolecular psychiatry and mental illness (Brief) Definition, etiology, dietary treatment and prognosis in the above conditions. Arthritis– Rheumatoid Arthritis Osteoarthritis Symptoms, dietary management 6. Nutrition in Cancer Types, symptoms, detection Cancer therapies and treatment – side effects and nutritional implications Goals of care and guidelines for oral feeding Accommodating side effects Enteral tube feeding – Nasogastric, Gastrostomy, Jejunostomy Parenteral Nutrition Pediatric patients with cancer The terminal cancer patient 7. Nutrition in Physiological Stress Physiological stress and its effect on body, nutritional implications. Fevers and infections Surgery and Management of Surgical Conditions Parenteral Nutrition – Types, mode, and composition of feeds Tube feeding – Routes, modes, composition, care to be taken during feeding Dietary guidelines Burns

					Metabolic implications – nutritional requirement Management and nutritional care Nutritional Management of Patients with HIV, AIDS Nutritional Management – Counselling and Management Goals of care Timing of food presentation Guidelines for oral feeding anti-tumour therapy Accommodating taste changes External tube feeding Parenteral nutrition Patient co-operation Pediatric patients with cancer The terminal cancer patient Misconceptions in nutritional care
			i) Nutrition Education And Dietetic Counseling	10	i. Dietician as part of the Medical Team and Outreach Services. ii. Clinical Information – Medical History and Patient Profile Techniques of obtaining relevant information, Retrospective information, Dietary Diagnosis, Assessing food and nutrient intakes, Lifestyles, Physical activity, Stress, Nutritional Status. Correlating Relevant Information and identifying areas of need. iii. The Care Process – Setting goals and objectives short term and long term, Counselling and Patient Education, Dietary Prescription. iv. Motivating Patients. v. Working with – 1. Hospitalized patients (adults, pediatric, elderly, and handicapped), adjusting and adopting to individual needs. 2. Outpatients (adults, pediatric, elderly, handicapped), patients' education, techniques and modes. vi. Follow up, Monitoring and Evaluation of outcome, Home visits vii. Maintaining records, Reporting findings, Applying findings, Resources and Aids for education and counselling, Terminating counselling, Education for individual patients, Use of regional language, linguistics in communication process, Counselling and education.

			j) Food Services Management	10	i. Introduction to food services and catering industry, Development of Food Service Institutions in India, Types of Services as affected by changes in the environment. ii. Hospital food service as a speciality – Characteristics, rates and services of the food production, service and management in hospitals. Role of the Food Service Manager / Dietitian. iii. Organizations – Types of organizations and characteristics. Organizational charts. iv. Catering Management Definition, Principles and Functions, Tools of Management Resources. Attributes of a successful manager. v. . Approaches to Management Traditional, Systems Approach, Total Quality Management. vi. Management of Resources – Capital, Space, Equipment and Furniture, Materials, Staff, Time and Energy, Procedures Physical facility design and planning. Equipment selection. vii. Purchase and store room management – Purchase systems, specifications, food requisition and inventory systems, quality assurance. viii. Human Resource Management 1. Definition, Development and policies 2. Recruitment Selection, Induction 3. Employment procedures: Employee Benefits, Training and Development, Human Relations, Job description, Job specifications, Job evaluation, Personnel appraisal. 4. Trade Union Negotiations and Settlement. ix. Financial Management (in brief since there is a separate subject Food Cost and Quality Control) – Elements of Financial management, Budget Systems and accounting, Budget preparation. x. Food Production and Service Operations

					1. General Planning 2. Preliminary planning 3. Consideration of patients with specific nutritional and dietary needs, labour use and productivity. 4. Flow pattern.
3	**Private Secretary**	Essential Qualification: (i) Degree from a recognized University. (ii) Skill Test Norms: Dictation : 7 Minutes @ 120 WPM Transcription – 45 Minutes English or 60 Minutes Hindi on a Computer Desirable: (i) Diploma/ Certificate in Secretarial Practice from a recognized Institute. (ii) Excellent command over Hindi and English (Written and spoken) (iii) Ability to use computers (iv) Diploma in Secretarial Practice or equivalent.	a) General Intelligence & Reasoning b) General Awareness c) Quantitative Aptitude d) English Language and Comprehension (e)Secretarial Practice concepts (f)Basic computer knowledge	20 10 10 20 20 20	(a) to (d) : --Same as that of Assistant Administrative Officer (e) Secretarial Practice concepts:- Introduction to Stenography , Consonants Vowels, Diphthongs, Triphones, Diphones and Abbreviated 'W' Grammalogues, Punctuation Signs and Phraseography Alternative Forms of 'R' and 'H' Circles, Loops & Hooks Compound Consonants and Medial Semi-Circle Upward and Downward 'L' and 'SH' Halving and Doubling Principles Contractions, Prefixes, Suffixes, Intersections, Figures and Advanced Phrases (f) Basic Computer Knowledge: Introduction to MS Windows, MS Office, Basics of Internet etc.
4	**Medico Social Worker**	Essential Qualification & Experience: (i) MA (Social Work)/ MSW, with specialization in Medical Social Work, from a recognized University/ Institution (ii) 5 Years' Experience in a government or	a) Framework: Social Welfare	10	The concept of Social Welfare Social Welfare: Concept, need and objectives Philosophy of Social Welfare and Social work Social welfare in historical perspective Changing concepts and practices of social welfare in

		private sector hospital of minimum 500 beds in line with welfare or Health Agency, preferably dealing with Medical / Public Health Service. Desirable: Ability to use computers - Hands on experience in office applications, spread sheets and presentations.			relation to social, economic and industrial development Changing political philosophy and its impact on social welfare Social Welfare and related terms(1) Social Development (2) Social Planning and social administration (3) Social reform (4) Social Security (5) Social Policy (6) Social Action (7) Social justice (8)Social and welfare services (9) Social legislation (10) Human Rights Professional Social work an Introduction The concept of professional social work-alignment of scientific and humanitarian motives for promoting social welfare.
			b) Framework: Social Welfare	10	The basic principles and values of professional social work and their relationship to the values of Indian Society Evolution of professional social work in UK, USA, Evolution of Professional Social work in India. Social work as a profession Nature and characteristics of a profession The basic values and Principles of professional social work Professional status of Social work in India Code of ethics for social workers Methods of Social Work Primary Methods of Social work Secondary methods of Social work Integrated approach of social work Interface between Professional and voluntary social work
			c) Psychology and Mental Health: Fundamentals	10	Mental Health & Psychology Psychology : Definitions and Fields Mental Health : Meaning, Definitions,

					Characteristics Normal & Abnormal Behaviour : Meaning, Characteristics Human Development : Heredity and Environment Meaning, Definition and scope of Mental Hygiene Characteristics and Importance of Mental Hygiene Aims of Mental Hygiene Principles of Mental Hygiene Programme of Mental Hygiene
			d) Developmental Sociology	10	Developmental Stages Developmental Stages I : Prenatal, Infancy Developmental Stages II : Babyhood, Childhood Developmental Stages III : Puberty, Adolescence, Adulthood. Developmental Stages III : Middle age, Old age. Personality Development 1. Psycho-Sexual development theory: Sigmund Freud 2. Psycho-Social development theory: Erick Erickson 3. Defence Mechanism 4. Perspectives of Psychopathology Unit Social Psychology Nature and scope of social psychology Attitude: nature and measurement of attitude prejudice and discrimination Communication: concept, methods, skills in communication, major obstacles Mass communication, public opinion,

					propaganda, fashion, social facilitation crowd behavior.
			e) Sociology :Theoretical Perspective	10	Conceptual & Theoretical Perspectives to Understand Society 1. Society: Nature, Approaches, Functions, Theories of Society (Evolutionary, Cyclical, Conflict and Systems theories). 2. Social Group: Concept & Characteristics of Primary Group, Secondary Group, Reference Group. 3. Social Institutions: Family, Marriage, Kinship, Property (Present trends). 4. Culture: Concept of Culture, Traditions, Customs, Values and Norms Social System and Social Process of Contemporary Society 1. Social System & Sub system: Structure & Function, Classification of System. 2. Social Structures: Status & Role. 3. Social Process: Meaning and kinds of Social Interaction, Socialization, Cooperation, Conflict, Assimilation, Social control.
			f) Sociology: Polity & Economy	10	1. State: Elements, Role and Functions. 2. Democratic government & process. 3. The nature of economic development, Classification of Developing Countries, 4. Meaning of Globalization, Liberalization, Privatization. : Social Stratification and Social Change in Contemporary Society 1. Social Stratification: Caste, Caste & Democracy, Tribes. 2. Social Change: Concept, Factors,

					Western theories. 3. Theories of Social Change in India: Sanskritization, Westernization, Modernization, Secularization.
			g) Problems of Contemporary Indian Society	10	1. Social Problem: Concept, Factors, Theories. 2. Poverty: Causes, Factors, Extent, Consequences, Theories, Measures, Impact on society. 3. Population Explosion: Causes, Factors, Extent, Consequences, Measures, Impact on society. 4. Unemployment: Causes, Factors, Extent, Consequences, Theories, Measures, Impact on society. 4. Environment pollution: Causes, Factors, Extent, Consequences, Theories, Measures, Impact on society. 5. Malnutrition: Causes, Factors, Extent, Consequences, Theories, Measures, Impact on society. 6.Positive and negative impact of Social Media(Internet, Face Book, Social Media, Television, Cinema, Mobile etc.)
			h) Social Work Research & Statistics	10	Research: Nature & Concept Nature and Characteristics of Scientific method and Social Phenomenon Meaning and definition of Research Nature scope and importance of research Types and Concepts used in Research Types of research: Historical, Descriptive, Analytical, Experimental, Interdisciplinary, Participative, action and evaluative research. Concepts used in research: Variables, Attributes, Universe, Sample, Hypothesis, matching, Measurement, Problem Formulation and Hypothesis Testing Problem formulation:

			i) Social Work Research & Statistics	10	Identifying probable issues for research, selecting specific research issue, formulation of objectives, clarifying the objective. Concepts and relevance of Hypothesis formulation and testing: Level of Significance, Degree of Freedom, Type 1 Type 2 Error. Data Collection and Analysis Methods of tools of data collection: Observation and Interview Schedule, Questionnaire, and secondary methods of data collection. Sampling design: Probability and non-probability Data processing and analysis, interpretation and report writing Research Design Research design: Concept, Meaning and importance of research Design Types of Research Design: Experimental Design: After only, Before-After, Ex-post facto experimental Design Non Experimental Design: Exploratory, Descriptive and Diagnostic
			j) Groups and Social works	10	Understanding Concepts of Group Work Concept of Group and its importance in human life cycle, Types of Groups Concept, Social Group Work as a method of Social Work 1.Theories and Models in Social Group Work 2.Values and Distinctive Principles of Social Group Work 3. Role of Group Worker 4.Social Group Work in Different fields 5.Group Work in Institutional settings 6.Understanding Individual in the Group Process and Group as a Totality Social Group Work Process and Programmes 1 Steps or Process of Group Formation 2. Stages / Phases in Group Development 3. Factors affecting Group Development and Role of Social Worker in different Stages of Group Development 4. Concept and

					Importance of Programme in Group Work Practice 5. Programme Planning, Development and Implementation Process Skills, Techniques, Recording and Evaluation in Social Group Work 1. Skills of Group Worker- For Group Development, Programme Planning, and Programme Implementation 2. Recording in Group Work: Principles and Types of Recording, Techniques of RecordingObservation, Sociogram. 3. Evaluation in Group Work- Importance of Continuous evaluation in Group Work, Types and Methods of Evaluation Group Process and Dynamics 1. Social processes in group work 2. Leadership and its development in group work process 3. Communication in Group 4. Group Dynamics:- Group Bond, Group-Conflict, Confrontation, Apathy and Group Control
5	**Assistant Administrative Officer**	Essential Qualification: Degree from recognized University or its equivalent Desirable: (i) MBA/ PG diploma in management from recognised Institutes. (ii) Knowledge of Government Rules and Regulations. (iii) Proficiency in Computers.	a) General Intelligence & Reasoning	15	(a) General Intelligence & Reasoning: It would include questions of both verbal and non-verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Classification, Symbolic/Number Classification, Figural Classification, Semantic Series, Number Series, Figural Series, Problem Solving, Word Building, Coding & de-coding, Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing inferences, Punched hole/pattern –folding & unfolding, Figural Pattern – folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small & Capital

					letters/numbers coding, decoding and classification, Embedded Figures, Critical thinking, Emotional Intelligence, Social Intelligence, Other sub-topics, if any.
			b) General Awareness	15	(b): General Awareness: Questions in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Questions will also be designed to test knowledge of current events and of such matters of every day observations and experience in their scientific aspect as may be expected of any educated person. The test will also include questions relating to India and its neighboring countries especially pertaining History, Culture, Geography, Economic Scene, General Policy & Scientific Research.
			c)Quantitative Aptitude	15	(c): Quantitative Aptitude: The questions will be designed to test the ability of appropriate use of numbers and number sense of the candidate. The scope of the test will be computation of whole numbers, decimals ,fractions and relationships between numbers, Percentage. Ratio & Proportion, Square roots, Averages, Interest, Profit and Loss, Discount, Partnership Business, Mixture and Alligation, Time and distance, Time & Work, Basic algebraic identities of School Algebra & Elementary surds, Graphs of Linear Equations, Triangle and its various kinds of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of a circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons , Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular or square base, Trigonometric ratio, Degree and Radian Measures, Standard Identities, Complementary angles, Heights and Distances, Histogram, Frequency polygon, Bar diagram & Pie chart
			d) English Language and Comprehension	15	(d): English Comprehension: Candidates' ability to understand correct English, his basic comprehension and writing ability, etc. would be tested. The questions in Parts A, B, & D will be

					of a level commensurate with the essential qualification viz. Graduation and questions in Part C will be of 10th standard level.
			e) Basic concepts of Management & Computers	20	(e): Basic concepts of Management & Computers: Principles of Management, Organisation behaviour, MS Office, MS Windows, Fundamentals of Computers, Internet etc.
			f) Central Govt. Service Rules	20	(f): Central Government Rules: Questions relating to CCS(Leave) Rule, CCS(Conduct) Rules, General Service Condition, Office Procedures, Types of correspondence, RTI Act, 2005, LTC, Travelling Allowance etc
6	**Programmer (Data Processing Assistant)**	Essential Qualification: BE/B.Tech (Comp. Sc./Comp.Engg.) OR Post-Graduation in Computer Application from a recognized University or Institution.	a) General Intelligence & Reasoning	10	(a) to (c) : - Same as that of Assistant Administrative Officer
			b) General Awareness	10	
			c) Quantitative Aptitude	10	
			d) Subject knowledge	70	(d):- Subject knowledge **Programming Skills-** Introduction to C Language, Structure of C program, Data Types, Variables, Constants, Input/Output Management, Arrays, Functions, Pointers, Structures, Types of Error Handling, Introduction to OOPS, Classes, and Objects, Basic concepts of OOPS, Structure of C++ Program, Copy Constructors, Destructors, Friend Functions **Operating System and Software Engineering –** Operating System, Types of Operating System, Threads, Inter Process Communication, Concurrency, Synchronization, Deadlock, Memory Management and Virtual Memory, Information Systems and Sofware Engineering, Data Flow Diagrams, Planning and Managing the project **Data Structures and Algorithms –** Abstract Data Types, Stacks, Queues, Linked Lists, Trees, Binary search Trees, Graphs, Types of Graph, Searching, Sorting, Algorithms Analysis, Asymptotic complexity **Computer Networks –** OSI Model, Concept of Layering, Communication Media, LAN Technologies, Flow and error control

					Techniques, Application Layer Protocols, Basics of Wi-Fi **Data Base Management Systems –** DataBase Environment, Advantages of Database approach, Database Users, Data Models and Schemas, DBMS Architecture, Database Languages and Interfaces, Database Development Process, Introduction to Data Modeling,Entity Relationship Model
7	**Chief Cashier**	Essential Qualification & Experience: (i) Graduate in Commerce. (ii) Possessing five years' Experience of handling cash and accounts work in Government Organization.	a) General Intelligence & Reasoning b) General Awareness c) Quantitative Aptitude d) English Language and Comprehension e) Government Accounting System & Budgeting f) Fundamental Principles and Basic Concepts of Accounting	10 10 10 10 20 40	(a) to (d) : --Same as that of Assistant Administrative Officer (e) Introduction of Government Accounting System and Government Budgeting. (f) Fundamental Principles and Basic Concepts of Accounting : Financial Accounting - Nature and scope, Limitations of Financial Accounting, Basic Concepts and Conventions, Generally Accepted Principles. Basic Concepts of Accounting: Single and Double Entry System, Books of Original Entry, Bank Reconciliation, Journal, Ledgers, Trial Balance, Rectification of Errors, Manufacturing, Trading, Profit & Loss Appropriation Accounts, Balance Sheet, Distinction between Capital and Revenue Expenditure, Depreciation Accounting, Valuation of Inventories, Non-profit making organizations' Accounts, Receipts and Payments, Income & Expenditure Accounts, Bills of Exchange, Self-Balancing Ledgers.
8	**Maternity & Child Welfare Officer**	Essential Qualification: Degree or Diploma in General Nursing and Midwifery or equivalent from a recognized University/Institution	a)Basic Sciences	10	(i) Describe the anatomical and biochemical structures so as to explain the physiological functions of human body and factors, which may disturb these, and mechanism of such disturbances.

		Essential Experience in family welfare programme: 1 year for degree holders 2 years for Diploma holders			(ii) Describe various groups of micro-organisms of clinical importance. (iii) Identify and take appropriate measures including disinfection and sterilization for the prevention of diseases in the hospital and community. (iv) Collect and handle specimens for various diagnostic tests. (v) Enumerate weights and measures and demonstrate skill in calculation of dosage and preparation of solutions. (vi) Read and interpret prescriptions and care for drugs according to the regulations. (vii) Describe various groups of drugs acting on different systems of the body. (viii) Recognize the toxic symptoms related to common drugs and poisons.
			b)Nutrition and Dietetics	10	(i) Describe various nutrients and their importance in the maintenance of health. (ii) Plan diets suitable to socio-economic status for different age groups and physiological conditions. (iii) Detect nutritional deficiencies and explain their prevention and management. (iv) Plan therapeutic diets for various disease conditions.
			c) Psychology, Mental Health and Psychiatric Nursing	10	(i) Describe normal and deviations in behavior among various age groups and their cause. (ii) Explain the principles of psychology and its application in

					health and diseases. (iii) Interpret behavior of self and others. (iv) Recognize deviations from normal behavior and provide guidance and counseling. (v) Explain the dynamics of patient's behavior and its application in providing nursing care. (vi) Demonstrate skill in communication and maintain interpersonal relations. (vii) Describe various therapies utilized in psychiatry and the various roles of nurses in psychiatric nursing.
			d) Fundamentals of Nursing	10	(i) Describe nursing as a profession, its scope, etiquettes & ethics. (ii) Provide first aid treatments. (iii) To provide congenial and safe environment to the patient. (iv) Carry out basic nursing procedures for the care of the patients with an understanding of the scientific principles involved. (v) Make accurate observations and records. (vi) Administer prescribed medications and carry out treatments. (vii) Maintain records of patients and nursing care.
			e) Community Health Nursing and Family Welfare Programs	10	(i) Describe personal, environmental, social and cultural factors contributing to health of individual, family and community. (ii) Explain methods of control of spread of diseases.

					(iii) Identify the needs for health education and impart and evaluate the effect of the same to patients, families and community. (iv) Prepare and use appropriate audio-visual aids for imparting health education. (v) Recognize symptoms of social disorganization and social pathology. (vi) To demonstrate skills in medico-social work. (vii) Explain the principles of health care to mothers and children and the services available for them in urban and rural communities. (viii) Identify deviations from normal amongst mother and children and take necessary action in clinics, health centres and homes. (ix) Educate the community about need and methods of family planning. (x) Demonstrate skill in community diagnosis and in delivery of community nursing services in accordance with the national health care system.
			f) Medical and Surgical Nursing	10	(i) Explain the causes, patho-physiology, symptoms, treatment and prophylactic measures in common medical and surgical conditions affecting various systems of the body. (ii) Provide patient centered nursing care to patients with common medical and surgical conditions affecting various systems of the body. (iii) Prepare operation theatre for surgery and assist in operative procedures. (iv) Identify common equipment

					used in operation theatre (v) Explain the anesthesia used, with their effects and dangers, and care for an anesthetized patient until such time as he recovers from the effect of anesthesia.
			g) Medical and Surgical Nursing	10	Recognize and provide first aid in case of common emergencies using the resuscitation equipment including intubation. Care for critically ill patients who required support for maintaining vital functions. Provide first aid in case of disaster, emergency and accidents and demonstrate skill in transporting the casualties. Organize casualty/emergency services.
			h) Pediatric Nursing	10	(i) Describe growth and development, nutritional and psychological needs of children at different age group. (ii) Explain basic principles involved in pediatric nursing. (iii) Provide nursing management to neonates and children with medical and surgical disorders. (iv) Recognize emergencies in neonates and children and take appropriate first aid measures. (v) Manage normal newborn and low birth weight baby. (vi) Describe various aspects of preventive pediatric nursing and be able to practice them while rendering nursing care in a hospital or community.
			i) Obstetrical Nursing	10	(i) Explain anatomy and physiology of pregnancy, child-birth and

					puerperium. (ii) Provide antenatal care to mothers. (iii) Conduct normal delivery independently in a hospital and community and recognize abnormalities and make timely referral to doctor. (iv) Perform episiotomy and suture a first and second -degree tear. (v) Guide and supervise multipurpose workers to carry on domiciliary services to mothers and children (vi) Describe the management of common obstetrical emergencies needing immediate treatment. (vii) Provide family welfare advice.
			j) Principles of Administration and Supervision, Education and Trends in Nursing	10	(i) Explain the principles of administration and its application to health administration at different levels. (ii) Describe the organizational pattern for nursing components of hospital and public health service. (iii) Maintain effective human relations to improve efficiency of the staff. (iv) Describe the principles of supervision and develop skill in supervisory techniques. (v) Explain the trends in nursing and nursing education in India and abroad. (vi) Appreciate the emergence of nursing as a profession and the rights, responsibilities and adjustment in professional life. (vii) Use different methods of teaching applicable to nursing.

9	**Bio Medical Engineer**	Essential Qualification & Experience: B.E./B.Tech in Bio Medical Engineering from a recognized Institution/University. OR Diploma Bio Medical Engineering from a recognized Institution with 2 years' experience in relevant field.	a) General Intelligence & Reasoning b) General Awareness c) Quantitative Aptitude d) English Language and Comprehension e) Subject knowledge of Bio Medical Engineering	10 5 5 10 70	(a) to (d) : - Same as that of Assistant Administrative Officer (e): Subject Knowledge: Computer Programming, Electronic Devices And Circuits, Circuit Theory, Transforms And Partial Differential Equations, Signals And Systems, Sensors And Measurements, Object Oriented Programming And Data Structures, Probability And Random Processes, Basics Of Electrical Engineering, Analog And Digital Ics, Pathology And Microbiology, Analog And Digital Communication, Circuits And Ics Laboratory, Pathology And Microbiology Laboratory, Bio Control Systems, Object Oriented Programming And Data Structures, Probability And Random Processes, Basics Of Electrical Engineering, Analog And Digital Ics, Pathology And Microbiology, Analog And Digital Communication, Circuits And Ics Laboratory, Pathology And Microbiology Laboratory, Bio Control Systems, Diagnostic And Therapeutic Equipment, Bio Materials And Artificial Organs, Biomedical Instrumentation, Microprocessor And Microcontroller, Hospital Management, Radiological

					Equipment, Biomechanics, Principles Of Digital Signal Processing, Environmental Science And Engineering, Digital Signal Processing Laboratory, Diagnostic And Therapeutic Equipment (Ecg, Eeg, Usg, Ct Scan, Mri, Infusion Pumps, Cardiac Monitors Etc.), Pattern Recognition And Neural Networks, Medical Informatics, Medical Optics, Digital Image Processing, Hospital Training, Rehabilitation Engineering Etc
10	**PACS Administrator**	Essential Qualification & Experience: BE/B. Tech/MCA + 2 years' experience in Medical IT systems/ PACS	a) General Intelligence &Reasoning b) General Awareness c) Quantitative Aptitude d) Subject knowledge of PACS	10 10 10 70	a) to (c) : - Same as that of Assistant Administrative Officer (d): Subject Knowledge : Department Organization: Digital Imaging and PACS Digital Imaging and PACS : Picture Archiving and Communication System Digital Imaging and PACS : what should a radiologist expect from PACS Digital Imaging and PACS : Image processing in Computed Radiography Intravascular Contrast Media Whole body Computed Tomography : Recent Advances Magnetic Resonance Imaging basic Principles Ultrasound : general Principles Radionuclide Imaging : General Principles Radionuclide Imaging : Pediatric Nuclear Medicine

					Dual Energy X-ray Absorptiometry Functional and Physiological Imaging Medicolegal issues in Diagnostic Radiology Radiation Protection and patient doses in diagnostic radiology
11	**Vocation Counselor**	Essential Qualification & Experience: (i) Post Graduate Degree in Psychology from a recognized Institution / University. (ii) Post Graduate Diploma in Rehabilitation Psychology / Vocational Counselling / Vocational Guidance and Training / Vocational Rehabilitation from a recognized Institution / University. (iii) 3 years' experience in the Rehabilitation of the Orthopedically Handicapped in a recognized Institution / Hospital.	a) Nature and concept of guidance, types of guidance	10	Nature and scope of guidance. Concept, definition, basic assumptions and principles of guidance. Importance of understanding the individual, Barriers to understanding, Aids in understanding, measurement and application of self-understanding, Guidance movement in India. Educational Guidance: Nature, Pupil personnel work, pupil appraisal information, Role of teacher, Preparation and training, School curriculum and guidance, Vocational guidance: Nature, study of occupations, occupational information, Theories of occupational choices, Job placement and Satisfaction. Personal Guidance: Nature of emotional problem, adjustment problems of adolescents and delinquents: prevention and treatment.
			b) Information and techniques essential for effective guidance	10	Achievement and aptitude tests, Personality and interest inventories, School records and reports Occupational information: Collection, Classification and dissemination. Individual and Group guidance. Organization of guidance programmer: Types and basic procedures.
			c) Stages of	10	Characteristics of different stages of

			human development and areas of guidance		development (Physical, Cognitive, Emotional, Social and Moral). • Problems of childhood and adolescence. Problems of adulthood and aged. Role of teacher in providing guidance services.
			d) Meaning & types of counseling	10	Meaning, Historical development and Importance of Counseling Individual and Group Counseling Emerging Trends in Counseling
			e) Approaches of counseling	10	Approaches of Counseling: Directive, Non directive, and Elective. Qualities and Professional Ethics of a Counselor.
			f) Areas of counseling (Counseling skills)	10	Counseling Families Concerning Children, Counseling with Parents, Counseling the Delinquent, Marriage Counseling, Premarital Counseling, Counseling the Handicapped, Career Counseling, and Adolescent Counseling. Role of Counselor in developing Good Mental Health. Building Trust: Listening, Attending, Observing, Building Rapport, Demonstrating Empathy. Specialized Concerns in Counseling: Substance Abuse, Drug Addiction; HIV AIDS; Child Abuse (Trauma); Internet and Technological Abuse.
			g) Counseling for exceptional children and adolescents.	10	Types of different abilities. Needs & Problems of children and adolescents with different abilities

			Types, needs and problems of special children		Importance of counseling of students with different abilities and their parents, family and peers.
			h) Identification and diagnosis of problem areas	10	Identification of personal, Social & academic problems of children (5-12 year) at elementary level Identification of academic, social & vocational needs & problems of adolescents (13 to 18 years) at secondary level. Diagnosis of Problem areas, stress as a cause of Mental, Emotional, Physical, Social behavior and academic problems.
			i) Intervention programmes	10	Individual and group counseling of children and adolescents for emotional, social, behavioral and academic problems. Relaxation strategies, yoga & meditation therapies for children and adolescents for reducing stress and other related problems.
			j) Career development	10	Meaning and historical development of career counseling. Concept of Career development. Different stages of career development. Emerging career options in present context. BASES OF CAREER DEVELOPMENT Vocational Development: reports of various educational commissions and committees. Identifying and analyzing career choices and career talents. Need for career education in schools. PRESENT CONDITIONS AND CAREER EDUCATION Changing economic conditions of

					society and the job market. Psycho-social conditions of the individuals. Advancement of technology and survival skills. Problems pertaining to work, family, education and leisure. CAREER CHOICE AND DECISION MAKING Career maturity: concepts and factors. Empowering students in career decision making (strategies) Matching career talents with career decision making. Guidance for developing life goals & choices PILLARS OF EDUCATION AND LIFE SKILLS Need for Life Skills Education. Importance of Life Skills for Growing Minds. Components of Life Skills. Importance of Emotional, Social and Thinking Skills. Concept of Four Pillars of Education: Learning to Know, Learning to Do, Learning to Live Together, and Learning to Be.
12	**Senior Hindi Officer**	Essential Qualification & Experience: Master's Degree of a recognized University in Hindi with English as a compulsory or elective subject or as the medium of examination at the Degree Level. OR Master's Degree of a recognized University in English	a) General Hindi b) General English	35 30	a) General Hindi b)General English Questions in this component will be designed to test the Candidate's understanding and knowledge of Hindi & English Languages and will be based on error recognition, fill in the blanks (using verbs, preposition, articles etc.),

		with Hindi as a compulsory or elective subject or as the medium of examination at the Degree Level. OR Master's Degree of a recognized University in any subject other than Hindi or English with Hindi medium and English as a compulsory or elective subject or as the medium of an examination at the Degree Level; OR Master's Degree of a recognized University in any subject other than Hindi or English with English medium and Hindi as a compulsory or elective subject or as the medium of a examination at the Degree Level; OR Master's Degree of a recognized University in any subject other than Hindi or English with Hindi and English as compulsory or elective subjects or either of the two as a medium of examination and the other as a compulsory or elective subject at Degree Level; AND Recognized Diploma or Certificate Course in Translation from Hindi to English & vice versa or two years' experience of Translation Work from Hindi to English and vice versa in Central or State Government Office including Government	c) Translation from Hindi to English and vice versa	35	vocabulary, spellings, grammar, Sentence structure, synonyms, antonyms, sentence completion, correct use of words, phrases and idioms, ability to write language correctly, precisely and effectively. c) Translation of small paragraphs consisting of 3-4 sentences from Hindi to English and vice versa Questions in this part should be designed to test the knowledge of translation.
13	**Assistant Stores Officer**	Essential Qualification & Experience: (i) Degree from a recognized University/	a) General Intelligence & Reasoning	15	(a) to (d) : --Same as that of Assistant Administrative Officer

		Institution; (ii) Post-graduate Degree/Diploma in Material Management from a recognized University/Institution; OR (iii) Bachelor's Degree in Material Management from a recognized University/Institution and 3 years' experience in Store handling (preferably Medical Stores).	b) General Awareness c) Quantitative Aptitude d) English Language and Comprehension e) Basic concepts of Material Management f) Latest Govt. initiatives in public procurement policy	15 15 15 20 20	(e):- Basic concepts of Material Management: Purchase Management, Inventory Management, Logistics Management, Packaging etc. (f): - Latest Govt. initiatives in public Procurement policy - GeM, GFR 2017 etc.
14	**Assistant Engineer (Civil)**	Essential Qualification & Experience: Graduate in Civil Engineering from a recognized University/Institute with 5 years' experience in design and engineering of Civil Projects, preferably in a Hospital Environment.	a) Subject knowledge of the concerned post	100	(a) Subject Knowledge of Civil Engineering: Strength of Material and Theory of Structures Stress-Strain relation – Hooke's Law, Determination of forces in members of trusses pin-jointed frames, Bending Moments and shear forces. Theory of simple bending, Continuous beams and simple portals – Determination of bending moments and shear forces – methods of analysis. Design Principles Determinations of dead, live and wind, seismic loads – Relevant I.S. Codes, Factor of Safety and Load Factor. Steel Design Design of simple Beams and plate Girders according to Indian Standards, Design of single and built-up columns, column base connections, Design of Steel Roof Trusses. Reinforced Concrete - Basic principles of reinforced concrete, shear, bond and diagonal tension, location of reinforcement, Design of singly and doubly reinforced beams, one way and two way slabs, Theory and design of reinforced concrete columns with uni-directional bending only, Design of cantilever and simple counterfort retaining wall, Liquid retaining structures – Special

					requirements Construction Practice - General details of Building construction including foundations, flooring, masonry and different type of roofs. Safety during construction, durability. General properties, standard requirements and tests for common building material such as bricks, stones, sand and aggregate, cement, lime, timber and steel. Tests for fresh and hardened concrete. Central PWD Specifications for building works, sanitary and water supply works and road works including modes of measurements. Surveying - Use and adjustment of Surveying Instruments: Chain, Plane table and accessories magnetic compass, level and theodolite. Use of Compass and Theodolite: Alignments and adjustments. Levelling: Methods of leveling and reduced level calculations. Contour Survey : Methods of contouring, properties of contours, Curves and alignment: Setting out of simple, reverse and transition curves using different methods, Vertical curves. Highway Engineering Road alignment in hills and plains, minimum standards for National highways. Principles of design of urban roads, their cross-sectional requirements and interactions, road drainage and maintenance. House paths, approach roads and service lanes. Public Health Engineering Water Supply: Quality and quantity of water required for public water supplies. Water purification processes. Water distribution systems – valves and fittings – testing. Sanitation: Orientation, ventilation and damp proofing of buildings. Sanitary appliances Construction and testing of house drains. Sewage disposal - Sewerage system: - Construction and maintenance. Types of sewage treatment – Oxidation ponds – simple sedimentation, re-circulation and filtration – plant, contact beds - percolating filters. Septic tanks.

					Soil Mechanics and Foundation Engineering: Properties of soils, classification, soil explorations, methods of determining bearing capacity. Foundation Engineering: Principles of selection of type of foundation for a structure, shallow and deep foundations. Compaction; Laboratory and field methods, optimum moisture content, soil stabilization.
15	**Assistant Engineer (Electrical)**	Essential Qualification & Experience: Graduate in Electrical Engineering from a recognized University/Institute with 5 years experience in design and engineering of Civil Projects preferably in a Hospital	a) Subject knowledge of the concerned post	100	(a) Subject knowledge of Electrical Engineering: General Knowledge of Indian Electricity Act, Indian Elect. Rules as amended up-to-date. General conditions of supply and charges to be paid to licencees for obtaining connection. CPWD General Specifications for Electrical Works, Principles of analysis of rates. General Principles in preparation of estimates, project reports, award of works and execution of works and measurement. ISI/BIS Standards and Codes of practices. Bombay and Delhi Lift Act and Rules. Illumination Units and Standards, Principles of indoor and outdoor lighting design. Types, characteristics and application of lamp in fittings and luminaires. Lighting calculation for indoor and outdoor applications. Internal Electrical Installations Systems of wiring and their design, distribution system. Apparatus for control, protection and Testing. Earthing, Lighting Protection, Safety & Maintenance Necessity of earthing, earthing resistance, type of earthing. Lighting protection design, layout, material and installation. Safety procedures and practices, principles of equipment installation, preventive maintenance and testing of equipment. Sub-Station upto 33 KV and Distribution Layout and Design for indoor and outdoor application. Specification for equipment, Sub- Station earthings, stand-by generating sets, commissioning procedures and tests.

					Distribution: Design of overhead line and underground distribution systems. Specification for cables, conductors, Supports etc. Cable joining and termination methods, power factor improvement, service connection to buildings. Lifts Design parameters, traffic analysis. Classification of Lift installations, choice of control and operation, safety, specifications for lift installation. Fire detection, Alarm and Protection Various fire detection, alarm and fire fighting system. Design and specification of equipment. Guidelines for provision of different types of fire alarm and fire fighting equipment for different types of buildings. Water Supply - Types of pumps and their characteristics. Prime movers, pumping systems and application. Specification for equipment and installation. ELECTRICAL APPARATUS - (i) Single and poly phase A.C. Circuit. Effects of resistance inductance and capacitance. (ii) Single and poly phase transformers – constructional features, equivalent circuits performance, parallel operation, phase conversion. Separation of losses and determination of efficiency by various methods. Auto transformers. (iii) Alternators, Constructional features, regulation, parallel operation and Protection. Automatic Voltage regulators, Emergency generating sets, automatic change over. (iv) Induction machines, polyphase motor and its principle of operation and equivalent circuit. Torque, slip characteristics. Crawling, methods of starting, single phase motor, its theory, characteristics and application. INSTRUMENT TRANSFORMERS, PROTECTIVE RELAYING, MEASUREMENTS - Current, Voltage transformers. Constructional features of IDMT relays, instantaneous relays including knowledge of overload earth fault, under voltage, Bucholz relays. Connection diagrams, settings.

					Electrical instruments and Measurements, principles of construction and theory of measuring instruments for direct and alternating currents. Commercial types. Measurement of resistance, Voltage, current, power, power factor and energy. Watt meters, energy meters. Thermo couples, Resistance Thermometers, Pyro-meters. Fault locating bridges for cables. Measurements of resistance, inductance and capacitance, wheatstone bridge. GENERATION, TRANSMISSION, DISTRIBUTION & UTILISATION. Diesel Power Generation – General layout, Base load, peak load, choice of sets. Power supply tariffs, economics. Insulators, types and application. Basic feature of industrial drives. Choice of electric motors for various drivers and estimation of their ratings. Behavior of motors during starting, acceleration, breaking and reversing operations. Speed control schemes for lifts cranes and machine tools. Theory, performance and application of various types of fractional horse power motors. Production of light by different methods. Calculation and measurement of light by different methods. Calculation and measurement of illumination. Photo meters. Polar Curves. Flood lighting. WORKSHOP TECHNOLOGY Estimation of power and energy requirements of electric welding, different types of equipments used and their characteristics. Manufacturing and Fabricating methods and practices for various electrical and mechanical equipment such as pumps, switch boards, light fittings, AHUs etc. ENERGY CONSERVATION, POWER FACTOR IMPROVEMENT Comparison of different types of lamps from the point of energy conservation, calculation of pay back period. Power factor improvement, Reduction of load current and transformer losses due to power factor improvements. KVA requirement for power factor improvement.

					SOLAR ENERGY UTILISATION Solar Hot Water system, principles, constructional features, constituent parts, installation, operation &maintenance, solar photo voltaic system, advantages/disadvantages of solar heating & solar photo voltaic system.
16	**Assistant Engineer (Air Conditioning & Refrigeration)**	Essential Qualification & Experience: Graduate in Mechanical / Electrical Engineering from a recognized University/ Institute with 5 Years' experience in repair and maintenance of large scale air conditioning and refrigeration systems in a Hospital environment.	a) Subject knowledge of the concerned post	100	(a) : Subject Knowledge of Air conditioning & Refrigeration: General - Knowledge of Indian Electricity Act, Indian Elect. Rules as amended up-to-date. General conditions of supply and charges to be paid to licencees for obtaining connection. CPWD General Specifications for Electrical Works, Principles of analysis of rates. General Principles in preparation of estimates, project reports, award of works and execution of works and measurement. ISI/BIS Standards and Codes of practices. Internal Electrical Installations - Systems of wiring and their design, distribution system. Apparatus for control, protection and Testing. Earthing, Lighting Protection, Safety & Maintenance - Necessity of earthing, earthing resistance, type of earthing. Lighting protection design, layout, material and installation. Safety procedures and practices, principles of equipment installation, preventive maintenance and testing of equipment. Sub-Station upto 33 KV and Distribution - Layout and Design for indoor and outdoor application. Specification for equipment, Sub- Station earthings, stand-by generating sets, commissioning procedures and tests. Distribution: Design of overhead line and underground distribution systems. Specification for cables, conductors, Supports etc. Cable joining and termination methods, power factor improvement, service connection to buildings. Air-Conditioning Ventilation - General principles of Refrigeration, Air-Conditioning, evaporative cooling and ventilation, Heating and cooling load

					estimation. Classification of systems, their design and application, structural requirements, specifications for installations. Water Supply - Types of pumps and their characteristics. Prime movers, pumping systems and application. Specification for equipment and installation. ELECTRICAL APPARATUS - (i) Single and poly phase A.C. Circuit. Effects of resistance inductance and capacitance. (ii) Single and poly phase transformers – constructional features, equivalent circuits performance, parallel operation, phase conversion. Separation of losses and determination of efficiency by various methods. Auto transformers. (iii) Alternators, Constructional features, regulation, parallel operation and Protection. Automatic Voltage regulators, Emergency generating sets, automatic change over. (iv) Induction machines, polyphase motor and its principle of operation and equivalent circuit. Torque, slip characteristics. Crawling, methods of starting, single phase motor, its theory, characteristics and application. INSTRUMENT TRANSFORMERS, PROTECTIVE RELAYING, MEASUREMENTS - Current, Voltage transformers. Constructional features of IDMT relays, instantaneous relays including knowledge of overload earth fault, undervoltage, Bucholz relays. Connection diagrams, settings. Electrical instruments and Measurements, principles of construction and theory of measuring instruments for direct and alternating currents. Commercial types. Measurement of resistance, Voltage, current, power, power factor and energy. Watt meters, energy meters. Thermo couples, Resistance Thermometers, Pyro-meters. Fault locating bridges for cables. Measurements of resistance, inductance and capacitance, wheatstone bridge. INTERNAL COMBUSTION ENGINES Fuels and Combustion. Fuels and their properties, combustion calculations.

					Analysis of products of combustion. Power cycles. Vapour power cycles- Carnot and Rankine. Gas Power-Otto and Diesel cycles. Deviation of actual cycles from theoretical cycles. Internal combustion engines – Two and four stroke compression ignition and spark ignition engines. Combustion phenomena. Detonation, Knocking, scavenging of two stroke engines. Fuel injection and carburation. Lubrication and cooling system performance and testing of IC engines. Pollution control requirements/standards. HEATING, AIR CONDITIONING AND REFRIGERATION Refrigeration – Refrigeration and heat pump cycles. Vapour compression, absorption Cycles. Refrigerants and their characteristics. Air Conditioning – Psychrometric chart, comfort airconditioning, comfort indices, ventilation requirements. Cooling and dehumidification methods. Industrial air-conditioning processes. Different methods of electric heating. Construction and performance of Electric heating equipment. WORKSHOP TECHNOLOGY Estimation of power and energy requirements of electric welding, different types of equipments used and their characteristics. Manufacturing and Fabricating methods and practices for various electrical and mechanical equipment such as pumps, switch boards, light fittings, AHUs etc. ENERGY CONSERVATION, POWER FACTOR IMPROVEMENT Comparison of different types of lamps from the point of energy conservation, calculation of pay back period. Power factor improvement, Reduction of load current and transformer losses due to power factor improvements. KVA requirement for power factor improvement. SOLAR ENERGY UTILISATION Solar Hot Water system, principles, constructional features, constituent parts, installation, operation & maintenance, solar photo voltaic system, advantages/disadvantages of solar heating & solar photo voltaic system.

17	**Gas Officer/Supervisor/Manager**	Essential Qualification & Experience: Degree in Mechanical Engineering with 5 years working experience with Manifold or its repairs in supervisory capacity in a Medical Setup. OR Diploma in Mechanical Engineering with 7 years working experience with Manifold or its repairs in supervisory capacity in a Medical Setup. Must be capable of carrying out work associated with the Medical Gas Management distribution line, taps, cocks and outlets.	a) Respiratory Anatomy and Physiology	10	A. Structure and function of the respiratory tract Nose - Role in humidification Pharynx - Obstruction in airways Larynx - Movement or vocal cords, Cord palsies. Trachea & Bronchial tree - vessels, nerve supply, respiratory tract, reflexes, bronchospasm Alveoli - Layers, Surfactants B. Respiratory Physiology • Control or breathing • Respiratory muscles - diaphragm, intercostals • Lung volumes - dead space, vital capacity, FRC etc. • Pleural cavity - intrapleural pressure, pneumothorax. • Work of breathing - airway resistance, compliance • Respiratory movements under anaesthesia. • Tracheal tug - signs, hiccup
			b) Pulmonary Gas exchange and disorders	10	A. Pulmonary Gas Exchange and Acid Base Status • Pulmonary circulation - Pulmonary oedema, pulmonary hypertension • Pulmonary function tests. • Transfer of gases - Oxygen & Carbon dioxide • Acid base status, definitions, acidosis types, Alkalosis types, buffers in the body. B. Oxygen: properties, storage, supply, hypoxia C. Respiratory failure, type, clinical features, causes.
			c) Cardiac Anatomy and Physiology	10	II. Cardiovascular System Anatomy - Chambers of the heart, major vasculature. Coronary supply, innervations, Conduction system Cardiac output - determinants, heart rate, preload, after load. Coronary blood flow& myocardial oxygen supply ECG - arrhythmias cardiovascular response to anaesthetic & surgical procedures.

					Hypotension - causes, effects, management. Cardio pulmonary resuscitation. Myocardial infarction, hypertension.
			d) Clinical Pharmacology of Oxygen and Oxygen delivery	10	Gases - O_2, N_2O, Air Gas properties and safety: a. the hazards of compressed and cryogenic gases; b. cylinder colours and labelling; c. actions on finding defective cylinders; d. operation of cylinder valves; e. cylinder storage and handling (medical gas/pathology gas stores); f. preparation of cylinders for use; g. selection of appropriate equipment and its connection and disconnection to/from cylinders respectively.
			e)Anaesthesia Machine	10	Hanger and yoke system Cylinder pressure gauge Pressure regulator Flow meter assembly Vapourizers - types, hazards, maintenance, filling and draining, etc. General considerations: humidity & heat Common components - connectors, adaptors, reservoir bags. Capnography ; ET CO_2 Pulse oximetry Methods of humidification.
			f) Breathing systems	10	Classification of breathing system Mapleson system - a b c d e f Jackson Rees system, Bain circuit Non rebreathing valves - AMBU valves The circle system

					Components Soda lime, indicators
			g) Gas Distributio n Systems	10	Compressed gas cylinders Colour coding Cylinder valves; pin index Gas piping system Recommendations for piping system Alarms & safety devices
			h) MGPS Design and Techniques	10	Statutory obligations and safe system operation MGPS design and installation requirements Basic fault-finding Structure and management of the permit-to work system MGPS equipment performance requirements (plant and pipeline) Technical reporting including system capacities/ limitations, upgrading requirements/equipment replacement, system compliance
			i) MGPS Policies and documentation	10	MGPS documentation Emergency procedures MGPS operational policy preparation, implementation and monitoring MGPS testing and quality control requirements Manifold systems Cryogenic liquid cylinders Bulk cryogenic (VIE) systems Alarm requirements
			j) Miscellaneous Systems	10	

18	**Office Assistant (NS)**	Essential Qualification: (i) Degree of recognized University or equivalent (ii) Proficiency in computers.	a) General Intelligence & Reasoning b) General Awareness c) Quantitative Aptitude d) English Language and Comprehension e)Basic Computer knowledge	20 20 20 20 20	(a) to (d) : --Same as that of Assistant Administrative Officer (e) : - Fundamentals of computers, MS Windows, MS Office, Internet etc.
19	**Store Keeper**	Essential Qualification & Experience: (i) Degree from a recognized University/ Institution; (ii) Post-graduate Degree/Diploma in Material Management from a recognized University/Institution; OR (iii) Bachelor's Degree in Material Management from a recognized University/Institution and 3years' experience in Store handling (preferably Medical Stores).	a) General Intelligence & Reasoning b) General Awareness c) Quantitative Aptitude d) English Language and Comprehension e) Basic concepts of Material Management f) Latest Govt. initiatives in public procurement policy	15 15 15 15 20 20	Same as mentioned for the post of Assistant Stores Officer.
20	**Radiographic Technician Grade I**	Essential Qualification & Experience: B.Sc. (Hons.) (3 years course) in Radiography from a recognized University / Institution. OR Diploma in Radiography from a recognized Institution with 2 years' experience. Desirable : Ability to use	a) General Intelligence and Quantitative ability	10	Questions in this component will be designed to test the candidate's understanding and knowledge of English language and will be based on spot the error, fill in the blanks, synonyms, antonyms, spelling/detecting misspelt words, idioms & phrases, one word substitution, improvement of sentences, active/passive voice of verbs, conversion into direct/indirect narration, shuffling of sentence parts, shuffling of sentences in a passage, comprehension passage and any other English language questions at the level of Matriculation/Higher Secondary. The

		Computers - Hands on experience in Office Applications, Spread-sheets and Presentations.			questions will be designed to test the ability of appropriate use of numbers and number sense of the candidate. The scope of the test will be percentage, Ratio & Proportion, Square roots, Averages, Interest, Profit & Loss, Discount, Partnership Business, Mixture and Allegation, Time and distance, Time & work, Basic algebraic identities of School Algebra, Elementary surds, Graphs of Linear Equations, Triangle and its chords, tangents, angles subtended by chords of a circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Square, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular or square base, Trigonometric ratio, Degree and Radian Measures, Standard Identities, Complementary angles, Heights and Distances, Histogram, Frequency Polygon, Bar diagram, Pie chart and any other question of Matriculation level.
			b) General Studies and Logical reasoning	10	Questions in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Questions will also be designed to test knowledge of current event and of such matters of every day observations and experience in their scientific aspect as may be expected of any educated person. The test will also include questions relating to India and its neighbouring Countries especially pertaining History, Culture, Geography, Economic Scene, General Policy, Indian Constitution &Scientific Research and Others. Logical Reasoning would include questions of both verbal and non-verbal type. This component may include questions on analogies, similarities and differences, space visualisation, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification,

					arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, Problem Solving, Word Building, Coding & de-coding, Numerical Operations, Symbolic Operations, Trends, Space Orientation, Space Visualisation, Venn Diagrams, Drawing inferences, Punched hole/pattern - folding & un-folding, Figural Pattern-folding and completion, Indexing, Address matching, Date & City matching, Classification of centre codes/roll numbers, Small & Capital letters/numbers coding, decoding and classification, Embedded Figures, Critical thinking, emotional Intelligence, Social Intelligence & Other sub-topics, if any. 5) Basic Computers: a) General Computer Processing ability in MS-Office like Word Processing, Excel, Power point, etc. & Operating Systems.b) Professional Software/Hardware System relevant to the Post. c) Any other Computer/IT related questions.
			c) Anatomy and Physiology	10	Structure of the body–cells, tissues. Musculoskeletal System: Skull, Vertebral column, Shoulder Girdle Bones of upper extremities, Bones of lower extremities, pelvis and its muscles, Ossification. Cardiovascular System: Heart–blood–Arteries–Veins. Lymphatic System: Circulation of Lymph, Lymph glands, Thoracic duct. Digestive System: Mouth–oesophagus–stomach–small intestines large intestines spleen Liver Gall bladder Pancreas. Respiratory System: Nose, Larynx-Trachea-Lungs Bony-case. Nervous System: Brain-meninges-ventricles-Spinal cord and nerves. Eye: Structure and its function. Ear: Structure and function. Surface Anatomy and Cross–sectional Anatomy. Reproductive System: Female & Male

					organs. Urinary System: Kidneys, Ureters, Bladder, Prostate and Urethra. Skin: Structure and its function. Endocrine System: Pituitary gland, Penial gland, Thymus gland, thyroid and parathyroid gland, suprarenal glands
			d) Dark room techniques	10	Photographic Process: Light image, Image produced by radiation, Light Sensitive materials, latent image. Film Material: The structure of X–ray & Imaging films, Resolving power, Grains of films, sensitivity of film, contrast of films, Type of films. X–ray Film Storage: Storage of unexposed films. Screens: Construction of intensifying screens. Choice of fluorescent material. Intensification factor, Detail, Sharpness. Speed, Screen contact, care of intensifying screens, Types of Screens. Cassettes: Cassette designs, Care of cassette, Mounting of intensifying screen in the cassettes, Various types of cassettes. Safe Light: Constituents, filter, testing. Film Processing: Constituents of processing solution and replenishes. Factors affecting the development. Types of developer and fixer, Factors affecting the use of fixer. Silver recovery methods. Film Rising, Washing and Drying: Intermediate rinse–washing and drying. Film Processing Equipment: Manual and Automatic processing. Dark Room Design: Outlay and materials used. Radiographic Image: The sharpness, contrast, detail, definition, viewing conditions & artifacts. Miscellaneous: Trimming, identification of films, legends, records filing, report distribution.
			e) General Physics	10	Elementary idea of thermionic emission, Electron–idea of mass and nature of charge, Coulomb's law, Electric field, Unit of potential. Ohm's law, Units of resistance, potential and current, Combination of resistance in series and parallel. Fuses, Units of electric power, Earthing of electrical equipment. Magnetic fields, Lines of force, Field

					pattern due to a straight current carrying conductor, coil carrying current, electromagnet, Construction and working of galvanometer, voltammeter and ammeter, (moving coil type and moving magnet type).Heat and methods of transference of heat, condensers, Inductance and Impedance. A.C. and D.C. currents-effective current, RMS value, peak value. Electromagnetic induction – Laws, fields, influence. Transformers – Principles, construction, and uses of step down and High tension transformers. Diode values and their use in rectifiers solid-state rectifiers, its various rectifying circuits uses in X–ray machines, production of X–rays and their properties, X–ray tube–Stationary anode and rotating anode & therapy tubes, X–ray circuit, interlocking circuits, relay and timers.
			f) Radiographic Techniques	10	Radiography Techniques Upper Limb: Fingers individual and as a whole hands, Carpal bones wrists, Forearm, elbow–head of radius, humerus, shoulder joint, Acromio-clavicular joint, scapula, sterno-clavicular joint, small joints. Lower Limb: Toes, foot, calcaneum & other tarsal bones, ankle joint, legs, knees, patella, fibula, femur, intercondylar notch. Hip & Pelvis: Hip, Neck of femur, threatre procedure, for hip pinning or reduction, pelvis, sacro-iliac joints, pubic bones, acetabulum. Vertebral Column: Curves, postures, relative levels atlanto, occipital region, odontoid process, Cervical spine, thoracic Inlet, Cervico, thoracic spine, lumbosacral spine, sacrum, coccyscoliosis, kyphosis, flexion, extension and neutral. Bones of the thorax: Sternum ribs. Skull: Land marks, Cranium, facial bones, maxilla, mandible, zygoma, T.M. joints, mastoids, petrous bones, optic foramen, sells turcica, P.N.S. Chest: Chest in teleradiography, chest supine & portable, Lordotic, apicogram and MMR. Abdomen: Preparation, indication and contraindication, acute abdomen, pregnancy abdomen for multiplicity maturity and foetal abnormality. Pelvirnetry. Soft tissue: Neck and breast.

					Emergency Radiography: Bedside radiography, O.T. Radiography. Radiography for age evidence: Bone age evidence. Dental Radiography: Occlusal view, Dental X–ray, Panoramic view.
			g) Radiographic procedures	10	I. (i) Pathology: Definition, cell growth, cell deformities, cell damage, defence mechanism, cell repair. (ii) Neoplasia: Benign & Malignant including its mode of growth and metastasis. (iii) Radiation: Local and systemic. (iv) Radiotherapy techniques. (v) Emergency in Radiology. II. (i) Contrast media. (ii) Urinary Tract: I.V.P., Retrograde Pyelography, Cystourethrography. Presacral Insufflation. (iii) Biliary Tract: Oral cholecystography, I.V.C, Transhepatic percutaneous cholangiography pre-operative cholangiography – T-tube cholangiography, E.R.C.P. (iv) Tomography: Principle, equipment and types of movements, procedure. (v) Venography: Splenoportovenography, Peripheral venography. (vi) Lymphangiography. (vii) Marnmography and Xeroradiography. (viii) Radiculography. (ix) Dacrocystography. III. (i) Gastro-intestinal Tract: Ba-swallow, Ba-meal upper G.I.T., Ba-meal follow-through, Ba-Enema. (ii) Female Genital Tract: Hystero-Salpingography, Gynecography, Placentography & Pelvimetry. (iii) Angiography: Carotid angiography, Femoral arteriography, Aortography, Selective angiography etc. (iv) CNS: Ventriculography, Myelography, Pneumoencephalography. (v) Sialography (vi) Sinography (vii) Nasopharyngography (viii) Laryngography (ix) Bronchography (x) Arthrography (xi) Discography
			h) Radiation Physics and	10	I. Latent images formation and its

			related equipments		processing. Various units used for measuring radiation–Roentgen, rad and rem. Construction of X–ray tube, X–rays–its production and properties. Ionization chambers, G.M. Counter and Scintillation Counter, Interaction of X–ray with matter. Quality and quantity of X–rays, HVT, linear absorption coefficient, Grid, Cones and Filters. Inverse square law, scattered radiations and appliances used to reduce it. II. Radioactivity Curie, Half life, decay factor. Details about radium, cobalt and caesium. Doses–dose and dose rate, exposure dose, exit dose, surface dose, depth dose, isodose charts and their uses. III. Radiation Hazards, Protection against it, film badge, pocket ionization chamber, maximum permissible dose. (a) High-tension control equipment – Diagnostic H.T. circuits, high tension generators, half wave full wave three phase, condensers discharge, contact voltage high tension switches, control and establishing equipment, tube filament supply, mains compensator mains resistance compensator. X-ray tubes – design, rating and care of X-ray tubes, practical considerations in choice of focus, inherent filtration. MAS meter elementary principles and construction, importance as check on. (i) Radiographic results. (ii) Apparatus behaviour and additive tube loading, exposure timers – spring activated, synchronous motor, value (Low-tension ionization testing timer accuracy). Interlocks and safety devices. (iii) Circuits – Simple circuit diagram and illustration of sequence from mains supply to control X-ray exposure bean. Centering devices – mechanical and optical, interaction of X-rays and the body transmission in body tissues. (b) Scattered radiation – control of scattered radiation, cones, diaphragm, single and multiple filters grid ratio in relation to KV, construction and operation, focused and non – focused, single stroke reciprocating and oscillating potter – bucky, diaphragms, criss cross grids, stationary grids, use etc. (c) Production of X-ray tubes and high

					tension circuits for the production of control panel and control safety device and interlocks, basic principles of mega voltage X-ray machines. (d) Fluoroscopy – Tube filtration, diaphragm, tilting couch screen grid and exploratory and control safety devices, compressors, protection, electrical radiographic and mechanical control, use and care of couch accessory fittings. (e) Special equipment – body section radiography, apparatus and controls simultaneous multi section accessories specialized couches, skull table, mobile units. Image intensifiers, principles, optical systems, for viewing and recording final image electrical and x-ray supply protection, applications, including cine radiography, mass miniature radiography, special radiography, equipment for high speed serial techniques (etc.) rapid cassette changer rapid films changer, roll films, full size and miniature, biplane equipment, grids, protection, problems of processing and presentation, care and maintenance – general principle and routine use of charts supplied by manufactures, radiographic calibration procedure.
			i) Patient-care	10	(a) Hospital staffing and organisation, records relating to patients and departmental statistics, professional attitude of the radiographer to patients and other members of the staff, medico legal aspects, minimising waiting time, appointments organisation stock taking and stock keeping. (b) Care of patient: - first contact with patient in the department handling of chair and stretcher patients, lifting of ill and injured patients, elementary hygiene, personal cleanliness, hygiene in relation to patients. E.g. clean linen and receptive nursing care, temperature. (c) First Aid: - Shock, asphyxia, convulsions, artificial respiration, electric shock, burns, scalds, haemorrhage, pressure point, tourniquet, fractures, splints, bandaging, foreign bodies, poisons, drug, reactions, administration of oxygen. (d) Preparation of a patient for general X-ray examinations. Departmental instruction to out patients or ward staff, use of aperients, enema and colonic irrigation, flatulence and flatus causes and methods of relief, principles of catheterization and intubations,

					premeditation, its uses and methods, anaesthetised patients, nursing care before and after special X-ray examinations e.g. in neurological, vascular and respiratory conditions diabetic patients, special attention to food, trauma hazards. (e) Preparation of patients for special x-ray examinations barium enema, barium meal, intravenous pyelography cholecystography etc. and their administration. (f) Principles and aspects: - Methods of sterilization, care and identification of instruments and surgical dressings in common use, setting of trays and trolleys for various examinations etc. intravenous pyelography, biopsy, elementary operating theatre produce. (g) Drugs in department- storage, labeling checking, regulations regarding (h) Contrast media- barium preparations, iodine Radiographic Photography: (a) Photographic aspects of radiography – the fundamentals of the photographic process, light sensitive salts of silver, the photographic emulsion gelatin as suspension medium, size and frequency of the silver halide grain in relation to sensitively and contrast, formation of the latent image, chemical development, construction of x-ray film base material, substratum coating, emulsion, coating anti-abrasive super coating sensitivity, storage of unexposed film. (b) X-ray materials: - Type of emulsion, characteristics and control screen films, non screen films, dental films, comparative speed and contrast to light and x-rays. Characteristics of x-ray emulsions, characteristics curves of x-ray film assessment of the results of correct exposure under & over exposure, density (D max) speed, contrast (Gamma infinity) graduation, fog, grain, exposure, kilovoltage and developing latitude. Intensifying screens fluorescence application of fluorescence in radiography, construction of an intensifying screen, types of emulsion in relation to type of salt, size of grain, coating, weight, kilovoltage, mounting and general care of screens, after glow test for reciprocate failure, intermittency effect. X-ray, testing a cassette for proving good screen contact, general case of cassettes. X-ray developers –

					characteristics and detail freedom from chemical fog and staining, long life possibility of degeneration. Standardization of quality of developers and development – function and constituents of an x-ray developer, standardization by time and temperature development latitude, exhaustion of a developer, replenishment of developers, ultra rapid developers, combined developer and fixer, fixers and fixing, hardening agent, time of fixation, exhaustion of a fixer, electrolytic silver recovery and fixer regeneration, rapid fixers, separate hardening. Rinsing, washing and drying – objects of rinsing and washing, methods, employed, methods of drying films, processing – preparation of solutions, available water supply, nature of mixing, vessels, order of mixing solutions, filtration, making stock solutions, storage of dry chemicals, storage of solutions, processing units, hangers, care of hangers, control of temperature by heating elements and thermostat, water mixer, by refrigeration, use of ice – film quality, ultra rapid processing, tank or dish units, stop bath rinse, wetting agents, after treatment of films. Automatic processing principles, procedure and regeneration of solutions. Knowledge of Atomic Energy Regulatory Board (AERB) regulations and rules.
			j) Specialized investigations	10	Computed Tomography Principles of CT – Basic Physics – Recent developments, applications etc. Positioning in CT Different types of contrast materials. Emergency treatment. Radiation hazards Disposal of unused matter. Magnetic Resonance Imaging Principle – Physics – Techniques – Types of coils – Basic term used in MRI Operations, Applications, etc. Positioning in MRI. Different types of contrast materials. Emergency treatment. MRI hazards. Factors affecting quality of imaging. Ultrasound

					Physics – Types of ultrasound – Techniques of ultrasound scanning in different parts – positioning and filming – Principles of Doppler effect and colour Doppler.
21	**Medical record Officer**	Essential Qualification & Experience: (i) Bachelor's Degree preferable with Science from a recognized University or Equivalent. (ii) Should have done one year course in Medical Record from recognized Institution. (iii) Not less than 5 years of experience in organizing and maintenance of Medical Records in a not less than 200 Bedded Medical Hospital / Institute.	a) Hospital and Patient-care Appraisal	10	(i) History and Evolution of Hospitals (ii) New trends in Hospitals. 2. Definition of Hospital - Objectives of Hospital. - Parameters of Good Medical Care/Patterns of Patient Care. - Functions of Hospital. 3. Role of a Hospital in Health is Delivery Systems (HCDS) 4. Classification of Hospitals. 5. Hospitals Organization and its analysis – Chart of Organization. – Board and committees – Duties and responsibilities thereof. 6. Departmental Administration – Delegation – Decentralization Patient Care Appraisal (PCA) – History of Medical Audit – Tools and Techniques – Various Phases of Medical Audit.
			b) Departments and Service Units	10	i) Clinical Departments (ii) Diagnostic and therapeutic services (including clinical Laboratories, Radiology, Physical Medicine and Rehabilitation and Pharmacy services) (iii) Nursing Department (iv) Dietary Department (v) Outpatient Department (vi) Accident and emergency services Department (vii) Medical Social Service Department (viii) General and Medical stores (ix) Blood Bank (x) Medical Library services. Service units in a hospital Laundry, Housekeeping, CSSD. Miscellaneous Services: Engineering, Mortuary and Transport services.
			c) Basic Anatomy	10	A. Anatomy 1. General Introduction – Definition of Anatomy & Physiology. – Types of Anatomy (including systemic) – Definition of topographic term/term used to describe the body.

					– Description of Various regions of the body. 2. Cells and tissues of body and general histology. 3. Anatomical description of the following: - Skin and breast – Ontology – Joints – Ligaments – Fasciae and Bursae – Musculoskeletal system – Cardiovascular system – Respiratory system – Lymphatic system – Blood and blood forming organs – congenital system – Endocrine system – Organs of special senses (ear, eye, etc.) – Digestive system – Embryology
			d) Basic Physiology	10	Introductory Lectures or specialization of tissues. Homeostasis and its importance in mammals. Blood and lymphatic system Cardiovascular system Excretory system, skin and temperature regulation Respiratory system Digestive system and metabolism Endocrinology Reproductive system Nervous system Special senses Muscles
			e) Basic Pathology andMicrobiology	10	- Definitions and Classification of diseases, Inflammatory diseases – viral and fungal, Inflammatory diseases –Parasitic, - Degenerative diseases – Fatty degeneration, Amyloid etc. – Tumors – Definition, etiology& classification, -Disturbances in blood flow, - pigment disorders, Hereditary diseases, C.V.S. Blood vessels, -V.S. Heart, Respiratory system, - G.I. tract, Liver Lymphatic system, - Genitourinary system, Skeletal system, - Blood, Central Nervous system, - Endocrine system Clinical Pathology – Normal composition of blood; diseases of RBCs.,WBCs., Plate less. – Coagulation factors and disorders – Blood groups and cross – matching, - Blood

					transfusion, - Urine composition: variation in common diseases, - CSF and body fluids, - Gastris & Duodenal contents, - Fasces – parasites, Introduction and historical background, Classification special, Characteristics of organisms bacterias, - Asepsis, - Disinfection Antiseptics- Sanitation, Infection, Immunity, Allergy study of pathologenic organisms, Non-pathology organisms, Virus and fungus, Parasitic diseases- their stance in India with lab Diagnosis.
			f) Medical Terminology	10	i. Objective ii. Basic iii.. Elements of Medical Terms (a) Roots (b) Prefixes (c) Suffixes (d) Colours (e) Numerals (f) Symbols(g)Abbreviationn (page501) (iv) Terms pertaining to Body as a whole. II. Terms relate to Investigations, and operation, treatment of conditions, disorders of: - 1.Skin and Breast (integumentary system) 2. Musculoskeletal 3. Neurological and psychiatric 4. Cardio- vascular 5. Blood and blood forming organs 6. Respiratory 7. Digestive 8. Uro – genital 9. Gynacological 10. Maternal, Antenatal and Neonatal conditions 11. Endocrine and Metabolic 12. Sense organs of: (i) Vision (ii) Hearing 13. Systemic: (i) Infectious diseases. (ii) Immunological diseases. (iii) Diseases of the Connective Tissues. b 14. Geriatrics and Psycho geriatrics. III. Supplementary terms: Selected terms relating: 1. Oncology 2. Anesthesiology 3. Physical Medicine and Rehabilitation 4. Nuclear Medicine 5. Plastic Surgery of Burns and Maxillofacial 6. Radio- Diagnosis 7. Radiotherapy

			g) Biostatistics	10	i) Introduction to Statistics. (ii) Methods of collection of data. (iii) Measures of central tendency (simple average, G.M., H.M. Mode and Median). (iv) Measures of dispersion (Standard deviation, range, variance, average deviation) (v) Sampling; Definition, Methods of sampling (randoin systematic, stratified, cluster). (iv) Correlation and regression: Significance, linear correlation, correlation coefficient, linear regression. (vii) Time series analysis – concept and its utility, component of time series. (viii) Test of significance. (ix) Graphical presentation of data. (x) Probability- concept and definition. (xi) Uses of statistics. -*1. Sources* of hospital statistics (In-Patient census, Out – Patient Deptt, and Special Clinics). 2. Definitions (live, birth, foctal death, immaturity, cause of death, underlying cause of death inpatient bed etc) 3. Analysis of hospital services and discharges. 4. Indices (Bed occupancy, average length of stay, bed turn – over interval, death rate, birth rate etc.) 5. Vital statistics. 6. Uses and Limitations of hospital data. 7. Method of compilation of various Health Returns/ Statistical Returns.
			h) Healthcare organization	10	1. Introduction to Principles of Management and Administration - scope and importance of management. –Principles of Management. – Functions of a Manger (POSDCORB-E). Management Techniques. –Material Management – Personal Administration. –Financial Administration. 2. Public Health Structure in India. – Directive Principles of -With relation to Public Health & medical Care. – Constitutional lists. – Various five years plans and priorities. 3. Role of Voluntary Health Organisation. 4.Basic facts of Health in India. 5. Current Objectives and strategies. – Population Dynamics. – Community Health Worker schemes. 6. National Health Programmes of Medicine and Homeopathy. 8. Other programmes of relevance to Health Sector. – Family Welfare. –

					Medical Termination of Pregnancy. – National Population Policy. – Maternity and Child Health.
			i) Medical Record Science	10	I. Introduction to Medical Record Science. II. - 1.Development, Analysis and Uses of Medical Record. 2. (i) Development of Medical Record Forms, basic and special. (ii) Order of Arrangements: (a) Ward (b) Medical Record Department. (c) Source oriented medical record. (d) Problem oriented medical record. (e) Integrated Medical Record. 3. Analysis of Medical record: (i) Quantitative. (ii) Qualitative. 4. Uses of Medical Records: (a) as a personal document. (b) as impersonal document. 5. Values of the Medical Record
			j) International classification of Diseases	10	Classification of diseases as per I.C.D.
22	**CSSD Technician**	Essential Qualification & Experience: B. Sc. (Microbiology or Medical Technology) with 3 years' experience in CSSD in a 200 bedded Hospital. OR Staff Nurse (A Grade Registration) with two years' experience in CSSD in a 200 bedded Hospital. OR Theatre Assistant Course with four years' experience in CSSD in a 200 bedded Hospital.	a)Basic Anatomy	10	A. Anatomy 1. General Introduction – Definition of Anatomy & Physiology. – Types of Anatomy (including systemic) – Definition of topographic term/term used to describe the body. – Description of Various regions of the body. 2. Cells and tissues of body and general histology. 3. Anatomical description of the following: - Skin and breast – Ontology – Joints – Ligaments – Fasciae and Bursae – Musculoskeletal system – Cardiovascular system – Respiratory system – Lymphatic system – Blood and blood forming organs – congenital system – Endocrine system – Organs of special senses (ear, eye, etc.) – Digestive system – Embryology
			b)Basic Physiology	10	Introductory Lectures or specialization of tissues. Homeostasis and its importance in mammals. Blood and lymphatic system

					Cardiovascular system Excretory system, skin and temperature regulation Respiratory system Digestive system and metabolism Endocrinology Reproductive system Nervous system Special senses Muscles
			c)Basic Pathology and Microbiology	10	- Definitions and Classification of diseases, Inflammatory diseases – viral and fungal, Inflammatory diseases –Parasitic, - Degenerative diseases – Fatty degeneration, Amyloid etc. – Tumors – Definition, etiology& classification, -Disturbances in blood flow, - pigment disorders, Hereditary diseases, C.V.S. Blood vessels, -V.S. Heart, Respiratory system, - G.I. tract, Liver Lymphatic system, - Genitourinary system, Skeletal system, - Blood, Central Nervous system, - Endocrine system Clinical Pathology – Normal composition of blood; diseases of RBCs.,WBCs., Plate less. – Coagulation factors and disorders – Blood groups and cross – matching, - Blood transfusion, - Urine composition: variation in common diseases, - CSF and body fluids, - Gastris & Duodenal contents, - Fasces – parasites, Introduction and historical background, Classification special, Characteristics of organisms bacterias, - Asepsis, - Disinfection Antiseptics- Sanitation, Infection, Immunity, Allergy study of pathologenic organisms, Non-pathology organisms, Virus and fungus, Parasitic diseases- their stance in India with lab Diagnosis.
			d) Operation theatre techniques	10	Operation theatre techniques Surgical Procedures Organize and set up trolleys for theatre Tracking and recall of equipment and

					items Surgical Instruments Criteria for Purchase and Maintenance Checking in and out of loan instruments Decontamination Process Scientific Principles Recommended Practices
			e) Disinfection	10	Principles of Disinfection Cleaning of equipment Use of detergents Sonic washers /Mechanical cleaning apparatus Cleaning of catheters and tubings, cleaning glass ware, cleaning syringes and needles Preparation and Supplies for Terminal Sterilization
			f) Packaging and assembly line	10	Precautions while handling instruments and line Assembly and packing Packaging selection and use Materials used for wrapping and packing assembling pack contents. Types of packs prepared. Inclusion of trays and gallipots in packs. Method of wrapping and making use of indications to show that a pack of container has been through a sterilization process date stamping.
			g) Sterlization methods	10	Different Methods of Sterilization High Temperature Sterilization – Dry Heat Moist heat sterilization EO gas sterilization H202 gas plasma vapour sterilization Endoscopes and their Sterilization Sterilization Recommended Practices for Flash Sterilization

			h) Sterlization record keeping	10	Sterile storage Call back system in case of detection of failure HVAC system Records & register maintenance
			i) Quality assurance	10	Quality assurance Biological indication and quality control Quality measurement methods and its standards
			j) Quality Standards	10	International Organization for Standardization (ISO) standards Water Quality and its impact in CSSD process Biomedical waste disposal protocols
23	**Junior Engineer (Civil)**	Essential Qualification & Experience: Graduate in Civil Engineering from a recognized University/Institute. Desirable: 2 Years' experience in design and engineering of Civil Projects preferably in a Hospital Environment. OR Diploma in Civil Engineering from a recognized University/Institute with 5 years' experience in design and engineering of Civil Projects, preferably in a Hospital Environment.	a) General Intelligence & Reasoning b) General Awareness c) Subject knowledge of the concerned post (Civil Engineering)	15 15 70	(a) & (b) :- Same as that of Assistant Administrative Officer (c) Civil Engineering: Building Materials : Physical and Chemical properties, classification, standard tests, uses and manufacture/quarrying of materials e.g. building stones, silicate based materials, cement (Portland), asbestos products, timber and wood based products, laminates, bituminous materials, paints, varnishes. Estimating, Costing and Valuation: estimate, glossary of technical terms, analysis of rates, methods and unit of measurement, Items of work – earthwork, Brick work (Modular & Traditional bricks), RCC work,

					Shuttering, Timber work, Painting, Flooring, Plastering. Boundary wall, Brick building, Water Tank, Septic tank, Bar bending schedule, Centre line method, Mid-section formula, Trapezodial formula, Simpson‟s rule. Cost estimate of Septic tank, flexible pavements, Tube well, isolates and combined footings, Steel Truss, Piles and pile-caps. Valuation – Value and cost, scrap value, salvage value, assessed value, sinking fund, depreciation and obsolescence, methods of valuation. Surveying : Principles of surveying, measurement of distance, chain surveying, working of prismatic compass, compass traversing, bearings, local attraction, plane table surveying, theodolite traversing, adjustment of theodolite, Levelling, Definition of terms used in levelling, contouring, curvature and refraction corrections, temporary and permanent adjustments of dumpy level, methods of contouring, uses of contour map, tachometric survey, curve setting, earth work calculation, advanced surveying equipment. Soil Mechanics : Origin of soil, phase diagram, Definitions-void ratio, porosity, degree of saturation, water content, specific gravity of soil grains, unit weights, density index and interrelationship of different parameters, Grain size distribution curves and their uses. Index properties of soils, Atterberg‟s limits, ISI soil classification and plasticity chart. Permeability of soil, coefficient of permeability, determination of coefficient of permeability, Unconfined and confined aquifers, effective stress, quick sand, consolidation of soils, Principles of consolidation, degree of consolidation, pre-consolidation pressure, normally consolidated soil, e-log p curve, computation of ultimate settlement. Shear strength of soils, direct shear test, Vane shear test, Triaxial test. Soil compaction, Laboratory compaction test, Maximum dry density and optimum moisture content, earth pressure theories, active and passive earth pressures, Bearing capacity of soils, plate load test, standard penetration test.

					Hydraulics : Fluid properties, hydrostatics, measurements of flow, Bernoulli‟s theorem and its application, flow through pipes, flow in open channels, weirs, flumes, spillways, pumps and turbines. Irrigation Engineering: Definition, necessity, benefits, 2II effects of irrigation, types and methods of irrigation, Hydrology – Measurement of rainfall, run off coefficient, rain gauge, losses from precipitation – evaporation, infiltration, etc. Water requirement of crops, duty, delta and base period, Kharif and Rabi Crops, Command area, Time factor, Crop ratio, Overlap allowance, Irrigation efficiencies. Different type of canals, types of canal irrigation, loss of water in canals. Canal lining – types and advantages. Shallow and deep to wells, yield from a well. Weir and barrage, Failure of weirs and permeable foundation, Slit and Scour, Kennedy‟s theory of critical velocity. Lacey‟s theory of uniform flow. Definition of flood, causes and effects, methods of flood control, water logging, preventive measure. Land reclamation, Characteristics of affecting fertility of soils, purposes, methods, description of land and reclamation processes. Major irrigation projects in India. Transportation Engineering: Highway Engineering – cross sectional elements, geometric design, types of pavements, pavement materials – aggregates and bitumen, different tests, Design of flexible and rigid pavements – Water Bound Macadam (WBM) and Wet Mix Macadam (WMM), Gravel Road, Bituminous construction, Rigid pavement joint, pavement maintenance, Highway drainage, Railway Engineering- Components of permanent way – sleepers, ballast, fixtures and fastening, track geometry, points and crossings, track junction, stations and yards. Traffic Engineering – Different traffic survey, speed-flow-density and their interrelationships, intersections and interchanges, traffic signals, traffic operation, traffic signs and markings, road safety. Environmental Engineering: Quality of water, source of water supply, purification of water, distribution of water, need of sanitation, sewerage

					systems, circular sewer, oval sewer, sewer appurtenances, sewage treatments. Surface water drainage. Solid waste management – types, effects, engineered management system. Air pollution – pollutants, causes, effects, control. Noise pollution – cause, health effects, control. Structural Engineering Theory of structures: Elasticity constants, types of beams – determinate and indeterminate, bending moment and shear force diagrams of simply supported, cantilever and over hanging beams. Moment of area and moment of inertia for rectangular & circular sections, bending moment and shear stress for tee, channel and compound sections, chimneys, dams and retaining walls, eccentric loads, slope deflection of simply supported and cantilever beams, critical load and columns, Torsion of circular section.
24	**Personal Assistant**	Essential Qualification & Experience: (i) Degree from a recognized University. (ii) Skill Test Norms: Dictation: 10 minutes @ 100 WPM. Transcription: 40 minutes English or 55 minutes Hindi on a Computer. Desirable : Diploma/Certificate in Secretarial Practice from a recognized Institute. Excellent command over Hindi and English (written and spoken)	a) General Intelligence & Reasoning b) General Awareness c) Quantitative Aptitude d) English Language and Comprehension	30 30 10 30	(a) to (d) : --Same as that of Assistant Administrative Officer
25	**Warden (Hostel Warden)**	Essential Qualification & Experience: (i) Graduate from recognized University / Institute. (ii) Diploma / Certificate in House Keeping / Material Management / Public Relations / Estate Management. (iii) Possessing two years' Experience of handling Hostels in Government/ reputed Organization.	a) General Intelligence & Reasoning b) General Awareness c) Quantitative Aptitude d) English Language and Comprehension	30 25 25 20	(a) to (d) :- Same as that of Assistant Administrative Officer
26	**Junior Accounts Officer (Account**	GraduateinCommerce Possessingtwoyears'experienceofhandlingaccountswork in	a) General Intelligence & Reasoning b) General	10 10	Same as Chief Cashier.

	ant)	GovernmentOrganization	Awareness c) Quantitative Aptitude d) English Language and Comprehension e) Government Accounting System & Budgeting f) Fundamental Principles and Basic Concepts of Accounting	 10 10 20 40	
27	**Multi Rehabilitation worker (Physiotherapist)**	Essential Qualification & Experience: Bachelor's Degree in Physiotherapy from a recognized Institute / University with 2 years experience. OR Diploma in Rehabilitation with 5 years experience. Registered with the Physiotherapy Council.	a) Anatomy b) Physiology	10 10	1. General and Applied anatomy 2. Musculoskeletal system – Connective tissue & its modification, tendons, membranes, special connective tissue. Bone structure, blood supply, growth, ossification, and classification. Muscle classification, structure and functional aspect. Joints – classification, structures of joints, movements, range, limiting factors, stability, blood supply, nerve supply, dislocations and applied anatomy. 3. Central nervous system – disposition, parts and functions 4. Cardiovascular system 5. Lymphatic system 6. Respiratory system 7. Digestive system 8. Urinary and Reproductive system 9. Endocrine system 1. General Physiology

					2. Blood 3. Cardiovascular system 4. Respiratory System 5. Nerve Muscle Physiology 6. Nervous system 7. Renal System 8. Digestive System 9. Endocrinology
			c) Fundamentals of Occupational Therapy History & development of Occupational Therapy.	10	
			d) Rehabilitation	10	
			e) Occupational performance model Generalized & specific principles of therapeutic exercises Principles & methods of testing range of motion & muscle strength	10	
			f) Testing methods of sensation,	10	

			perception, coordination and muscle tone Therapeutic modalities Human development and its importance in occupational therapy. General principles of human maturation g) a) Prevocational evaluation i) Evaluation of work capacity ii) Evaluation of physical capacity iii) Evaluation of functional capacity b) On the job or work site evaluation c) Work samples such as TOWER, BTE, WEST d) Work hardening & work conditioning h) Different types of tools &	10 10	

			equipment's & their uses in Occupational Therapy Define & classify splints with their brief description, state general principles of splinting, describe material used i)Hand function & evaluation methods j) Activities of daily living Occupational therapy as diagnostic & prognostic procedure.Steps involved in preparing the client for return to work.	10 10	

28	**Dental Technician**	Essential Qualification: (i) 10 + 2 with Science from a recognized University/ Board. (ii) Diploma (minimum 2 years duration) from a recognized Institution in Dental Hygiene; or Dental Mechanic; or Maxillofacial Prosthesis and Orthodontic appliances. (iii) Registered as Dental Hygienist/Dental Mechanic with the Dental Council of India.	A) Fabrication of complete denture a) Impression techniques b) Impression materials c) Border moulding d) Boxing Beading e) Fabrication of occlusion rims and jaw relation f) Teeth setting g) Try in h) Acrylization B) Fabrication of removable partial dentures Maintenance of Oral Hygiene a) Plaque control b) Scaling, root planning and curettage Dental Hygiene C) Flexible dentures Relining &	20 20 20	

			Rebasing Fabrication of fixed partial dentures: Ceramic crown & bridges fabrication D) Dental materials Soldering Welding Fabrication of space maintainers F) Habit breaking appliances Removable orthodontic appliances Importance of Oral Health	20 20	

29	**Refractionist**	Essential Qualification: B.Sc. in Ophthalmic Techniques or equivalent from a recognized University / Institution.	a) Anatomy of eye	10	
			b) Physiology of eye	10	
			c)General consideration of different terms used in ophthalmology. – Common diseases of eyelids – Common diseases of conjunctiva	10	
			d)General consideration of different terms used in ophthalmology. - Common diseases of sclera Common diseases of iris & ciliary body – Glaucoma Cataract – Orbit	10	
			e)Examination of eye - Visual acquity – amplitude of accommodation – Colour vision	10	
			f)Examination of eye – Principle of Radioscopy – Static refraction	10	
			g)Errors of refraction * Myopia *	10	

			Hypermetropia * Astigmatism h)Errors of refraction – Apahna – Presbyopia – Anisometropia – Anisokomia i)Physical optics * properties of light * Principal of reflection * Principles of refractions j)Physical optics * Lenses and their combinations – Keratometry – Contact lenses * Indications * Types * Uses* Practice – Low vision aids,.	10 10 10	
30	**Librarian Grade-III**	Essential Qualification & Experience: i) Bachelor Degree in Library Science or Library and Information Service from a recognized University/Institute. OR B.Sc. Degree or equivalent from a recognized University and Bachelor Degree or Post Graduate Diploma or equivalent in Library Science from a recognized University or Institute. WITH ii) 2 years' professional experience in a Library under Central/State/Autonomous/Statutory organization/PSU/University or recognized Research and Educational	a) General Intelligence & Reasoning b) General Awareness c) Quantitative Aptitude d) English Language and Comprehension e) Subject Knowledge of the concerned post (Library methods and techniques)	10 10 10 10 60	(a) to (d) : --Same as that of Assistant Administrative Officer e) Library Methods and Techniques Library and Society: Laws of Library Science; Types of Libraries; Library Associations, Systems and Programmers; Library Movement and Library Legislation in India; Organizations and Institutions involved in the development of Library and

		Institution. iii) Ability to use Computers - Hands on experience in Office Applications, Spread sheets and Presentations. Desirable : Diploma in Computer Application from a recognized University or Institute.			Information Services-UNESCO, IFLA, FID, INIS, NISSAT, etc.; Library Management: Collection development - Types of Documents and Selection Principles, Acquisition Procedure, Acquisition of Journals and Periodicals, Preparation of Documents for use; Library Personnel and Library Committee, Library Rules and Regulations; Library Finance and Budget; Principles of Library Management, Library Organization and Structure; Use and Maintenance of the Library - Circulation, Maintenance, Shelving, Stock Verification, Binding and Preservation, Weeding out, etc.; Library Classification Theory and Practice: Canons and Principles, Library Classification Schemes - DDC, CC, UDC; Library Cataloguing Theory and Practice: Canons and Principles; Library Cataloguing Codes - CCC and AACR; Reference and Information Sources: Bibliography and Reference Sources - Types of Bibliography; Reference Sources- Dictionaries, Encyclopedias, Ready Reference Sources, etc.; Sources of Information - Primary, Secondary, Tertiary, Documentary, Non-Documentary; E-Documents, EBooks, E-Journals, etc.; Information Services: Concept and need for Information; Types of Documents; Nature and organization of Information Services, Abstracting and Indexing Services; Computer based Information Services - CAS, SDI; Information Technology: Basics Introduction to Computers; Use of computers in Library housekeeping, Library Automation; Software and software packages; Networks - DELNET, NICNET, etc.; National and International Information Systems - NISSAT, NASSDOC, INSDOC, DESIDOC, etc.
31	**Junior Engineer (Electrical)**	Essential Qualification & Experience: Graduate in Electrical Engineering from a recognized University/Institute. Desirable : 2 years' experience in repair and maintenance of	a) General Intelligence & Reasoning b) General Awareness	15 15	(a) & (b) :- Same as that of Assistant Administrative Officer

		Electrical Systems preferably in a Hospital Environment. OR Diploma in Electrical Engineering from a recognized University/Institute With 5 years' experience in repair and maintenance of Electrical Systems preferably in a Hospital Environment.	c) Subject knowledge of the concerned post (Electrical Engineering)	70	(c) Electrical Engineering: Basic concepts: Concepts of resistance, inductance, capacitance, and various factors affecting them. Concepts of current, voltage, power, energy and their units. Circuit law : Kirchhoff's law, Simple Circuit solution using network theorems. Magnetic Circuit: Concepts of flux, mmf, reluctance, Different kinds of magnetic materials, Magnetic calculations for conductors of different configuration e.g. straight, circular, solenoidal, etc. Electromagnetic induction, self and mutual induction. AC Fundamentals: Instantaneous, peak, R.M.S. and average values of alternating waves, Representation of sinusoidal wave form, simple series and parallel AC Circuits consisting of R.L. and C, Resonance, Tank Circuit. Poly Phase system – star and delta connection, 3 phase power, DC and sinusoidal response of R-Land R-C circuit. Measurement and measuring instruments: Measurement of power (1 phase and 3 phase, both active and re-active) and energy, 2 wattmeter method of 3 phase power measurement. Measurement of frequency and phase angle. Ammeter and voltmeter (both moving oil and moving iron type), extension of range wattmeter, Multimeters, Megger, Energy meter AC Bridges. Use of CRO, Signal Generator, CT, PT and their uses. Earth Fault detection. Electrical Machines : (a) D.C. Machine – Construction, Basic Principles of D.C. motors and generators, their characteristics, speed control and starting of D.C. Motors. Method of braking motor, Losses and efficiency of D.C. Machines. (b) 1 phase and 3 phase transformers – Construction, Principles of operation, equivalent circuit, voltage regulation, O.C. and S.C. Tests, Losses and efficiency. Effect of voltage, frequency and wave form on losses. Parallel operation of 1 phase /3 phase transformers. Auto transformers. (c) 3 phase induction motors, rotating magnetic field, principle of operation, equivalent circuit, torque-speed characteristics, starting and speed

					control of 3 phase induction motors. Methods of braking, effect of voltage and frequency variation on torque speed characteristics. Fractional Kilowatt Motors and Single Phase Induction Motors: Characteristics and applications. Synchronous Machines - Generation of 3-phase e.m.f. armature reaction, voltage regulation, parallel operation of two alternators, synchronizing, control of active and reactive power. Starting and applications of synchronous motors. Generation, Transmission and Distribution – Different types of power stations, Load factor, diversity factor, demand factor, cost of generation, inter-connection of power stations. Power factor improvement, various types of tariffs, types of faults, short circuit current for symmetrical faults. Switchgears – rating of circuit breakers, Principles of arc extinction by oil and air, H.R.C. Fuses, Protection against earth leakage / over current, etc. Buchholtz relay, Merz-Price system of protection of generators & transformers, protection of feeders and bus bars. Lightning arresters, various transmission and distribution system, comparison of conductor materials, efficiency of different system. Cable – Different type of cables, cable rating and derating factor. Estimation and costing : Estimation of lighting scheme, electric installation of machines and relevant IE rules. Earthing practices and IE Rules. Utilization of Electrical Energy : Illumination, Electric heating, Electric welding, Electroplating, Electric drives and motors. Basic Electronics: Working of various electronic devices e.g. P N Junction diodes, Transistors (NPN and PNP type), BJT and JFET. Simple circuits using these devices.
32	**Junior Engineer (Air Conditioning & Refriger**	Essential Qualification & Experience: Graduate in Electrical/Mechanical Engineering from a recognized University/Institute.	a) General Intelligence & Reasoning b) General Awareness	15 15	(a) & (b) :- Same as that of Assistant Administrative Officer

	ation)	Desirable : 2 years' experience in repair and maintenance of large scale Air Conditioning and Refrigeration Systems. OR Diploma in Electrical/Mechanical Engineering from a recognized University/Institute. With 5 years' experience in repair and maintenance of large scale Air Conditioning and Refrigeration Systems.	c)Subject knowledge of the concerned post (Air conditioning & Refrigeration)	70	(c):- Subject Knowledge (Air conditioning & Refrigeration): General - Knowledge of Indian Electricity Act, Indian Elect. Rules as amended up-to-date. General conditions of supply and charges to be paid to licencees for obtaining connection. CPWD General Specifications for Electrical Works, Principles of analysis of rates. General Principles in preparation of estimates, project reports, award of works and execution of works and measurement. ISI/BIS Standards and Codes of practices. Internal Electrical Installations - Systems of wiring and their design, distribution system. Apparatus for control, protection and Testing. Earthing, Lighting Protection, Safety & Maintenance - Necessity of earthing, earthing resistance, type of earthing. Lighting protection design, layout, material and installation. Safety procedures and practices, principles of equipment installation, preventive maintenance and testing of equipment. Sub-Station up to 33 KV and Distribution - Layout and Design for indoor and outdoor application. Specifications for equipment, Sub- Station earthlings, stand-by generating sets, commissioning procedures and tests. Distribution: Design of overhead line and underground distribution systems. Specification for cables, conductors, Supports etc. Cable joining and termination methods, power factor improvement, service connection to buildings. Air-Conditioning Ventilation - General principles of Refrigeration, Air-Conditioning, evaporative cooling and ventilation, Heating and cooling load estimation. Classification of systems, their design and application, structural requirements, specifications for installations. Water Supply - Types of pumps and their characteristics. Prime movers, pumping

					systems and application. Specification for equipment and installation. ELECTRICAL APPARATUS - (i) Single and poly phase A.C. Circuit. Effects of resistance inductance and capacitance. (ii) Single and poly phase transformers – constructional features, equivalent circuits performance, parallel operation, phase conversion. Separation of losses and determination of efficiency by various methods. Auto transformers. (iii) Alternators, Constructional features, regulation, parallel operation and Protection. Automatic Voltage regulators, Emergency generating sets, automatic change over. (iv) Induction machines, polyphase motor and its principle of operation and equivalent circuit. Torque, slip characteristics. Crawling, methods of starting, single phase motor, its theory, characteristics and application. INSTRUMENT TRANSFORMERS, PROTECTIVE RELAYING, MEASUREMENTS - Current, Voltage transformers. Constructional features of IDMT relays, instantaneous relays including knowledge of overload earth fault, undervoltage, Bucholz relays. Connection diagrams, settings. Electrical instruments and Measurements, principles of construction and theory of measuring instruments for direct and alternating currents. Commercial types. Measurement of resistance, Voltage, current, power, power factor and energy. Watt meters, energy meters. Thermos couples, Resistance Thermometers, Pyro-meters. Fault locating bridges for cables. Measurements of resistance, inductance and capacitance, Wheatstone bridge. INTERNAL COMBUSTION ENGINES Fuels and Combustion. Fuels and their properties, combustion calculations. Analysis of products of combustion. Power cycles. Vapor power cycles-Carnot and Rankine. Gas Power-Otto and Diesel cycles. Deviation of actual cycles from theoretical cycles. Internal combustion engines – Two and four stroke compression ignition and spark

					ignition engines. Combustion phenomena. Detonation, Knocking, scavenging of two stroke engines. Fuel injection and carburation. Lubrication and cooling system performance and testing of IC engines. Pollution control requirements/standards. HEATING, AIR CONDITIONING AND REFRIGERATION Refrigeration – Refrigeration and heat pump cycles. Vapour compression, absorption Cycles. Refrigerants and their characteristics. Air Conditioning – Psychrometric chart, comfort airconditioning, comfort indices, ventilation requirements. Cooling and dehumidification methods. Industrial air-conditioning processes. Different methods of electric heating. Construction and performance of Electric heating equipment. WORKSHOP TECHNOLOGY Estimation of power and energy requirements of electric welding, different types of equipments used and their characteristics. Manufacturing and Fabricating methods and practices for various electrical and mechanical equipment such as pumps, switch boards, light fittings, AHUs etc. ENERGY CONSERVATION, POWER FACTOR IMPROVEMENT Comparison of different types of lamps from the point of energy conservation, calculation of payback period. Power factor improvement, Reduction of load current and transformer losses due to power factor improvements. KVA requirement for power factor improvement. SOLAR ENERGY UTILISATION Solar Hot Water system, principles, constructional features, constituent parts, installation, operation & maintenance, solar photo voltaic system, advantages/disadvantages of solar heating & solar photo voltaic system.
33	**Junior Hindi Translator**	Master's Degree of a recognized University in Hindi with English as a compulsory or elective subject or as the medium of examination at the	a) General Hindi, b) General English	35 30	Same as Senior Hindi Officer

		Degree Level. OR Master's Degree of a recognized University in English with Hindi as a compulsory or elective subject or as the medium of examination at the Degree Level. OR Master's Degree of a recognized University in any subject other than Hindi or English with Hindi medium and English as a compulsory or elective subject or as the medium of an examination at the Degree Level. OR Master's Degree of a recognized University in any subject other than Hindi or English with English medium and Hindi as a compulsory or elective subject or as the medium of an examination at the Degree Level; OR Master's Degree of a recognized University in any subject other than Hindi or English with Hindi and English as compulsory or elective subjects or either of the two as a medium of examination and the other as a compulsory or elective subject at Degree Level; AND Recognized Diploma or Certificate Course in Translation from Hindi to English & vice versa or two years' experience of Translation Work from Hindi to English and vice versa in Central or State Government Office including Government of India Undertaking.	c) Translation from Hindi to English and vice versa	35	

34	**Radiotherapy Technician Grade-II**	Essential Qualification & Experience: B.Sc. (Hons.) (3 years course) in Radiography from a recognized University / Institution. OR Diploma in Radiography from a recognized Institution with 2 years' experience. Desirable : Ability to use Computers - Hands on experience in Office Applications, Spread-sheets and Presentations.	a)General Intelligence and Quantitative ability	10	Questions in this component will be designed to test the candidate's understanding and knowledge of English language and will be based on spot the error, fill in the blanks, synonyms, antonyms, spelling/detecting misspelt words, idioms & phrases, one word substitution, improvement of sentences, active/passive voice of verbs, conversion into direct/indirect narration, shuffling of sentence parts, shuffling of sentences in a passage, comprehension passage and any other English language questions at the level of Matriculation/Higher Secondary. The questions will be designed to test the ability of appropriate use of numbers and number sense of the candidate. The scope of the test will be percentage, Ratio & Proportion, Square roots, Averages, Interest, Profit & Loss, Discount, Partnership Business, Mixture and Allegation, Time and distance, Time & work, Basic algebraic identities of School Algebra, Elementary surds, Graphs of Linear Equations, Triangle and its chords, tangents, angles subtended by chords of a circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Square, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular or square base, Trigonometric ratio, Degree and Radian Measures, Standard Identities, Complementary angles, Heights and Distances, Histogram, Frequency Polygon, Bar diagram, Pie chart and any other question of Matriculation level.
			b)General Studies and Logical reasoning	10	Questions in this component will be aimed at testing the candidates general awareness of the environment around him and its application to society. Questions will also be designed to test knowledge of current event and of such matters of every day observations and experience in their scientific aspect as may be expected of any educated person. The test will also include questions relating to India and its neighbouring Countries

					especially pertaining History, Culture, Geography, Economic Scene, General Policy, Indian Constitution &Scientific Research and Others. Logical Reasoning would include questions of both verbal and non-verbal type. This component may include questions on analogies, similarities and differences, space visualisation, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, Problem Solving, Word Building, Coding & de-coding, Numerical Operations, Symbolic Operations, Trends, Space Orientation, Space Visualisation, Venn Diagrams, Drawing inferences, Punched hole/pattern - folding & un-folding, Figural Pattern-folding and completion, Indexing, Address matching, Date & City matching, Classification of centre codes/roll numbers, Small & Capital letters/numbers coding, decoding and classification, Embedded Figures, Critical thinking, motional Intelligence, Social Intelligence & Other sub-topics, if any. 5) Basic Computers: a) General Computer Processing ability in MS-Office like Word Processing, Excel, Power point, etc. & Operating Systems.b) Professional Software/Hardware System relevant to the Post. c) Any other Computer/IT related questions.
			c) Anatomy and Physiology	10	Structure of the body–cells, tissues. Musculoskeletal System: Skull, Vertebral column, Shoulder Girdle Bones of upper extremities, Bones of lower extremities, pelvis and its muscles, Ossification.

					Cardiovascular System: Heart–blood–Arteries–Veins. Lymphatic System: Circulation of Lymph, Lymph glands, Thoracic duct. Digestive System: Mouth–oesophagus–stomach–small intestines large intestines spleen Liver Gall bladder Pancreas. Respiratory System: Nose, Larynx-Trachea-Lungs Bony-case. Nervous System: Brain-meninges-ventricles-Spinal cord and nerves. Eye: Structure and its function. Ear: Structure and function. Surface Anatomy and Cross–sectional Anatomy. Reproductive System: Female & Male organs. Urinary System: Kidneys, Ureters, Bladder, Prostate and Urethra. Skin: Structure and its function. Endocrine System: Pituitary gland, Penial gland, Thymus gland, thyroid and parathyroid gland, suprarenal glands
			d) Dark room techniques	10	Photographic Process: Light image, Image produced by radiation, Light Sensitive materials, latent image. Film Material: The structure of X–ray & Imaging films, Resolving power, Grains of films, sensitivity of film, contrast of films, Type of films. X–ray Film Storage: Storage of unexposed films. Screens: Construction of intensifying screens. Choice of fluorescent material. Intensification factor, Detail, Sharpness. Speed, Screen contact, care of intensifying screens, Types of Screens. Cassettes: Cassette designs, Care of cassette, Mounting of intensifying screen in the cassettes, Various types of cassettes. Safe Light: Constituents, filter, testing. Film Processing: Constituents of processing solution and replenishes. Factors affecting the development. Types of developer and fixer, Factors affecting the use of fixer. Silver recovery methods. Film Rising, Washing and Drying: Intermediate rinse–washing and drying. Film Processing Equipment: Manual and Automatic processing. Dark Room Design: Outlay and materials used.

					Radiographic Image: The sharpness, contrast, detail, definition, viewing conditions & artifacts. Miscellaneous: Trimming, identification of films, legends, records filing, report distribution.
			e)General Physics	10	Elementary idea of thermionic emission, Electron–idea of mass and nature of charge, Coulomb's law, Electric field, Unit of potential. Ohm's law, Units of resistance, potential and current, Combination of resistance in series and parallel. Fuses, Units of electric power, Earthing of electrical equipment. Magnetic fields, Lines of force, Field pattern due to a straight current carrying conductor, coil carrying current, electromagnet, Construction and working of galvanometer, voltammeter and ammeter, (moving coil type and moving magnet type).Heat and methods of transference of heat, condensers, Inductance and Impedance. A.C. and D.C. currents-effective current, RMS value, peak value. Electromagnetic induction – Laws, fields, influence. Transformers – Principles, construction, and uses of step down and High tension transformers. Diode values and their use in rectifiers solid-state rectifiers, its various rectifying circuits uses in X–ray machines, production of X–rays and their properties, X–ray tube–Stationary anode and rotating anode & therapy tubes, X–ray circuit, interlocking circuits, relay and timers.
			f) Radiographic Techniques	10	Radiography Techniques Upper Limb: Fingers individual and as a whole hands, Carpal bones wrists, Forearm, elbow–head of radius, humerus, shoulder joint, Acromio-clavicular joint, scapula, sterno-clavicular joint, small joints. Lower Limb: Toes, foot, calcaneum & other tarsal bones, ankle joint, legs, knees, patella, fibula, femur, intercondylar notch. Hip & Pelvis: Hip, Neck of femur, threatre procedure, for hip pinning or reduction, pelvis, sacro-iliac joints, pubic bones, acetabulum. Vertebral Column: Curves, postures,

					relative levels atlanto, occipital region, odontoid process, Cervical spine, thoracic Inlet, Cervico, thoracic spine, lumbosacral spine, sacrum, coccyscoliosis, kyphosis, flexion, extension and neutral. Bones of the thorax: Sternum ribs. Skull: Land marks, Cranium, facial bones, maxilla, mandible, zygoma, T.M. joints, mastoids, petrous bones, optic foramen, sells turcica, P.N.S. Chest: Chest in teleradiography, chest supine & portable, Lordotic, apicogram and MMR. Abdomen: Preparation, indication and contraindication, acute abdomen, pregnancy abdomen for multiplicity maturity and foetal abnormality. Pelvirnetry. Soft tissue: Neck and breast. Emergency Radiography: Bedside radiography, O.T. Radiography. Radiography for age evidence: Bone age evidence. Dental Radiography: Occlusal view, Dental X–ray, Panoramic view.
			g) Radiographic procedures	10	I. (i) Pathology: Definition, cell growth, cell deformities, cell damage, defence mechanism, cell repair. (ii) Neoplasia: Benign & Malignant including its mode of growth and metastasis. (iii) Radiation: Local and systemic. (iv) Radiotherapy techniques. (v) Emergency in Radiology. II. (i) Contrast media. (ii) Urinary Tract: I.V.P., Retrograde Pyelography, Cystourethrography. Presacral Insufflation. (iii) Biliary Tract: Oral cholecystography, I.V.C, Transhepatic percutaneous cholangiography pre-operative cholangiography – T-tube cholangiography, E.R.C.P. (iv) Tomography: Principle, equipment and types of movements, procedure. (v) Venography: Splenoportovenography, Peripheral venography. (vi) Lymphangiography. (vii) Marnmography and Xeroradiography. (viii) Radiculography. (ix) Dacrocystography. III. (i) Gastro-intestinal Tract: Ba-swallow, Ba-meal upper G.I.T., Ba-meal follow-

					through, Ba-Enema. (ii) Female Genital Tract: Hystero-Salpingography, Gynecography, Placentography & Pelvimetry. (iii) Angiography: Carotid angiography, Femoral arteriography, Aortography, Selective angiography etc. (iv) CNS: Ventriculography, Myelography, Pneumoencephalography. (v) Sialography (vi) Sinography (vii) Nasopharyngography (viii) Laryngography (ix) Bronchography (x) Arthrography (xi) Discography
			h) Radiation Physics and related equipments	10	I. Latent images formation and its processing. Various units used for measuring radiation–Roentgen, rad and rem. Construction of X–ray tube, X–rays–its production and properties. Ionization chambers, G.M. Counter and Scintillation Counter, Interaction of X–ray with matter. Quality and quantity of X–rays, HVT, linear absorption coefficient, Grid, Cones and Filters. Inverse square law, scattered radiations and appliances used to reduce it. II. Radioactivity Curie, Half life, decay factor. Details about radium, cobalt and caesium. Doses–dose and dose rate, exposure dose, exit dose, surface dose, depth dose, isodose charts and their uses. III. Radiation Hazards, Protection against it, film badge, pocket ionization chamber, maximum permissible dose. (a) High-tension control equipment – Diagnostic H.T. circuits, high tension generators, half wave full wave three phase, condensers discharge, contact voltage high tension switches, control and establishing equipment, tube filament supply, mains compensator mains resistance compensator. X-ray tubes – design, rating and care of X-ray tubes, practical considerations in choice of focus, inherent filtration. MAS meter elementary principles and construction, importance as check on. (i) Radiographic results. (ii) Apparatus behaviour and additive

					tube loading, exposure timers – spring activated, synchronous motor, value (Low-tension ionization testing timer accuracy). Interlocks and safety devices. (iii) Circuits – Simple circuit diagram and illustration of sequence from mains supply to control X-ray exposure bean. Centering devices – mechanical and optical, interaction of X-rays and the body transmission in body tissues. (b) Scattered radiation – control of scattered radiation, cones, diaphragm, single and multiple filters grid ratio in relation to KV, construction and operation, focused and non – focused, single stroke reciprocating and oscillating potter – bucky, diaphragms, criss cross grids, stationary grids, use etc. (c) Production of X-ray tubes and high tension circuits for the production of control panel and control safety device and interlocks, basic principles of mega voltage X-ray machines. (d) Fluoroscopy – Tube filtration, diaphragm, tilting couch screen grid and exploratory and control safety devices, compressors, protection, electrical radiographic and mechanical control, use and care of couch accessory fittings. (e) Special equipment – body section radiography, apparatus and controls simultaneous multi section accessories specialized couches, skull table, mobile units. Image intensifiers, principles, optical systems, for viewing and recording final image electrical and x-ray supply protection, applications, including cine radiography, mass miniature radiography, special radiography, equipment for high speed serial techniques (etc.) rapid cassette changer rapid films changer, roll films, full size and miniature, biplane equipment, grids, protection, problems of processing and presentation, care and maintenance – general principle and routine use of charts supplied by manufactures, radiographic calibration procedure.
			i) Patient-care	10	(a) Hospital staffing and organisation, records relating to patients and departmental statistics, professional attitude of the radiographer to patients and other members of the staff, medico legal aspects, minimising waiting time, appointments organisation stock taking and stock keeping.

					(b) Care of patient: - first contact with patient in the department handling of chair and stretcher patients, lifting of ill and injured patients, elementary hygiene, personal cleanliness, hygiene in relation to patients. E.g. clean linen and receptive nursing care, temperature. (c) First Aid: - Shock, asphyxia, convulsions, artificial respiration, electric shock, burns, scalds, haemorrhage, pressure point, tourniquet, fractures, splints, bandaging, foreign bodies, poisons, drug, reactions, administration of oxygen. (d) Preparation of a patient for general X-ray examinations. Departmental instruction to out patients or ward staff, use of aperients, enema and colonic irrigation, flatulence and flatus causes and methods of relief, principles of catheterization and intubations, premeditation, its uses and methods, anaesthetised patients, nursing care before and after special X-ray examinations e.g. in neurological, vascular and respiratory conditions diabetic patients, special attention to food, trauma hazards. (e) Preparation of patients for special x-ray examinations barium enema, barium meal, intravenous pyelography cholecystography etc. and their administration. (f) Principles and aspects: - Methods of sterilization, care and identification of instruments and surgical dressings in common use, setting of trays and trolleys for various examinations etc. intravenous pyelography, biopsy, elementary operating theatre produce. (g) Drugs in department- storage, labeling checking, regulations regarding (h) Contrast media- barium preparations, iodine Radiographic Photography: (a) Photographic aspects of radiography – the fundamentals of the photographic process, light sensitive salts of silver, the photographic emulsion gelatin as suspension medium, size and frequency of the silver halide grain in relation to sensitively and contrast, formation of the latent image, chemical development, construction of x-ray film base material, substratum coating, emulsion, coating anti-abrasive super coating sensitivity, storage of unexposed film. (b) X-ray materials: - Type of emulsion, characteristics and control screen films, non screen films, dental films,

					comparative speed and contrast to light and x-rays. Characteristics of x-ray emulsions, characteristics curves of x-ray film assessment of the results of correct exposure under & over exposure, density (D max) speed, contrast (Gamma infinity) graduation, fog, grain, exposure, kilovoltage and developing latitude. Intensifying screens fluorescence application of fluorescence in radiography, construction of an intensifying screen, types of emulsion in relation to type of salt, size of grain, coating, weight, kilovoltage, mounting and general care of screens, after glow test for reciprocate failure, intermittency effect. X-ray, testing a cassette for proving good screen contact, general case of cassettes. X-ray developers – characteristics and detail freedom from chemical fog and staining, long life possibility of degeneration. Standardization of quality of developers and development – function and constituents of an x-ray developer, standardization by time and temperature development latitude, exhaustion of a developer, replenishment of developers, ultra rapid developers, combined developer and fixer, fixers and fixing, hardening agent, time of fixation, exhaustion of a fixer, electrolytic silver recovery and fixer regeneration, rapid fixers, separate hardening. Rinsing, washing and drying – objects of rinsing and washing, methods, employed, methods of drying films, processing – preparation of solutions, available water supply, nature of mixing, vessels, order of mixing solutions, filtration, making stock solutions, storage of dry chemicals, storage of solutions, processing units, hangers, care of hangers, control of temperature by heating elements and thermostat, water mixer, by refrigeration, use of ice – film quality, ultra rapid processing, tank or dish units, stop bath rinse, wetting agents, after treatment of films. Automatic processing principles, procedure and regeneration of solutions. Knowledge of Atomic Energy Regulatory Board (AERB) regulations and rules.
			j) Specialized investigations	10	Computed Tomography

					Principles of CT – Basic Physics – Recent developments, applications etc. Positioning in CT Different types of contrast materials. Emergency treatment. Radiation hazards Disposal of unused matter. Magnetic Resonance Imaging Principle – Physics – Techniques – Types of coils – Basic term used in MRI Operations, Applications, etc. Positioning in MRI. Different types of contrast materials. Emergency treatment. MRI hazards. Factors affecting quality of imaging. Ultrasound Physics – Types of ultrasound – Techniques of ultrasound scanning in different parts – positioning and filming – Principles of Doppler effect and colour Doppler.
35	**Physiotherapist**	Essential Qualification & Experience: Bachelor's Degree in Physiotherapy from a recognized Institute / University with 2 years experience. OR Diploma in Rehabilitation with 5 years experience. Registered with the Physiotherapy Council.	a) Anatomy	10	1. General and Applied anatomy. 2. Musculoskeletal system – Connective tissue & its modification, tendons, membranes, special connective tissue. Bone structure, blood supply, growth, ossification, and classification. Muscle classification, structure and functional aspect. Joints – classification, structures of joints, movements, range, limiting factors, stability, blood supply, nerve supply, dislocations and applied anatomy. 3. Central nervous system – disposition, parts and functions 4. Cardiovascular system 5. Lymphatic system 6. Respiratory system 7. Digestive system

					8. Urinary and Reproductive system 9. Endocrine system
			b) Physiology	10	1. General Physiology 2. Blood 3. Cardiovascular system 4. Respiratory System 5. Nerve Muscle Physiology 6. Nervous system 7. Renal System 8. Digestive System 9. Endocrinology
			c) **Fundamentals of Occupational Therapy** History & development of Occupational Therapy	10	
			d) Rehabilitation	10	
			e) Occupational performance model Generalized & specific principles of therapeutic exercises	10	
			f) Therapeutic		

			modalities	10	
			g) Principles & methods of testing range of motion & muscle strength. Testing methods of sensation, perception, coordination and muscle tone.	10	
			h) Human development and its importance in occupational therapy. General principles of human maturation	10	
			i) Activities of daily living Occupational therapy as diagnostic & prognostic procedure. Steps involved in preparing the client for return to work.	10	
			j) a) Prevocational evaluation i) Evaluation of work capacity ii) Evaluation of physical capacity	10	

			iii) Evaluation of functional capacity b) On the job or work site evaluation c) Work samples such as TOWER, BTE, WEST d) Work hardening & work conditioning Different types of tools & equipments & their uses in Occupational Therapy Define & classify splints with their brief description, state general principles of splinting, describe material used. Hand function & evaluation methods		

36	**Occupational Therapist**	Essential Qualification & Experience: (i) 10 +2 in Science (Physics, Chemistry and Biology) and; (ii) Bachelor's Degree in Occupational Therapy from a recognized Institute / University. (iii) 2 years experience. Registered with the Occupational Therapy Council.	a) Anatomy	10	1. General and Applied anatomy. 2. Musculoskeletal system – Connective tissue & its modification, tendons, membranes, special connective tissue. Bone structure, blood supply, growth, ossification, and classification. Muscle classification, structure and functional aspect. Joints – classification, structures of joints, movements, range, limiting factors, stability, blood supply, nerve supply, dislocations and applied anatomy. 3. Central nervous system – disposition, parts and functions 4. Cardiovascular system 5. Lymphatic system 6. Respiratory system 7. Digestive system 8. Urinary and Reproductive system 9. Endocrine system
			b) Physiology	10	1. General Physiology 2. Blood 3. Cardiovascular system 4. Respiratory System 5. Nerve Muscle Physiology 6. Nervous system 7. Renal System 8. Digestive System 9. Endocrinology
			c) **Fundamentals of Occupational Therapy** History & development of Occupational Therapy	10	

			d) Rehabilitation	10	
			e) Occupational performance model Generalized &specific principles of therapeutic exercises	10	
			f) Therapeutic modalities	10	
			g) Principles & methods of testing range of motion & muscle strength. Testing methods of sensation, perception, coordination and muscle tone.	10	
			h) Human development and its importance in occupational therapy. General principles of human maturation	10	
			i) Activities of daily living Occupational therapy as diagnostic & prognostic procedure.	10	
			Steps involved in preparing the		

			client for return to work. j) a) Prevocational evaluation i) Evaluation of work capacity ii) Evaluation of physical capacity iii) Evaluation of functional capacity b) On the job or work site evaluation c) Work samples such as TOWER, BTE, WEST d) Work hardening & work conditioning Different types of tools & equipments & their uses in Occupational Therapy Define & classify splints with their brief description, state general principles of splinting, describe material used.	10	

37	**TB & Chest Diseases Health Assistant**	Essential Qualification & Experience: B.Sc. (Hons) Nursing from a recognized Institute / University. OR Diploma in Nursing with 2 years of relevant experience.	a) Anatomy of respiratory system b)Basic Physiology of Respiratory system c)Basic understanding of Tuberculosis d) Basic understanding of Anti-TB drugs and categories of treatment e) Prevention of tuberculosis f) Technical and Operational Guidelines for TB Control in India 2016 g) Guidelines for prevention and treatment of TB in PLHIV	10 10 10 10 20 20 20	
38	**Junior Reception Officer**	Essential Qualification: (i) Degree from a recognized University. Desirable: (i) Post-graduate Diploma in Journalism/Public	a) General Intelligence & Reasoning b) General Awareness	10 10	(a) to (d) :- Same as that of Assistant Administrative Officer

		Relations. (ii)Experience in Public Relations/Publications/ Printing/ Publishing. (iii) Exposure to working on Personal Computer.	c) Quantitative Aptitude	10	
			d) English Language and Comprehension	10	
			e) Basic computer knowledge	20	(e): Basic Computer Knowledge: Introduction to MS Windows, MS Office, Basics of Internet etc.
			f) Subject knowledge of the concerned post (Public Relations)	40	(f): Subject Knowledge **Principles of Communication and Public Relations** WHAT IS COMMUNICATION? Definitions – Elements of Communication, Nature, Role and Scope of Communication, Communications, Public opinion and Democracy, Communication mass media and Socio-economic development. METHODS OF COMMUNICATION: Face to face Communication, Group Communication, Mass Communication-Spoken, Written, Un-Spoken and Unwritten, Present state of Communication in India. MASS COMMUNICATIONS AND MASS MEDIA: Marshal McLuchan's theory-the Medium is the message, One-step, two-step, multi-step flow of Communication, Mass Media and its characteristics What is Communication research? The nature and task of Communication research. PRINCIPLES OF PUBLIC RELATIONS: What is Public Relations? Meaning and Definitions, Basic elements of PR, Nature, role and scope, PR as a tool of modern management – PR role in the Indian Setting-Developing economy. PR as distinct from other forms of Communication, PR and Publicity, Lobbying, Propaganda, Sales Promotion, and Advertising, PR and Corporate Marketing Services. Historical Perspective-Industrial

					revolution-the beginnings of PR – Pioneers-Ivy Lee in America – Technological and media revolution in the Society- PR during First and Second World Wars – The Development of Indian PR, Early Phase, Professionalism, Genesis and Growth of PRSI – Present status and Future of PR in India. Public Opinion – Meaning and Definition- Opinion Leaders-Individuals Institution, Roots of public attitudes – Culture, the family, religion, Economic and Social Classes – Role of PR in opinion formation-persuasion. The Ethics of PR – Social Responsibility Code of Professional Standards for the practice of PR – IRSI – Code of Ethics. **Public Relations Media** MEDIA CLASSIFICATION: Introduction to Mass Media, Functions of Mass Media, Characteristics, Limitations, advantage and relative appeal of different media. NEWS-PAPERS AND MAGAZINES: Principal categories of newspapers and periodicals, News Agencies, Government and Press – Mass Media as Social Instruments. RADIO BROADCASTING: Ratio in India, Relative coverage and appeal of Radio and Press. Impact of Radio on rural India and rural development. TV IN INDIA: A brief history of Television – Coverage, present status and impact on masses, Role of Satellite Communication, TV for Socio-Economic change, The future of Television in India. FILM IN INDIA: Film as a tool of PR, Impact of films, Documentaries, PR Films, Feature Films, Script writing of newsreel and documentaries. PHOTOGRAPHS: The Camera as a tool of PR, Uses of Photos in PR, News-photos, Photo features-photo Editing, Caption writing. EXHIBITIONS: Exhibition as a PR tool, Types of Exhibitions, Planning an Exhibition-Theme and Display. MEDIA RELATIONS:

					-Strategy for good media relations, Inter-Media Publicity, Press Conference. -Traditional Media as a PR tool – Types – Advantages - Role of traditional Media in rural India. -Outdoor media as a PR tool – Hoardings – Posters – Transit media – Bus panels – Neon sings – Direct Mail – advantages. -The Art of News writing – What is News, Difference between newspapers writing and Broadcast writing, Language, content and style. -Writing for Newspapers and House Journals - Reporting – How to write a press release, Press release – Its parts, headline, subhead lines, the lead, paragraphs, essentials of writing a press release. -Feature writing, Corporate features-Development-stories. -Editorial Writings: House Journal's Editorials, Writing for Radio & TV. **Public Relations Practice** PUBLIC RELATIONS PRACTICE: Scope of the Practice ; Profile of the practitioner ; Planning for Public Relations ; Measuring Public Relations Objectives ; Organizing Public Relations department;- Organizing Public Relations Agency. PUBLIC RELATIONS SPECIALISATION: Public Relations in Employee Relations ; Public Relations in Industrial Relations ; Public Relations and the Community ; Public Relations and the Govt. ; Public Relations in Promotion of causes and Ideas.
39	**Speech Pathologist**	Essential Qualification: BASLP (Bachelors in Audiology and Speech Language Pathology) from RCI recognized Institute/University or equivalent.	a) INTRODUCTION TO HUMAN COMMUNICATION	10	a) History and development of the profession of Speech-Language Pathology (SLP) specifically in India b)Various settings of service delivery c) Other professions concerned with communication disorders d) Human communication: Definition and component i. Interdependency & interrelation between communication, hearing, speech, and language. ii. Function of communication, speech and language iii. Modes of communication (Verbal & Non-verbal) iv. Characteristics of good speech v. Interactive bases of human communication b. Nervous system:

					i. Divisions and functions of the nervous system, nerve cell, receptors and synapse, types of nerve fibers. Peripheral nervous system. Brief description of spinal cord and CSF. ii. Structure of the brain and divisions: general and lobes of cerebrum. Reticular formation, Basal ganglia and cerebellum. Reflex action and common reflexes. Cranial nerves, distribution and supply with the special reference to II , V, VII , IX, X , XII., Nerve tracts (motor and sensory), Brodmann's area, anatomy of the nervous system related to speech and language. c. Mechanism of speech and language production i. Anatomy and physiology of respiratory system: ii. Detailed study of trachea, larynx, oropharynx and nasopharynx. • Respiration for life and speech iii. Physiology: External and internal respiration. Mechanism of respiration-internal and external influence, nervous control, Lung volumes (vital capacity-tidal volume. residual air, artificial respiration.(in brief) d. Basic Acoustics of speech i. Vibrating system – simple harmonic motion – simple vibrating system – system with two or more masses – system with many modes of vibrations – vibration spectra. Waves – What is a wave? Progressive waves – sound waves – wave propagation – Doppler effect – reflection, diffraction, interference, absorption. Resonance of a mass spring vibrator- standing waves – partials, harmonics and overtones – Acoustics impedance – Helmholtz resonator – sympathetic vibrations. 2. Mechanism of speech and language production ii. Anatomy and physiology of laryngeal system • Development of voice • Bases of pitch and loudness change mechanism e. Mechanism of speech and language production i. Anatomy and Physiology of Articulatory syste ii. Development of Articulation iii. Anatomy and Physiology of

					Resonatory system f. Development of speech and Language: Development of language g. Semantics: A brief introduction to different types of meaning homonyms, synonyms and antonyms. h. Morphology: Morpheme – bound and free, process of word formation, content and function words. i. Syntax:, grammatical and syntactic categories, sentence types, Syntactic analysis. j. Pragmatics: Introduction to verbal and non-verbal communication and other indicators, intent of communication. k. Theories and models of language Acquisition – Behavioral, Nativistic, Cognitive, Linguistic, Pragmatic, Biological and Information processing model. Developmental issues in communicative development – genetic, neurological, medical, behavioural, social and psychological. l. Bilingualism / multilingualism in children; Bilingual Language learning contexts at home and school situations, compound / coordinate context and others. m. Unit 3 Definition, Etiology, Characteristics, Classification and Impact of Hearing Impairment, Mental Retardation, Cerebral Palsy n. Definition, Etiology, Characteristics and classification of Autism Spectrum Disorders/Pervasive Developmental Definition, Etiology, Characteristics, Classification and Impact of Specific Language Impairment • Learning Disability • Acquired aphasias in childhood • Traumatic Brain Injury • Multiple disabilities Introduction to assessment procedures, differential diagnosis and management
			b) INTRODUCTION TO HEARING & HEARING SCIENCES	10	a) Origin of Audiology, Its growth & development (since World War II) • Its growth in India • Scope of Audiology, Branches of Audiology • Audiovestibular system: Anatomy of the external, middle and internal ears. Ascending and descending auditory and

					vestibular pathways. • Physiology of the external, middle & inner ear, central hearing mechanisms, cochlear microphonics, action potentials, theories of hearing (AC & BC) , Theory of bone conduction • Vestibular system: Functions of utricle, saccule and vestibular apparatus. Posture and equilibrium. Tests of posture and equilibrium • Causes of hearing loss Genetic (congenital, late onset, progressive, syndromic / non-syndromic) Non-Genetic (Congenital/acquired) Importance of case history in identifying the cause of hearing loss a. Role of hearing (threshold concept, binaural hearing, head shadow, pinna shadow effect, MAF, MAP – Curve for threshold of hearing) • Sound Pressure, Power and Loudness. Physical and psychophysical scales, Equal loudness contours, Frequency weighting curves, combined sources, Pitch and Timbre. Physical and psychophysical scales. Fourier analysis of complex Tones • dB concept: power and pressure formulae: zero dB reference for pressure and power calculation of actual SPL, reference and dB values with any to given values, calculation of overall dB when two signals are superimposed. • Phones and Sones: relation between phones and sones; use of phone and sonograph; computation of relative loudness of two given sounds using these graph. Frequency and intensity, their psychological correlates: dL for frequency and intensity b. Calibration: Biological and instrumental for AC & BC transducers • Procedure • interpretation • precautions to be taken while testing • Audiometric room construction • Acoustics of Rooms. Sound propagation in outdoors and indoors. • Direct, early and reverberant sound. Calculation of reverberation time. • Air absorption. Background noise. • Loudspeaker placement and directivity. • Sound images and multiple sources. • Sound field in listening rooms. Quadraphonic sound. • Listening with earphones. Pressure field, free field and

					diffused field. • Audiometric test rooms – Basic requirements concept and structure – transmission loss, • NRC rating – Standards for sound treated rooms – Basic requirements, concept and structure – standards. • Classrooms of hearing impaired children – Basic requirements, concept and structure – standards. c. Basic concepts of AC & BC testing • Pure Tone audiometery • Need and scope • Instrumentation, Different types of transducers • Standards • Permissible ambient noise levels for audiometric testing • Classification of audiograms • Sound field & closed field testing • Factors affecting AC & BC testing • Screening Vs Diagnostic pure tone testing • Extended high frequency testing & its interpretation • Masking: Definition, types of masking, types of noises, critical band concept, • Terminology related to masking: Test ear, non-test ear, masker, maskee, crossover, cross hearing and shadow curve • Interaural attenuation; Factors affecting IA; Criteria for masking during AC &BC • Factors determining amount of masking noise, AB gap in masked ear, masking dilemma in bilateral symmetrical conduction hearing loss. • Fusion Inferred Test (FIT) • Types and degrees of hearing loss d. Tuning fork tests : Tuning fork tests (Rinne, Weber, Bing, Schwabach), interpretation, merits & demerits. • Speech audiometry • Orientation to speech audiometry • Need for speech audiometry • Speech recognition threshold, speech identification score, UCL, MCL, dynamic range, articulation index • Tests developed in India and abroad • Factors affecting speech audiometry • Limitations of speech audiometry • Masking for speech audiometry • PI-PB function
			c) MANAGEMENT OF THE HEARING	10	a. Definitions and goals of rehabilitation & aural rehabilitation • Early identification and its important in aural rehabilitation • Unisensory Vs Multisensory

			IMPAIRED		approach • Manual Vs oral form of communication for children with hearing impairment • Total communication b. Methods of teaching language to the hearing impaired o Natural method o Structured method o Computer aided method c. Educational problems, of children with hearing impairment in India • Educational placement of hearing impaired children • Criteria for recommending the various educational placements • Factors affecting their outcome • Counseling the parents and teachers regarding the education of the hearing handicapped • Parent Infant Training Programme (PIP) & Mother's Training Programme, Home training –need, preparation of lessons; correspondence programs (John Tracey Clinic, SKI-HI), follow up d. Introduction to hearing aid technology: Parts of hearing aids & its functions • Type of hearing aids: - Body level Vs ear level - Monaural Vs Binaural Vs Pseudobinaural - Directional hearing aids, modular hearing aids • Classroom amplification devices; Group amplification systems– hard wired, induction loop, FM, infrared rays. • Setting up class rooms for the hearing handicapped • Classroom acoustics preferential seating and adequate illumination e. Ear moulds: Importance, types (hard, soft), procedure of making each type of ear mould, styles of ear moulds, criteria for selection of one style over the other, ear mould modifications, EAC of hearing aid along with ear mould. • Importance of counseling for users & parents – importance of harness, BTE loops. Tips to facilitate acceptance of hearing aids, battery life, battery charger. Counseling for geriatric population, Trouble shooting of hearing aids
			d) ENT	10	a) Anatomy & Physiology of external, middle & inner ear, auditory pathways, vestibular pathway. Diseases of the external middle and inner ear leading to hearing loss: Congenital malformations, traumatic lesions, infections,

					management of middle ear and Eustachian tube disorders. (b) Other causes of hearing loss – Facial paralysis, Tumors of the cerebello- pontine angle, Acoustic neuroma. Infection and management of inner ear diseases. Cochleovestibular diseases and its management. a. Anatomy & Physiology of pharynx & oro-peripheral structures Causes of speech disorder, Disorders of the mouth, Tumors of the jaw and oral cavity, nasopharynx and pharynx, pharyngitis, Diseases of tonsils and adenoids. (b) Oesophageal conditions: Congenital abnormality – Atresia, Tracheo-oesophageal fistula, Stenosis, Short oesophagus. Neoplasm – Benign, Malignant, Lesions of the oral articulatory structures like cleft lip, cleft palate, submucosal cleft, Velopharyngeal incompetence. b. Anatomy & Physiology of larynx – physiology of phonation / physiology of respiration. (b) Congenital diseases of the larynx – difference between an infant and an adult larynx. Stridor – causes of infantile stridor. Disorders of structure – Laryngomalacia, Bifid epiglottis, Laryngeal web, Atresia, fistula, Laryngeal cleft, Tumors and Cysts, Laryngitis, Laryngeal trauma and Stenosis. Neuromuscular dysfunctions of the larynx – Vocal cord palsy, Spastic dysphonia, Hypothyroidism, gastro oesophageal reflux disorders, Laryngectomy, artificial larynx, oesophageal speech, tracheo oesophageal puncture.
			e) PSYCHOLOGY RELATED TO SPEECH AND HEARING	10	a. Introduction to psychology- Definition, History and perspectives, Branches and scope, application of psychology in the field of speech and hearing. • Introduction to Clinical psychology – Definition, Perspectives and models of mental disorders b. Psychology of learning – Introduction, Definition of learning, Theories of learning, Classical conditioning, Operant conditioning and Social learning. •

					Application of learning theories in the field of speech and hearing (therapeutic, educational and rehabilitative applications). c. Cognitive Psychology – Introduction, Definition and theoretical perspectives (David Rumelhart and David Mc Clelland, Noam Chomsky, George miller, Allan Newell). • Applications of cognitive psychology in the field of speech and hearing. • Neuropsychology – Introduction, definition, principles of neuropsychological assessment, diagnosis and rehabilitation. • Applications of neuropsychology in the field of speech and hearing. d. Psychodiagnositcs – Case history taking, Mental status examination, behavioural analysis, psychological testing. • Counselling- Meaning and definition, types of counselling, Counselling in rehabilitation practice. e. Developmental psychology: • Introduction, Definition, Principles, Motor development, Emotional development • Cognitive development- Definition, Piaget's theory • Play as a therapeutic tool • Personality development- Introduction, Stages, Hazards
			f) SPEECH LANGUAGE DIAGNOSTICS AND THERAPEUTICS	10	a. Speech language diagnostics Client history – definition, description, utility & need. Essential factors to be included in the client history form – comparison of adults vs. children's history – usefulness of the client history 2. Basic terminologies and concepts • Introduction to diagnostics • Terminologies in the diagnostic process • General principles of diagnosis • Diagnostic setup and tools b. Diagnostic approaches and methods • Approaches to diagnosis – importance of diagnosis in client history, essential factors to be included according to the conditions/disorders. Methods of taking case history. • Interview – principles and techniques • Self-

					reports, questionnaire, observations. • Diagnostic models – SLPM, Wepman, Bloom and Lahey • Types of diagnoses – Clinical diagnosis, direct diagnosis, differential diagnosis, diagnosis by observation, diagnosis by exclusion, diagnosis by treatment, instrumental diagnosis, provocative diagnosis, provisional diagnosis; advantage/disadvantages • Team approach to diagnosis • Characteristics of a good clinician as diagnostician B. Speech therapeutics c. 1. Basic concepts of therapeutics • Terminologies in speech therapeutics • General principles of speech and language therapy • Speech therapy set-up • Individual and group therapy • Integrated and inclusive education Unit 4 1. Procedures for speech-language therapy • Approaches to speech and language therapy – formal, informal and eclectic approaches • Types of speech and language therapy • Planning for speech and language therapy – goals, steps, procedures, activities 2. Techniques for: Speech and language therapy for various disorders of speech and language Importance of reinforcement principles and strategies in speech and language therapy, types and schedules of rewards and punishment 1. Clinical documentation and professional codes • Documentation of diagnostic, clinical and referral reports • Introduction to parent counselling, facilitation of parent participation and transfer of skills, follow-up • Evaluation of therapy outcome • Ethics in diagnosis and speech language therapy • Self-assessment and characteristics of a clinician
			g) ARTICULATION AND PHONOLOGICAL DISORDERS	10	a) Review of phonological development and articulatory mechanism • Fundamentals of Articulatory phonetics • Definition and types of coarticulation • Transcription methods in perceptual analysis • Phonological processes – types, language specific issues,

					identification and classification of errors. b) Distinctive features – types, language specific issues, identification of errors and analysis. • Acoustic aspects of production and perception of speech sounds; use of spectrograms • Factors related to articulation and phonological disorders: •Structural •Cognitive – Linguistic •Neurological •Psychosocial •Social •Metalinguistic c) Assessment procedures: Types of assessment, sampling procedures, scoring procedures, criteria for selection of instruments for assessment. • Assessment of Oral peripheral mechanism • Speech sound discrimination, stimulability and oral stereognosis. • Analysis and interpretation of data: • Intelligibility and severity judgments • Normative data • Error patterns. • Characteristics of disordered phonology and differential diagnosis d) Intervention: Stages of treatment and measuring improvement, long term goals, short term goals and activities for achieving goals in cases with misarticulation. • Issues in maintenance and generalization. • Team approach and professional communication (inter, intra professional and client oriented) • Approaches to treatment: motokinesthetic, traditional approaches integral stimulation, phonological, distinctive feature, minimal contrast therapy, learning theories, programmed, paired – stimuli. • Computerized intervention packages, metaphon therapy e) Cleft Lip and Palate • Etiological factors • Embryology of the Face and Palate • Types of Cleft lip and Palate, Classification systems • Syndromes • Velopharyngeal mechanism- muscles and function; inadequacy, incompetency and insufficiency • Speech and Language problems of individuals with Cleft • Associated problems of individuals with Cleft • Diagnostic procedures and Instruments used in Assessment of speech in Cleft palate • Team Management: Composition, responsibilities and co-ordinator • Treatment concepts • Treatment procedures for speech • Prosthetic speech appliances for patients with Cleft palate Glossectomy and Mandibulectomy • Effect of partial and Total Glossectomy on speech •

					Characteristics of Glossectomy speech • Rehabilitation of speech • Prosthetic fitting, design, assessment • Dysphagia specific to glossectomy and mandibulectomy: assessment and rehabilitation
			h) MOTOR SPEECH DISORDERS	10	a. Childhood Motor Speech Disorders b. Introduction to neuromotor organization and sensorimotor control of speech - Motor areas in cerebral cortex, motor control by subcortical structures, brainstem, cerebellum and spinal cord. - Central nervous system and peripheral nervous system in speech motor control. - Centrifugal pathways and motor control - Neuromuscular organization and control - Sensorimotor integration - Introduction to motor speech disorders in children- Dysarthria and Developmental apraxia of Speech c. Definition, causes and classification - Neuromuscular development in normals and children with cerebral palsy - Reflex profile - Associated problems - Speech and language problems of children with cerebral palsy - Assessment of speech in cerebral palsy- objective and subjective methods - Differential diagnosis of cerebral palsy - Management: Introduction to different approaches to neuromuscular education (Bobath, Phelps and the others); Speech rehabiliatation in cerebral palsy- Verbal approaches: vegetative exercises, oral sensorimotor facilitation techniques, compensatory techniques- correction of respiratory, phonatory, resonatory and articulatory errors; Team approach to rehabilitation; Neurosurgical techniques for children with cerebral palsy d. Different types of Cerebral palsy: - Disorders of muscle tone: Spasticity, rigidity, flaccidity, atonia - Disorders of movement: Hyperkinesias and dyskinesias- Ballismus, tremor, tic disorder, myoclons, athetosis, chorea, dystonia, hypokinesias - Disorders

					of coordination- Ataxia Syndromes with motor speech disorders- Examples: - Juvenile progressive bulbar palsy - Congenital supranuclear palsy - Guillain-Barre syndrome - Duchenne muscular dystrophy e. Apraxia of speech in children or developmental apraxia of speech - Definition - Description: verbal and non-verbal apraxia - Differential diagnosis- dysarthria and other developmental disorders - Management of developmental apraxia of speech- Facilitation techniques for oral motor movements, speech therapy techniques, generalization of speech f. Definition - alternative and augmentative communication (AAC). Application of alternative and augmentative communication methods in developmental dysarthrias and developmental apraxia of speech- Symbol selection, techniques for communication, assessment for AAC candidacy, choosing an appropriate system and technique, training communication patterns, effective use of AAC g. Adult Motor Speech Disorders
			i) DYSARTHRIA AND APRAXIA	10	Definition and classification of dysarthria in adults. b) Types of dysarthria in adults. c) Neurogenic disorders learning to dysarthria in adults. • Vascular disorders – dysarthria following strokes, CVA, cranial nerve palsies and peripheral nerve palsies. • Infection condition of the nervous system – eg. Meningitis, polyneuritis and neuro syphilis. • Traumatic conditions – Traumatic brain injury and dysarthria • Toxic conditions – dysarthria due to exogenic and endogenic causes. • Degenerative and demyelinating conditions – multiple sclerosis, Parkinson's disease, motor neuron diseases, Amyotrophic lateral sclerosis. • Genetic conditions – Huntington's chorea, Guillian – Barre syndrome. • Others leading to dysarthria – Anoxic conditions, metabolic conditions, idiopathic conditions and

					neoplasm. Assessment of dysarthria Instrumental analysis • Physiological and Electrophysiological methods • Acoustics • Advantages and disadvantages of instrumental analysis of speech in dysarthria. Perceptual analysis – measures, standard tests and methods, speech intelligibility assessment scales, advantages and disadvantages of perceptual analysis of speech in dysarthria. e) Differential diagnosis of dysarthria from functional articulation disorders, apraxia of speech, aphasia and allied disorders. Management of dysarthria - Medical, surgical and prosthetic approaches - Speech therapy • Vegetative exercises • Oral sensori motor facilitation techniques • Compensatory approaches – correction of respiratory, phonatory, articulatory and prosodic errors. • Strategies to improve intelligibility of speech. Apraxia of speech in adults • Definition of verbal and nonverbal apraxia of speech • Different types, characteristics and classification • Assessment of apraxia of speech – standard tests and scales, subjective methods and protocols • Management of apraxia of speech – different approaches • Improving intelligibility of speech. Dysphagia: • Definition • Phases of normal swallow • Etiology of swallowing disorders • Assessment and Intervention
			j)DIAGNOSTIC AUDIOLOGY	10	Introduction to Diagnostic Audiology: - Need for test battery approach in auditory diagnosis & integration of results of audiological tests. - Indications for administering audiological tests to identify Cochlear pathology, Retro-cochlear pathology, functional hearing loss, Central processing disorders. 2. Tests to differentiate between cochlear & retro-cochlear pathology - ABLB, MLB -

					SISI - Test for adaptation - Bekesy Audiometry - Brief tone audiometry - PIPB function Immittance Audiometry - Introduction - Principle of Immittance audiometry - Instrumentation - Tympanometry – Tympanometric peak pressure, static immittance, gradient/tympanometric width. - Reflexometry – Ipsilateral & contralateral acoustic reflexes, special tests - Clinical application of Immittance evaluation - Immittance evaluation in the pediatric population Unit 3 4. Auditory Brainstem Response - Introduction & classification of AEPs, Instrumentation, Test procedure, factors affecting Auditory Brainstem Responses, Interpretation of results & clinical application, Auditory Brainstem Response in pediatric response. - ECOG, early response - Middle & Long latency auditory evoked potentials – test procedure, factors affecting MLR & LLR, Interpretation of results & clinical application, Findings in the pediatric population Otoacoustic Emissions Introduction, classification of OAEs, Instrumentation, measurement of OAE procedure, interpretation of results & clinical applications, findings in the pediatric population. 6. Tests to detect Pseudohypoacusis - Pure tone tests including tone in noise test, Stenger test - Speech tests including Lombard test, Stenger test, Lip-reading test, Doefler-Stewart test. - Identification of functional hearing loss Central Auditory Disorders (a) Definition, terminologies used, incidence & causes, indications for administration of CAD test, rationale for CAD tests. (b) Tests to detect Central Auditory Disorders - Monoaural low redundancy tests - Filtered speech tests - Time compressed speech tests - Speech-

					in-noise test - SSI with ICM - Other monoaural low redundancy tests (c) Dichotic speech tests - Dichotic digit test - Staggered spondaic word test - Dichotic CV test - SSI with CCM - Competing sentence test - Other dichotic speech tests (d) Binaural interaction tests - RASP - Binaural Fusion Test (BST) - MLD - Other binaural interaction tests (e) Temporal ordering tasks - Pitch pattern test - Duration pattern tests - Other temporal ordering tests (f) Variables influencing Central Auditory Assessment - Procedural variables - Subject variables (g) Test findings in subjects with central auditory disorders - Brainstem lesion - Cortical & hemispheric lesion - Interhemispheric dysfunction - CAPD in children - CAPD in elderly (h) Other special test – Minimal auditory capability test, SPIN, HINT, CST. Operational characteristics, types and specifications. -No design aspects. Concepts and block diagrams only 1. 2. Basics of digital signal processing – Analog signal, digital signal, A to D and D to A conversion, Basic concept of Digital Signal Processing and its implementation, How does a DSP based system works? Application- DSP based hearing aids. Microphones as transducers. Velocity microphones. uni-directional microphones Microphone impedance and sensitivity. Loudspeakers as transducers. Structure of a dynamic loudspeaker. Air suspension. Baffles and enclosures. Horn speakers. Multi-speaker systems. Loudspeaker Efficiency, Loudspeaker power and distortion. Recording and Reproduction of sound. Recording characteristics. Dynamic Range, Stereophonic recording. Magnetic tape recording and playback. Tape speed and frequency response, Bias and equalization, Tape noise, Digital Tape recording, CD ROM recording 2. Measuring Instruments - Multi-meter. Cathode ray oscilloscope.

					Sine wave generator. Function Generator, Frequency counter, Measuring microphones, Sound Level Meter, Integrated Sound Level Meter, Artificial ear, Artificial Mastoid, Couplers, Hearing aid test box, Measurement of different types of sound Historical development of hearing aids Non-electrical hearing aids Electric hearing aids a) Basic elements of hearing aids: Microphone, Amplifier, Receiver, Cords, Batteries c) Directional hearing aids, modular hearing aids Routing of signals, head shadow / baffle / diffraction effects Output limiting: Peak clipping, compression Extended low frequency amplification, frequency transposition (Bone anchored hearing aid, Master Hearing aids) d) Signal processing in hearing aids - BILL, TILL, PILL - Programmable and digital hearing aids - Signal enhancing technology Basics of electricity & electronics - Direct and alternating current, DC Power supplies, voltage stabilizers, Passive circuit elements, transistors. Linear and digital Integrated circuits, microprocessors. Micro computers and Computers. Filters, Linear and non-linear Amplifiers and Oscillators, Amplifier power and distortion Electroacoustic Characteristics & measurements for hearing aids
40	**Audiologist**	Essential Qualification: BASLP (Bachelors in Audiology and Speech Language Pathology) from RCI recognized Institute/University or equivalent.	a) INTRODUCTION TO HUMAN COMMUNICATION	10	a. History and development of the profession of Speech-Language Pathology (SLP) specifically in India b. Various settings of service delivery c. Other professions concerned with communication disorders d. Human communication: i. Definition and component ii. Interdependency & interrelation between communication, hearing, speech, and language. iii. Function of communication, speech and language iv. Modes of communication (Verbal & Non-verbal) v. Characteristics of good speech vi. Interactive bases of human

					communication e. Nervous system: i. Divisions and functions of the nervous system, nerve cell, receptors and synapse, types of nerve fibers. Peripheral nervous system. Brief description of spinal cord and CSF. ii. Structure of the brain and divisions: general and lobes of cerebrum. Reticular formation, Basal ganglia and cerebellum. Reflex action and common reflexes. Cranial nerves, distribution and supply with the special reference to II , V, VII , IX, X , XII., Nerve tracts (motor and sensory), Brodmann's area, anatomy of the nervous system related to speech and language. f. Mechanism of speech and language production i. Anatomy and physiology of respiratory system: ii. Detailed study of trachea, larynx, oropharynx and nasopharynx. • Respiration for life and speech iii. Physiology: External and internal respiration. Mechanism of respiration-internal and external influence, nervous control, Lung volumes (vital capacity-tidal volume. residual air, artificial respiration.(in brief) g. Basic Acoustics of speech i. Vibrating system – simple harmonic motion – simple vibrating system – system with two or more masses – system with many modes of vibrations – vibration spectra. Waves – What is a wave? Progressive waves – sound waves – wave propagation – Doppler effect – reflection, diffraction, interference, absorption. Resonance of a mass spring vibrator- standing waves – partials, harmonics and overtones – Acoustics impedance – Helmholtz resonator – sympathetic vibrations. 2. Mechanism of speech and language production ii. Anatomy and physiology of laryngeal system • Development of voice • Bases of pitch and loudness change mechanism h. Mechanism of speech and language production

					i. Anatomy and Physiology of Articulatory syste ii. Development of Articulation iii. Anatomy and Physiology of Resonatory system i. Development of speech and Language: Development of language j. Semantics: A brief introduction to different types of meaning homonyms, synonyms and antonyms. k. Morphology: Morpheme – bound and free, process of word formation, content and function words. l. Syntax:, grammatical and syntactic categories, sentence types, Syntactic analysis. m. Pragmatics: Introduction to verbal and non-verbal communication and other indicators, intent of communication. n. Theories and models of language Acquisition – Behavioral, Nativistic, Cognitive, Linguistic, Pragmatic, Biological and Information processing model. Developmental issues in communicative development – genetic, neurological, medical, behavioural, social and psychological. o. Bilingualism / multilingualism in children; Bilingual Language learning contexts at home and school situations, compound / coordinate context and others. p. Unit 3 Definition, Etiology, Characteristics, Classification and Impact of Hearing Impairment, Mental Retardation, Cerebral Palsy q. Definition, Etiology, Characteristics and classification of Autism Spectrum Disorders/Pervasive Developmental r. Definition, Etiology, Characteristics, Classification and Impact of Specific Language Impairment • Learning Disability • Acquired aphasias in childhood • Traumatic Brain Injury • Multiple disabilities Introduction to assessment procedures, differential diagnosis and management.
			b)		Origin of Audiology, Its growth &

			INTRODUCTION TO HEARING & HEARING SCIENCES	10	development (since World War II) • Its growth in India • Scope of Audiology, Branches of Audiology • Audiovestibular system: Anatomy of the external, middle and internal ears. Ascending and descending auditory and vestibular pathways. • Physiology of the external, middle & inner ear, central hearing mechanisms, cochlear microphonics, action potentials, theories of hearing (AC & BC) , Theory of bone conduction • Vestibular system: Functions of utricle, saccule and vestibular apparatus. Posture and equilibrium. Tests of posture and equilibrium • Causes of hearing loss Genetic (congenital, late onset, progressive, syndromic / non-syndromic) Non-Genetic (Congenital/acquired) Importance of case history in identifying the cause of hearing loss f. Role of hearing (threshold concept, binaural hearing, head shadow, pinna shadow effect, MAF, MAP – Curve for threshold of hearing) • Sound Pressure, Power and Loudness. Physical and psychophysical scales, Equal loudness contours, Frequency weighting curves, combined sources, Pitch and Timbre. Physical and psychophysical scales. Fourier analysis of complex Tones • dB concept: power and pressure formulae: zero dB reference for pressure and power calculation of actual SPL, reference and dB values with any to given values, calculation of overall dB when two signals are superimposed. • Phones and Sones: relation between phones and sones; use of phone and sonograph; computation of relative loudness of two given sounds using these graph. Frequency and intensity, their psychological correlates: dL for frequency and intensity g. Calibration: Biological and instrumental for AC & BC transducers • Procedure • interpretation • precautions to be taken while testing • Audiometric room construction • Acoustics of Rooms. Sound propagation in outdoors and indoors. • Direct, early and reverberant sound. Calculation of reverberation time. • Air absorption. Background noise.

					• Loudspeaker placement and directivity. • Sound images and multiple sources. • Sound field in listening rooms. Quadraphonic sound. • Listening with earphones. Pressure field, free field and diffused field. • Audiometric test rooms – Basic requirements concept and structure – transmission loss, • NRC rating – Standards for sound treated rooms – Basic requirements, concept and structure – standards. • Classrooms of hearing impaired children – Basic requirements, concept and structure – standards. h. Basic concepts of AC & BC testing • Pure Tone audiometery • Need and scope • Instrumentation, Different types of transducers • Standards • Permissible ambient noise levels for audiometric testing • Classification of audiograms • Sound field & closed field testing • Factors affecting AC & BC testing • Screening Vs Diagnostic pure tone testing • Extended high frequency testing & its interpretation • Masking: Definition, types of masking, types of noises, critical band concept, • Terminology related to masking: Test ear, non-test ear, masker, maskee, crossover, cross hearing and shadow curve • Interaural attenuation; Factors affecting IA; Criteria for masking during AC &BC • Factors determining amount of masking noise, AB gap in masked ear, masking dilemma in bilateral symmetrical conduction hearing loss. • Fusion Inferred Test (FIT) • Types and degrees of hearing loss i. Tuning fork tests : Tuning fork tests (Rinne, Weber, Bing, Schwabach), interpretation, merits & demerits. • Speech audiometry • Orientation to speech audiometry • Need for speech audiometry • Speech recognition threshold, speech identification score, UCL, MCL, dynamic range, articulation index • Tests developed in India and abroad • Factors affecting speech audiometry • Limitations of speech audiometry • Masking for speech audiometry • PI-PB function

			c) MANAGEMENT OF THE HEARING IMPAIRED	10	j. Definitions and goals of rehabilitation & aural rehabilitation • Early identification and its important in aural rehabilitation • Unisensory Vs Multisensory approach • Manual Vs oral form of communication for children with hearing impairment • Total communication k. Methods of teaching language to the hearing impaired o Natural method o Structured method o Computer aided method l. Educational problems, of children with hearing impairment in India • Educational placement of hearing impaired children • Criteria for recommending the various educational placements • Factors affecting their outcome • Counseling the parents and teachers regarding the education of the hearing handicapped • Parent Infant Training Programme (PIP) & Mother's Training Programme, Home training –need, preparation of lessons; correspondence programs (John Tracey Clinic, SKI-HI), follow up m. Introduction to hearing aid technology: Parts of hearing aids & its functions • Type of hearing aids: - Body level Vs ear level - Monaural Vs Binaural Vs Pseudobinaural - Directional hearing aids, modular hearing aids • Classroom amplification devices; Group amplification systems– hard wired, induction loop, FM, infrared rays. • Setting up class rooms for the hearing handicapped • Classroom acoustics preferential seating and adequate illumination n. Ear moulds: Importance, types (hard, soft), procedure of making each type of ear mould, styles of ear moulds, criteria for selection of one style over the other, ear mould modifications, EAC of hearing aid along with ear mould. • Importance of counseling for users & parents – importance of harness, BTE loops. Tips to facilitate acceptance of hearing aids, battery life, battery charger. Counseling for geriatric population, Trouble shooting of hearing aids

			d) ENT	10	o. Anatomy & Physiology of external, middle & inner ear, auditory pathways, vestibular pathway. Diseases of the external middle and inner ear leading to hearing loss: Congenital malformations, traumatic lesions, infections, management of middle ear and Eustachian tube disorders. (b) Other causes of hearing loss – Facial paralysis, Tumors of the cerebello- pontine angle, Acoustic neuroma. Infection and management of inner ear diseases. Cochleovestibular diseases and its management. p. Anatomy & Physiology of pharynx & oro-peripheral structures Causes of speech disorder, Disorders of the mouth, Tumors of the jaw and oral cavity, nasopharynx and pharynx, pharyngitis, Diseases of tonsils and adenoids. (b) Oesophageal conditions: Congenital abnormality – Atresia, Tracheo-oesophageal fistula, Stenosis, Short oesophagus. Neoplasm – Benign, Malignant, Lesions of the oral articulatory structures like cleft lip, cleft palate, submucosal cleft, Velopharyngeal incompetence. q. Anatomy & Physiology of larynx – physiology of phonation / physiology of respiration. (b) Congenital diseases of the larynx – difference between an infant and an adult larynx. Stridor – causes of infantile stridor. Disorders of structure – Laryngomalacia, Bifid epiglottis, Laryngeal web, Atresia, fistula, Laryngeal cleft, Tumors and Cysts, Laryngitis, Laryngeal trauma and Stenosis. Neuromuscular dysfunctions of the larynx – Vocal cord palsy, Spastic dysphonia, Hypothyroidism, gastro oesophageal reflux disorders, Laryngectomy, artificial larynx, oesophageal speech, tracheo oesophageal puncture.
			e) PSYCHOLOGY RELATED TO SPEECH AND HEARING	10	Introduction to psychology- Definition, History and perspectives, Branches and scope, application of psychology in the field of speech and hearing. •

					Introduction to Clinical psychology – Definition, Perspectives and models of mental disorders r. Psychology of learning – Introduction, Definition of learning, Theories of learning, Classical conditioning, Operant conditioning and Social learning. • Application of learning theories in the field of speech and hearing (therapeutic, educational and rehabilitative applications). s. Cognitive Psychology – Introduction, Definition and theoretical perspectives (David Rumelhart and David Mc Clelland, Noam Chomsky, George miller, Allan Newell). • Applications of cognitive psychology in the field of speech and hearing. • Neuropsychology – Introduction, definition, principles of neuropsychological assessment, diagnosis and rehabilitation. • Applications of neuropsychology in the field of speech and hearing. t. Psychodiagnositcs – Case history taking, Mental status examination, behavioural analysis, psychological testing. • Counselling- Meaning and definition, types of counselling, Counselling in rehabilitation practice. u. Developmental psychology: • Introduction, Definition, Principles, Motor development, Emotional development • Cognitive development- Definition, Piaget's theory • Play as a therapeutic tool • Personality development- Introduction, Stages, Hazards
			f)SPEECH LANGUAGE DIAGNOSTICS AND THERAPEUTIC	10	Speech language diagnostics Client history – definition, description, utility & need. Essential factors to be included in the client history form – comparison of adults vs. children's history – usefulness of the client history 2. Basic

			S		terminologies and concepts • Introduction to diagnostics • Terminologies in the diagnostic process • General principles of diagnosis • Diagnostic setup and tools v. Diagnostic approaches and methods • Approaches to diagnosis – importance of diagnosis in client history, essential factors to be included according to the conditions/disorders. Methods of taking case history. • Interview – principles and techniques • Self-reports, questionnaire, observations. • Diagnostic models – SLPM, Wepman, Bloom and Lahey • Types of diagnoses – Clinical diagnosis, direct diagnosis, differential diagnosis, diagnosis by observation, diagnosis by exclusion, diagnosis by treatment, instrumental diagnosis, provocative diagnosis, provisional diagnosis; advantage/disadvantages • Team approach to diagnosis • Characteristics of a good clinician as diagnostician B. Speech therapeutics w. 1. Basic concepts of therapeutics • Terminologies in speech therapeutics • General principles of speech and language therapy • Speech therapy set-up • Individual and group therapy • Integrated and inclusive education Unit 4 1. Procedures for speech-language therapy • Approaches to speech and language therapy – formal, informal and eclectic approaches • Types of speech and language therapy • Planning for speech and language therapy – goals, steps, procedures, activities 2. Techniques for: Speech and language therapy for various disorders of speech and language Importance of reinforcement principles and strategies in speech and language therapy, types and schedules of rewards and punishment 1. Clinical documentation and professional codes • Documentation of diagnostic, clinical and referral reports • Introduction to parent counselling, facilitation of parent participation and transfer of skills, follow-up • Evaluation of therapy outcome • Ethics in diagnosis and speech language therapy • Self-

					assessment and characteristics of a clinician
			g) ARTICULATION AND PHONOLOGICAL DISORDERS	10	Review of phonological development and articulatory mechanism • Fundamentals of Articulatory phonetics • Definition and types of coarticulation • Transcription methods in perceptual analysis • Phonological processes – types, language specific issues, identification and classification of errors. a. Distinctive features – types, language specific issues, identification of errors and analysis. • Acoustic aspects of production and perception of speech sounds; use of spectrograms • Factors related to articulation and phonological disorders: •Structural •Cognitive – Linguistic •Neurological •Psychosocial •Social •Metalinguistic b. Assessment procedures: Types of assessment, sampling procedures, scoring procedures, criteria for selection of instruments for assessment. • Assessment of Oral peripheral mechanism • Speech sound discrimination, stimulability and oral stereognosis. • Analysis and interpretation of data: • Intelligibility and severity judgments • Normative data • Error patterns. • Characteristics of disordered phonology and differential diagnosis c. Intervention: Stages of treatment and measuring improvement, long term goals, short term goals and activities for achieving goals in cases with misarticulation. • Issues in maintenance and generalization. • Team approach and professional communication (inter, intra professional and client oriented) • Approaches to treatment: motokinesthetic, traditional approaches integral stimulation, phonological, distinctive feature, minimal contrast therapy, learning theories, programmed, paired – stimuli. • Computerized intervention packages, metaphon therapy d. Cleft Lip and Palate • Etiological factors • Embryology of the Face and Palate • Types of Cleft lip and

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			h)MOTOR SPEECH DISORDERS	10	i) Childhood Motor Speech Disorders h. Introduction to neuromotor organization and sensorimotor control of speech - Motor areas in cerebral cortex, motor control by subcortical structures, brainstem, cerebellum and spinal cord. - Central nervous system and peripheral nervous system in speech motor control. - Centrifugal pathways and motor control - Neuromuscular organization and control - Sensorimotor integration - Introduction to motor speech disorders in children- Dysarthria and Developmental apraxia of Speech i. Definition, causes and classification - Neuromuscular development in normals and children with cerebral palsy - Reflex profile - Associated problems - Speech and language problems of children with cerebral palsy - Assessment of speech in cerebral palsy- objective and subjective methods - Differential diagnosis of cerebral palsy - Management: Introduction to different approaches to neuromuscular education (Bobath, Phelps and the others); Speech rehabiliatation in cerebral palsy- Verbal approaches: vegetative

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			j) DIAGNOSTIC AUDIOLOGY	10	Introduction to Diagnostic Audiology: - Need for test battery approach in auditory diagnosis & integration of results of audiological tests. - Indications for administering audiological tests to identify Cochlear pathology, Retro-cochlear pathology, functional hearing loss, Central processing disorders. 2. Tests to differentiate between cochlear & retro-cochlear pathology - ABLB, MLB - SISI - Test for adaptation - Bekesy Audiometry - Brief tone audiometry - PIPB function Immittance Audiometry - Introduction - Principle of Immittance audiometry - Instrumentation - Tympanometry – Tympanometric peak pressure, static immittance, gradient/tympanometric width. - Reflexometry – Ipsilateral & contralateral acoustic reflexes, special tests - Clinical application of Immittance evaluation - Immittance evaluation in the pediatric population Unit 3 4. Auditory Brainstem Response - Introduction & classification of AEPs, Instrumentation, Test procedure, factors affecting Auditory Brainstem Responses, Interpretation of results & clinical application, Auditory Brainstem Response in pediatric response. - ECOG, early response - Middle & Long latency auditory evoked potentials – test procedure, factors affecting MLR & LLR, Interpretation of results & clinical application, Findings in the pediatric population Otoacoustic Emissions Introduction, classification of OAEs, Instrumentation, measurement of OAE procedure, interpretation of results & clinical applications, findings in the pediatric population. 6. Tests to detect Pseudohypoacusis - Pure tone tests including tone in noise test, Stenger test

					- Speech tests including Lombard test, Stenger test, Lip-reading test, Doefler-Stewart test. - Identification of functional hearing loss Central Auditory Disorders (a) Definition, terminologies used, incidence & causes, indications for administration of CAD test, rationale for CAD tests. (b) Tests to detect Central Auditory Disorders - Monoaural low redundancy tests - Filtered speech tests - Time compressed speech tests - Speech-in-noise test - SSI with ICM - Other monoaural low redundancy tests (c) Dichotic speech tests - Dichotic digit test - Staggered spondaic word test - Dichotic CV test - SSI with CCM - Competing sentence test - Other dichotic speech tests (d) Binaural interaction tests - RASP - Binaural Fusion Test (BST) - MLD - Other binaural interaction tests (e) Temporal ordering tasks - Pitch pattern test - Duration pattern tests - Other temporal ordering tests (f) Variables influencing Central Auditory Assessment - Procedural variables - Subject variables (g) Test findings in subjects with central auditory disorders - Brainstem lesion - Cortical & hemispheric lesion - Interhemispheric dysfunction - CAPD in children - CAPD in elderly (h) Other special test – Minimal auditory capability test, SPIN, HINT, CST. Operational characteristics, types and specifications. -No design aspects. Concepts and block diagrams only 1. 2. Basics of digital signal processing – Analog signal, digital signal, A to D and D to A conversion, Basic concept of Digital Signal Processing and its implementation, How does a DSP based system works? Application- DSP based hearing aids. Microphones as transducers. Velocity microphones. uni-directional microphones Microphone impedance and sensitivity. Loudspeakers as transducers. Structure of a dynamic loudspeaker. Air suspension. Baffles

					and enclosures. Horn speakers. Multi-speaker systems. Loudspeaker Efficiency, Loudspeaker power and distortion. Recording and Reproduction of sound. Recording characteristics. Dynamic Range, Stereophonic recording. Magnetic tape recording and playback. Tape speed and frequency response, Bias and equalization, Tape noise, Digital Tape recording, CD ROM recording 2. Measuring Instruments - Multi-meter. Cathode ray oscilloscope. Sine wave generator. Function Generator, Frequency counter, Measuring microphones, Sound Level Meter, Integrated Sound Level Meter, Artificial ear, Artificial Mastoid, Couplers, Hearing aid test box, Measurement of different types of sound Historical development of hearing aids Non-electrical hearing aids Electric hearing aids a) Basic elements of hearing aids: Microphone, Amplifier, Receiver, Cords, Batteries c) Directional hearing aids, modular hearing aids Routing of signals, head shadow / baffle / diffraction effects Output limiting: Peak clipping, compression Extended low frequency amplification, frequency transposition (Bone anchored hearing aid, Master Hearing aids) d) Signal processing in hearing aids - BILL, TILL, PILL - Programmable and digital hearing aids - Signal enhancing technology Basics of electricity & electronics - Direct and alternating current, DC Power supplies, voltage stabilizers, Passive circuit elements, transistors. Linear and digital Integrated circuits, microprocessors. Micro computers and Computers. Filters, Linear and non-linear Amplifiers and Oscillators, Amplifier power and distortion Electroacoustic Characteristics & measurements for hearing aids

41	**ECG Technical Assistant**	Essential Qualification & Experience: 10+2 in Science with Certificate/Diploma Course in Echocardiography from recognized Institute and 2 years experience in the field.	a) Anatomy or Heart	10	Structure of Myocytes - Coronary Arteries veins - Nerves, Pericardium - Relation or heart to thoracic structures/ Mediastinum.
			b) Physiology and Pathology	10	- Depolarization/ Depolarization - Conic charges- Influx and Efflux of Na^{T_1} KT. – Calcium in Sarcoplasmic Reticulum. – Properties – Automaticty, Refractory period etc. – Normal ECG pattern and Recording. – Physiological charges in ECG Introduction of Rheumatic Heart disease, coronary Artery disease, Pericardial disease, Rest Heart disease, Arrhythmias with Pathogenesis and complications.
			c) Pharmacology	10	Cardiac Drugs – Effect of drugs on ECG charges. – Toxicity of Drugs and ECG charges
			d) Clinical cardiology	10	- Recording of E.C.G. – Recording of various leads/ modifications under different clinical conditions. – Recording at different speed/ Amplitude. – Recording on single channel machine multi channel machine with analyses. – Basic interpretation of Myocardial Infarction, Arrhythmia/ Hypertrophy/ Effect of Drugs. –Reporting of ECG and ECG changes which need immediate attention/ intervention
			e) Cardiopulmonary resuscitation	10	Fundamentals and proceddures
			f) Electro cardiography	10	Electro physiology, Einthevernis law (a) Introduction to ECG Reading normal and Abnormal ECG.

					Electricity – principles of AC/DC, Types of Batteries, Power Supply system, Ohm's Law CRT, Tube Multi meter Electro med, equipment standards and safety (a) ECG maintenance of minimum repairs Applied aspects of ultra sound/ Doppler principles and practice.
			g) Defibrillation	10	Indication and indications and Precautions
			h) Stress ECG principles	10	methods of recording and observations
			i) Holter recording Introduction to cardiac catheterization	10	principles, methods of recording and observations
			j) Fundamentals of computers	10	Concepts of computer hardware, input/output devices, Central processing unit, main memory, secondary memory etc., Definition of instructions, programmes, software
42	**Health Educator (Social Psychologist)**	Essential Qualification & Experience: (i) M.A. / M.Sc. Degree in Psychology from a recognized Institute / University. (ii) Five years working experience with the Physically Challenged in a Rehabilitation Centre. Desirable: M.Phil. in Clinical Psychology.	a)Basic Psychology	10	1.Basic Psychology Psychophysics and Perception • Signal detection theory, subliminal perception and related factors, information processing approach to perception, culture and perception, perceptual styles. Ecological perspective on perception. Perceptual Processes • Approaches to the Study of Perception: Gestalt and physiological approaches. • Perceptual Organization : Gestalt, Figure and Ground, Laws of Organization. • Perceptual Constancy : Size, Shape and Brightness, Illusion; Perception of Depth and Movements. • Role of

					motivation and learning inperception Attention: Motivation Basic Motivational Concepts : Instincts, needs, drives, incentives, motivational cycle. • Approaches to the Study of Motivation : Psychoanalytical, ethological, S – R Cognitive,humanistic. Biological Motives: Hunger, thirst, sleep andsex. Social Motives : Achievement, affiliation,approval Exploratory behaviour andcuriosity Motivation and Emotion Physiological correlates ofemotions. • Theories of emotions: James – Lange, Canon – Bard, Schachter andSinger. Conflicts: Sources andtypes
			b)Social Psyhology	10	Current trends in Social Psychology. Historical Background: Growth of social psychology, Methods of social psychology. Theoretical perspective: Cognitive dissonance, Social comparison, Attribution, Field Psychoanalytic, Symbolic interactions, Socio-biology. Social cognition. Person perception, impression management. Role of Stereotypes in person Perception types of influence process. Social Influence Processes: Leadership Attitude: Nature and Characteristics, Development and change. Theories of attitudechange. Pro social behaviour, aggression and violence. Nature, Characteristics, Determinants, Theories.
			c)Research Methodology-1	10	Research Methodology • Types of psychological research. • Methods of Psychological Research: Experimental, Quasi – experimental, case studies, field studies and cross – cultural studies. • Variables: Nature

					and types. Techniques of experimental manipulation control in experiment. Sources of bias. Ethical issues in psychological research, Research Process: Consideration of research problem and hypothesis, Operationalization. Sampling: probability and nonprobability sampling. Research designs: Cross Sectional and Longitudinal Correlation, factorial, randomized block, matched group, quasi – experimental, Graceo Latin Square time series design Central tendencies, Dispersion, Normal Probability Curve,its properties and utility in inferential statistics, Null hypothesis, Type I and Type II errors, Levels of significance. Method of collecting data – I: Observation, Questionnaire, and Interview. Test &Scales
			d)Research Methodology-2	10	Experimental Design: Single Factor, Randomized block, 2X2 factorial design, repeated measures (on onefactor), ANOVA:one–wayandtwo–way:Randomized andRepeatedMeasure Design. ANCOVA, Post ANOVAtests. Measures of relationships: bi-serial, point bi-serial, tetracoricand phi, Multiple and partial Correlations. Regression: simple and multiple, Factor Analysis: Assumptions ,Methods Rotation and interpretation Use of computer in psychological researches, Research report writing
			e)Psychopathology	10	Concept of Psychopathology, Classification systems inpsychopathology: W.H.O. (ICD-10) and multiracial systems (DSM-IVTR): Evaluation of classification

					system. Theoretical background, approaches to psychopathology (1)Psychodynamic. (2) Behavioural. (3) Cognitive. (4) Phenomenological. (5) Biological. (6) Socio cultural; Diagnosis – purposes of diagnosis, reducing undesirable Variability: diagnosticsystem. Anxiety disorder : Panic, Phobic, OCD, Post – Traumatic, GAD, somatoform disorders, Impulse control disorder, eating disorder, Sleep disorder, dissociative: Types, symptoms and management. Psychotic disorders: Schizophrenia, Mood disorder. Personality disorder (cluster categories and problems), types & symptoms: Types, Symptoms and management. Substance related disorders. Mental Retardation and developmental disorders
			f)Basic Psychological Processes	10	Learning Process: Classical conditioning: Procedure, Phenomena and related issues. Instrumental learning: Phenomena, Paradigms and theoretical issues. Process, Escape Conditioning, Avoidance Conditioning, Generalization. Reinforcement: Basic variables and schedules. Experimental analysis of behaviour:Behaviour modification, shaping Discrimination learning. , Neurophysiology of learning. Verbal learning: Methods and materials, organizationalprocesses Learning theories: Hull, Tolman,Skinner. Cognitive approaches in learning: Latent learning, observationallearning Memory and forgetting • Memory Processes: Encoding, Storage,Retrieval. • Stages of Memory: Sensory memory, Short-term Memory (STM) and Long – term

					Memory (LTM). • Episodic and Semanticmemory. • Theories of Forgetting: Interference, decay,retrieval
			g)Cultural Psychology	10	Group Dynamics and Group behaviour, Group effectiveness, and Group Cohesiveness: meanings, formation, decision making, problem solving and group level behaviours. Leadership: Meaning and nature, function, styles andeffectiveness. Social issues: Poverty, Caste, gender, population issues in India, Communal tension and harmony. Culture and Behaviour I: Culture and Cognition and emotion. Culture and Organisation. Culture and Behaviour II: Culture and Health. Culture andPersonality. Social psychology: Health, Environment andLaw
			h)Psychology and Health Behaviour	10	Methods and Basicconcepts • Methods of Physiological psychology: Lesion and Brain Stimulation. • Receptors, effectors and adjustermechanisms. • Neural impulse: Origin, conduction andmeasurement. Sensory system: Vision andAudition. • Human nervous system: Structure andfunctions. Sleep and waking: Stages of sleep, Disorders of sleep and Physiologicalmechanisms of sleep andwaking. • Drinking and its neural mechanism; hunger and its neuralmechanism. • Endocrine System: Chemical andglandular. Approach to therapy (Psychoanalytic, Biological Behavioural, Behavioural medicine and spiritual therapy). UNIT -

					V Mental health promotion and maintenance, present issues and trends in health psychology
			i)Basic Psychiatry1	10	Disorders of consciousness, attention, motor behavior, orientation, experience of self, speech, thought, perception, emotion, and memory. Psychoses: Schizophrenia, affective disorders, delusional disorders and other forms of psychotic disorders – types, clinical features, etiology and management. Neurotic, stress-related and somatoform disorders: types, clinical features, etiology and management. Disorders of personality and behavior: Specific personality disorders; mental & behavioral disorders due to psychoactive substance use; habit and impulse disorders; sexual disorders and dysfunctions – types, clinical features, etiology and management. Organic mental disorders: Dementia, delirium and other related conditions with neuralgic and systemic disorders – types, clinical features, etiology and management
			j)Basic Psychiatry-2	10	Behavioral, emotional and developmental disorders of childhood and adolescence: types, clinical features, etiology and management. Mental retardation: Classification, etiology and management. Neurobiology of mental disorders: Neurobiological theories of psychosis, mood disorders, suicide, anxiety disorders, substance use disorders and other emotional and behavioral syndromes. Therapeutic approaches: Drugs, ECT, psychosurgery,

					psychotherapy, and behavior therapy, preventive and rehabilitative strategies – half-way home, sheltered workshop, daycare, and institutionalization. Consultation-liaison psychiatry: Psychiatric consultation in general hospital; primary care setting. Special populations/Specialties: Geriatric, terminally ill, HIV/AIDS, suicidal, abused, violent and noncooperative patients; psychiatric services in community, and following disaster/calamity
43	**Technician Prosthetics & Orthotics**	Essential Qualification: Bachelor's Degree in Prosthetics & Orthotics from an Institution / University recognized by Rehabilitation Council of India. Registration with the Rehabilitation Council of India. Desirable: 2 years' experience in the field	a)Anatomy , Physiology and Materials	10	General: introduction & definition, anatomical terms, regions of body, cavities & their contents, cell structure, arrangement into organs and systems. Osteology: structure & function of bones and joints, skull, vertebrae, upper extremity and lower extremity. Systemic: outline and gross anatomy of cardiovascular system, respiratory system, integumentory system, and genito – urinary system, gastro-intestinal system. Lower extremity: survey of structure and function of lower limb, detailed structure and function of bones and joints of lower limb, blood supply to lower limb, main nerves to lower limb, cutaneous nerve supply, origins, insertions, actions and nerve supply of muscles of lower limb and surface anatomy. Upper extremity: survey of structure and function of upper limb, detailed structure and function of bones and joints of upper limb, blood supply to upper limb , brachial plexus, major nerves to upper limb , cutaneous nerve supply, origins , insertions , actions and nerve supply of muscles of upper limb and surface anatomy. Spine: outline of structure and function of vertebral column, detailed structure of vertebrae throughout vertebral column, structure and function of atlanto – occipital, atlanto- axial and all other invertebral joints origins, insertions, actions and nerve supply of major muscles of vertebral column. Applied anatomy: surface anatomy, locomotion and movements, anthropometry. General: introduction and definition of various terms, cell structure and

					function including cell division, body water and body fluid, oedema. Musculo-skeletal: voluntary and involuntary muscles and their functions. Various types of joints, skeletal system, weight bearing and gait analysis. Nervous system: reflex action, regulation of posture, general survey of voluntary movement, pain, reflex action, autonomic nervous system. The blood: outline of coagulation of the blood, RBC, WBC, immunity reaction and inflammation. Cardio – Vascular: General consideration, Heart rate, Regulation of blood pressure, peripheral circulation, and Capillaries vascular response of the skin. Respiratory System: General consideration, Carriage of Oxygen by the blood, Carbon dioxide transparent in the body, Cyanosis, Dyspnoea, Regulation of body temperature. Metal work: mechanical working of metal especially steel and aluminum, fundamental of riveting, soldering, brazing and welding, power metallurgy, surface coating of metal. Metal and Alloys: fundamental of metal & alloys both ferrous & non- ferrous, properties, testing and inspection of metals & alloys, heat treatment of metals. Wood utilization: wood types, seasoning, preservation, lamination properties and adhesive for wood. Wood work: introduction to wood, wood works & wood working tools. Pattern making & making of various kinds of joints. Leather utilization: leather, types, tanning, preservation, lamination, properties and adhesive for the leather. Fabric: fabric types, properties, utilization, selection and quality control. Plastics: introduction to plastics, types of plastics & molecular structure. Relationship of properties to structure, monomers, polymers, additives, mechanical properties, effect of properties on method of production. Fabrication: fabrication process, effect of fabrication process, micro structural changes, shrinkage & other degradation during processing, environmental effect, thermoforming plastics, their fabrication process. Thermosetting and fabrication process, composite material and their uses, elastomers, H.D.P.E, PP, PP-CP,

					viscoelastic behavior of plastics, introduction to fiber reinforcement plastics, introduction to and their processing especially various types of moulding and lamination. Joining: joining of plastics and welding, adhesives and their effect on their structure and plastics properties. Foams: different types of foams used in P&0 especially latex, polyurethane, polyethylene& other kind of rigid/ semi rigid /flexible foams.
			b)Mechanics and Applied Mechanics, Ergonomics with applied mechanics and Engineering Drawing Tools Equipment & P&O Workshop Technologies and Bio-Mechanics	10	General Mechanics: definition of mechanics, foundation materials on units, dimensional homogeneity, scalar & vector quantities, co-ordinate system, Newton's law, resolution & summation of forces and moments in two & three dimensions, equivalent force system, free body diagrams, equation of equilibrium, plans & space frames analysis, parallel & non-parallel forces, torque, linear & angular motion, uniform acceleration, friction, inertia, moment of inertia, dynamic equilibrium (translation/rotation) ,energy, momentum. Simple stress & strains: definition of stress & strains, factor of safety stress, modulus of elasticity, longitudinal strain & internal strain, Poisson's ratio etc. stress & strains curves, statement of formulae relating between different modules, simple problems to understand the above principles of composite bars-formula relating to loads & strain in individual members simple to understand the above relation. General: introduction to definition & scope in modern industrial social studies on machine or man oriented topics, display devices for transmitting information from machine to man, controls in information from man to machine, safety factors, pollution, noise, fumes, atmospheric pollution if motion study in relation to Ergonomics principle. Introduction: drawing instruments & their uses, sizes & layout of drawing sheets, item reference on drawing & items lists, planning on assembly. General principles: folding of drawing

					print scale, plane & diagonal, lines, lettering, general principles of presentation, sectors & other conventions conventional representations circle, tangent ellipse, cycloised involute of circles. Fundamentals: dimension on technical drawing, indication of linear & angular tolerance on technical drawing, methods of dimensioning & tolerancing, cone method of indicating surface textureon, technical drawing for structural metal work, orthographic projection of points, lines, simple objects & combination, isometric views, auxiliary views, drawing of screw threads form bolts screws & screw joints, weld 7 welded joint dimensioning & sketching of P & O components / parts, pulley shafts, coupling etc. Designs: design calculation & its application for prosthetics & calculation orthotics devices. General Sketching: sketching for preparing assembly, workshop drawing, various parts & components used in prosthetics & orthotics, basic idea of design analysis, itemization, empiricism, approximation & synthesis, detail diagram of all kind of orthoses, prostheses & mobility aids. General: introduction to bench work, hand tools, measuring tools & instruments, equipment's for mass production, introduction to lathe machine and its operation, milling machine & its operation, tooling attachment, shaping machine & its uses, grinding machine, abrasive machine, special tools and equipment use in fabrication of orthoses and prostheses. General: introduction to terminology, definition, planes & directions, regions & landmark of the body, center of gravity- line of gravity, types of lever, lever arm, body, mass, force, equilibrium, floor reaction axes of rotation, speed, acceleration. Velocity (scalar & vector), kinetics and kinematics, human weight bearing system – weight bearing line, normal human locomotion –definition, characteristics of normal gait, characteristics of pathological gait. Biomechanics of normal foot, pathological foot, foot arches, normal & surgical foot wear.

					Tissue mechanics: introduction to relevant biological tissues & their mechanical properties. Human movements: range of movements of lower/ upper limbs & spine. Normal & pathological gait- introduction to EMG studies. Biomechanics of Symes prostheses, partial foot prostheses, below knee (trans- tibial) prostheses. Gait deviations: gait deviation while using foot orthoses (FO), Ankle foot orthoses (AFO) and Trans tibial prostheses.
			c)Prosthetics & Orthotics Sciences, Orthotics and Psychology, Sociology and vocational aspects	10	Introduction: introduction to prosthetics, definition of various terminology's, historical development in lower extremity prosthetics in India and abroad. Prosthetic feet: various types of prosthetic feet, conventional foot, rocker, SACH foot, modified SACH foot, Jaipur foot, Seattle foot, flex foot, quantum foot, peg roelite foot, carbon copy foot, comparative studies of prosthetic feet, single axis, double axis, multi-axial foot, other kind of feet etc. heel height adjustment, adjustable ankle, various kind of ankle mechanism. Partial foot: various types of partial foot prosthesis, its bio mechanics, prescription principles, material used in partial foot prosthesis, various cast techniques of partial foot prosthesis & fabrication techniques. Syme's: various types of Symes prosthesis, prosthetic component prescription criteria, principles, material used for Symes prostheses, casting techniques, cast modification, fabrication technique for Symes (P.T.B type) prostheses, fabrication techniques for conventional Symes prosthesis. Below knee: various types of B.K (Trans tibial) prostheses with a focus on endoskeletal prostheses. All types B.K prosthetic components – both conventional & modular. B.K prescription criteria and principles, materials used for B.K prosthesis, measurement & casting techniques for PTB prostheses, cast modification, fabrication techniques for PTB

					prostheses, and fabrication techniques for B.K conventional prostheses – both open & close ended socket, different types of socket designs- PTB, PTS, PTBSC, PTBSC-SP, different types of suspension. Different Technology: conventional B.K prosthesis with local components, ALIMCO components, Jaipur limb (using HDPE), ICRC technology, endoskeleton/ modular –all common types. Gait deviation & analysis: persons with chopart, Symes, B.K prostheses, checkout procedure for persons with chopart, Symes & B.K prostheses. General: introduction to orthotics. Definition of various terminologies, History of orthoses in India and abroad. Various materials used in orthotics. Different types of orthoses: user's client assessment & prescription criteria, measuring & casting, cast modification, three point force system, fabrication, fitting , alignment , check out & finishing of following of following devices . Shoe modification: medial/lateral rise (inside/ outside shoe) M.T bar (inside/ outside shoe) arch support, meta tarsal pad, calcaneal heel wedge, heel raise, Thomas heel, heel pad for calcaneal spur,'T' strap (medial & lateral), fixation of stirrup plate in shoe/ sandal, various types of arch support – flexible/ semi rigid / rigid/ custom molded, SMO – custom molded supra malleolar orthosis. Various types of foot orthoses for diabetic feet & other sensory deficiencies. AFO (Ankle foot orthoses) – conventional AFO-Limited/foot drop (using ALIMCO components) plastic AFO (custom molded), using metal hinges, plastic hinges, different trim lines. Plastic AFO for calcaneal deformity, AFO with soft insert, fabricated AFO, AFO with inside / outside posting, AFO with build in compensation. Club foot orthosis (CTEV): Denis brown splint (night splint), ankle support, prefabricated CTEV splint, custom molded FO/AFO/KAFO, POP splint, shoe modification. Fracture: tibial guard & other kinds of foot & ankle fracture orthoses. Disability &development:

					Background to social, political & economical issues in India & other low-income countries. Affected on poor who live in rural & urban areas. Disability & women introduction to community based rehabilitation as compared to the existing medical model & its function. Introduction to impairment, disability & handicap. Introduction to disability issues, Government schemes & initiatives, legislation, local resources available & referral. Income generation schemes, purpose of Sanghas / group of PWDs. Access, Adaptation & changes of environment where people live or work, PWD Act. Psychology: introduction to psychology, outline of psychology & the individual, behavior, intelligence & abilities, learning & remembering, psychological development, cognitive process, personality, moral development, psychological aspect of disability. The role of the family, child with the disability, parent of the disable child. Acceptance of several disabled persons, social- sexual relationships, independence living. Sociology: introduction to sociology & outline of society, definition, outline of social works, nature of social organization, non –governmental organization & its role in prosthetics & orthotics, structure & function of social institution, village as community, social changes, social problems, social welfare, vocational rehab. , Employment, self-employment, removing environmental barriers, recreation for the disabled, community welfare organization, social welfare programs, professional & social work in medical setup, M.S.W in rehabilitation, practical & environment difficulties of patient in use of appliance, outline of educational aspect, job analysis, job placement. Community Based Rehab. : What is CBR & its need- what way it is different that IBR , simple knowledge about other disabilities, its prevention & its management ,to where to refer ,when to refer, role of other professionals in CBR, early identification & early intervention , how to work as a team in CBR /IBR structure , simple techniques to make CBR activities more purposeful.

			d)PMR Medical Aspects (Specific disorders)	10	General: introduction to health cares system, rehab. In health care, rehab. Under various ministries, introduction to Institution Based Rehab. (IBR) and Community Based Rehab. (CBR). Prosthetics & orthotics in CBR & role of CBR worker in P&0. Introduction to general medicine & disease, chemical & physical agent causing diseases, outline of metabolic disorders e.g. Diabetes mellitus, deficiency diseases e.g. Vit.D deficiency & Vit. C deficiency. Specific disorders : peripheral nerve injury , poliomyelitis ,cerebral palsy , muscular dystrophy, club foot, spina bifida ,hemiplegia, spinal cord injury (paraplegia / quadriplegia) , tuberculosis & perthes disease, leprosy , burns, Erb's palsy ,tumors- malignant & benign. Sports injuries: introduction to sports injuries, common sports injuries & other management, mechanism of injury to hip, knee, ankle, shoulder, elbow, wrist & hand in various sports & outline of their orthotic management. Rehab. Therapy: introduction to physiotherapy & occupational therapy, child development in brief- milestone & delayed milestone, assessment procedure, evaluation of muscle power, range of motion, checking of joint stability, checking of pelvic tilt, use of Goniometer, checking of muscular atrophy/ dystrophy, functional assessment which includes ADL, stretching, strengthening, breathing exercises, therapy at post – surgical stage (re- educating the muscle, maintaining ROM, preventing. Stump care & care of non-amputated limb, exercise through games involving parent & guardians, pop bandage application for temporary splinting &correction of simple deformity, stump bandaging application etc. Physical medicine & Rehab. : Concept of total rehab. , Rehab. Team & role of each of the member of the team, introduction to physical medicine, principles of clinical examination, diagnosis & treatment, different aspect of physical medicine & rehab. , Rehab. Aspect of visually handicapped, hearing handicapped & mentally retarded.

			e)Orthopaedics and Amputation surgery	10	General: introduction, principles of Orthopaedics, fracture & types of management. Inflammation: outline of Inflammation, osteomyelitis, and inflammation of joint. Rheumatoid arthritis,, infective arthritis , tuberculosis arthritis ,osteoarthritis, ankylosing spondylitis, arthritis of hemophilic joints, neuropathic joints, inflammation of tendon sheath & bursae, contractures , posture etc. metabolic diseases of bones e.g. Rickets, osteomalacia , gout, scurvy, etc poliomyelitis & all its effect. Spine: outline of torticollis, cervical rib, spina bifida, spondylolisthesis, scoliosis- all types, kyphosis, lordosis, spondylosis, prolapsed of intervertebebral disc. Hip: outline of dislocation (congenital, traumatic, pathological, paralytic & spastic), coxa-vara, coxa-valga. Knee: outline of meniscal tears, dislocation of patella, genu valgus, genu varum, genu recurvatum, ligamentous injuries. Ankle & foot: outline of sprain (acute & chronic) ,CTEV ,calcaneo-varus & pes valgus, hallux valgus & varus, calcaneal spurs, metatarsalgia, planter fascitis, anesthetic feet, bunion. Shoulder: outline of recurrent dislocation, bicipital tendonitis & periarthritis. Elbow: outline of cubitus varus& valgus, Madelung's deformity, tennis elbow, Volkmann's contracture, Dupuytren's disease, claw hand, de-quervain's disease & claw hand. Wrist & hand: tenosynovitis, mallet finger. Carpal tunnel syndrome. General: indication / causes, general principles, types of amputation .i.e., Guillotine, Flap, osteoplastic Myoplastic, osteo-myoplastic, individual preparation for prosthesis, ideal stump, preoperative & post-operative prosthetic management techniques in general. Amputation: amputation surgery in lower & upper limb, amputation in

					special circumstances, like in infant & children, congenital limb deficiencies & its universal classification, ischemic limbs, elderly persons & malignancy
			f)Electricity and Bio mechanics	10	Basic concept : introduction to SI system of units , charge , current , resistance, potential difference, electromotive forces, energy, power, voltage & current relationship, energy storage, DC circuit, AC circuit, sine wave, frequency, period phase, RMS value, inductive & capacitive reactance. Resistors: resistors sensitive to temperature, strain & light, resistors in series & in parallel. Transformers: principle, voltage, turns & ratio currents. Semi conductors: outline concept of Semi conductors & insulators, conduction in intrinsic & extrinsic semi conductors. Amplifiers: amplifiers as a system element, operational amplifiers & their ideal characteristics. The small single equivalent circuit having a controlled source, voltage & current gain, the decibel power gain, noise & drift voltage, source in amplifiers & bio systems. Feed back: the general feed back equation, feed back voltage series & loop gain, loop gain accuracy, input resistance, output resistance, band width noise, feed back as control mechanism in the wider sense, positive feed back – instability & self- oscillation in amplifier & oscillators. Measurements: electronic measuring instruments, the cathode ray oscilloscope, summary of recording instruments, concept of resolution & accuracy applied to digital & analogue instruments, transducers for temperature, light, pressure. Sound, description, specification & use in circuit. Myoelectrodes : technology of metals & metal paste electrodes, the equivalent circuit between electrodes, stability, source of unwanted voltage electrode system, other types of myoelectrodes micro electrodes, implanted electrodes, comparison with surface electrodes . Electrical safety : description of single

					phase & three phase supply system & voltage involved , function of line , natural & earth in single phase system , current practice in pin connection & colour codes, simple safety procedure to be taken when servicing equipment , effect on safety on fault condition, fuses, conductors & earth leakage detectors- miniature circuit breakers (MCB) voltage regulators integrated circuits . Bio electricity: biological potentials, muscle action potential, electromyography & myo – electricity. Joint force analysis: body segment parameters, joint force during swing & stance phase, force analysis on foot & ankle joint, knee joint & hip joint. Human locomotion & gait analysis: introduction to different ways to do gait analysis by using force late / TV analysis/ electromyography studies, energy studies, gait repeatability, variations due to age, variation due to foot ware, orthosis/ prosthesis, common type of pathological gait, above knee amputee gait analysis & deviation, gait variations due to alignment or pathological conditions. Through knee bio mechanics: prescription principles, socket bio mechanics & alignment techniques. Above knee prosthetics bio mechanics: general socket bio mechanics, above knee socket bio mechanics, & analysis socket forces, analysis of above knee socket component, bio mechanics of AK prosthesis alignment Above knee orthotics bio mechanics : bio mechanical principles of various kinds of above knee orthosis especially KAFO & FRO, bio mechanics of HKAFO especially to prevent scissoring, three/ four / five pressure force system, KAFO & HKAFO gait deviation – variation due to alignment or pathological condition, gait analysis of KAFO & HKSFO with various types of crutches

			g)Prosthetics and Orthotics	10	Knee joints: all types of endoskeletal & exoskeletal knee joints – single axis, polycentric , free , constant friction , variable friction, microchip control, hydraulic, swing phase control , stance phase control knee joints etc. Hip joints: for AK as well as for hip disarticulation/ hemipelvictomy- all types of hip joint especially single axis & swivel type. Through knee prostheses : various types – through knee prosthetic component , material used, casting techniques, cast modification , fabrication , its gait analysis & deviation, check-out procedures . A.K Prosthesis: types, A.K prosthetic component .A.K socket shape, clinical consideration , casting & measurement techniques , cast modification , fabrication, various types of suspension systems especially suction & silicon type. Different technology: conventional A.K prosthesis with local component, ALIMCO component, Jaipur limb (using HDPE), ICRC technology, endoskeletal / modular – all common types, A.K gait analysis & check-out procedure. Hip disarticulation prosthesis: various types of through hip prosthesis, different types prescription principles , material & component to be used, casting & measurement techniques , cast modification , alignment , suspension fitting , donning & doffing techniques, check-out procedure ,testing & training , gait analysis & gait deviation . A.K Orthosis: all types of KAFO, HKAFO & also orthosis for CDH, CP, paraplegia, Legg Calve Perthes disease, spina bifida, leprosy & hemiplegia. Orthotic component: prescription principles of various various types of KAFO, knee orthosis, & HKAFO. Fabrication : casting & measurement techniques , choosing right kind of material & component , , cast modification , fabrication & alignment techniques using different technologies- its advantages & disadvantages , accomodation of limb length discrepancy while designing orthosis , gait analysis & check-out procedure .

			h)Work Shop Management and Computer Studies	10	Introduction: principle of administrative & management structure, industrial management, definition of organization, type of organizational set up, workshop administration & management. Man management: introduction, discipline, security, distribution of work, work sheet, time sheet & staff welfare. Store purchase: Store & Store organization, inventory control, purchase organization, introduction to cost accounting, use of computer for effective Store management. Safety: industrial accidents, safety & hazards. Planning: planning of prosthetic & orthotics workshop, all types of various scale, workshop layout, plan layout, costing, billing, documentation especially development of recording system to manage individual records. Construction: construction, ventilation, electrification, colour scheme, lighting, sanitary convenience, further expansion & accessibility of prosthetic & orthotic workshop & fitting. **Computer Aided Design & Manufacturing (CAD CAM)** **Basics of CAD : introduction , definition , history , current status , product cycle , automation , designing , application & benefits.** **Computer Graphics: introduction of software, function of graphic package, application software.** AutoCAD 2002: Introduction, foundation of AutoCAD commands, execution of simple 2D drawing, understanding 3D commands, executing 3D commands, creating 3D.

					Rendering & image attach to an object starting new project, creating, editing, saving drawing, annotation, dimension, plotting, customization, AutoLisp. Basics of CAD: introduction of CNC machine, basics of computer aided designing & manufacturing (CADCAM) & its use in P&O, other kinds of computer use in prosthetics & orthotics, CADCAM technology in socket making & also making of different kinds of prosthetics & orthotics
			i)Bio Mechanics and Mobility and Rehabilitation aids	10	Tissue mechanism: study of mechanical characteristics & function of bones, skins, ligaments, cartilage & muscle. Spinal bio mechanics: motion of the spine , bio mechanics of different region in spinal column , bio mechanics inter vertebral disc, lumbar spine loading, during normal activities & effects of orthoses on this load, bio mechanical principle of spinal orthosis. Biomechanics of corsets, cervical / thoraco / lumbar / sacral spinal orthoses. Biomechanics of scoliosis correction using different technologies & especially using spinal orthoses. Upper limb: grasp pattern , grasp force , mechanical replacement of hand function , augmentation of deficient hand function, upper limb prosthetic socket bio mechanics –all types, orthoses bio mechanics, application of external power, myoelectric control of external power & usage of devices. Control systems: introduction to control theory, application in prosthetic & orthotics of functional electrical stimulation (FES), hybrid orthoses, myo electric & bio feedback. Design concept –I: buckling, theories in

					failure / fatigue / stress concentration, connection, fluid mechanism & beam deflection. Design concept –II: shear force & bending moment diagrams, centroids, 2^{nd} moment of area & mass, theorem of parallel axes, bending stress, torsional stress of circular shaft, combine axial & bending stresses, combine & torsional stresses , combine axial bending torsional stresses , open & close helical spring, beam deflection, design test standards / material / Philadelphia loads/ ISO, design calculation for P&O devices. Mobility & walking aids: canes, walking sticks, crutches- axillary, elbow & forearm support, different types of walking frames, walker & their attachment, parapodium & David Hart Walker. Developmental aids : bio mechanics of different kind of developmental aids, normal mile stone & delayed mile stone, measurement techniques, fabrication of box seat, special chair with or without table / tray, standing / tilting frame, low level cart, prone board & various developmental & educational toys, maximum use of appropriate technology while making developmental aids. Moulded seats: bio- mechanics, prescription criteria, cast & measurement techniques, cast modification & fabrication of moulded seats with inside or out side posting, use of different materials & technologies to fabricate the same, suspension or right kind of strapping. Wheel chair : different types , prescription criteria , measurements techniques, wheel chair modification & maintenance according to individual's need , various attachment of the wheel chair , motorized wheel chair , tricycle & motorized tricycle , scooty, different types of cushion & its fabrication

					techniques . Gait Training with crutches: training with various walking aides & that to different ways, installation / fabrication of parallel bars & transition from parallel bars to walker then to crutches or sticks. Self help devices: special gadgets for prehension & to assist in activities of daily living.
			j)Upper Limb Prosthetics and Orthotics	10	Upper limb prosthetics : historical development in Upper limb prostheses – India & abroad, Upper extremity prosthetics component – terminal devices, wrist unit, elbow units, shoulder units, harnessing systems in upper extremity prosthetics. Partial hand: both cosmetic & functional types which also includes silicon prostheses, cosmetic hand glove & finger, device for augmentation of function & cosmesis for partial hand amputation & finger amputation. Wrist disarticulation: prescription criteria, types of through wrist prostheses – component , socket shape, clinical consideration, casting & measurement techniques, cast modification, fabrication techniques, alignment techniques, harnessing & suspension mechanism, fitting, donning & doffing techniques, check out procedure, testing & training. Below elbow : prescription criteria , types of B.E prostheses- component , type of socket which include self suspending , flexible / rigid socket or combination of both , clinical consideration , casting & measurement techniques. Cast modification, fabrication techniques- single wall / double wall, alignment techniques,

					harnessing & suspension mechanism, control system – body powered & externally powered, fitting donning & doffing techniques, check out procedure, testing & training. Above elbow : prescription criteria, types of AE prostheses which also includes elbow disarticulation prostheses – components, different types of elbow mechanism, types of socket which includes self suspension, flexible / rigid socket or combination of both, clinical consideration, casting & measurement techniques. Cast modification, fabrication techniques - single wall / double wall, alignment techniques, harnessing & suspension mechanism, control system – body powered & externally powered, fitting donning & doffing techniques, check out procedure, testing & training. Shoulder disarticulation: prescription criteria, types of shoulder disarticulation prostheses both cosmetic & functional – components, different types of elbow & shoulder mechanism, types of socket, flexible / rigid socket or combination of, clinical consideration, casting & measurement techniques. Cast modification, fabrication techniques - single wall / double wall, alignment techniques, harnessing & suspension mechanism, control system – body powered & externally powered, fitting donning & doffing techniques, check out procedure, testing &training . Upper limb orthotics: objective of splinting & principles, bio mechanical principle of all type of Upper limb orthotics, material used & its advantage & disadvantage, basic component splinting, all type of hand / finger orthoses, wrist hand orthoses which

					includes – flexor hinge splint finger driven, – flexor hinge splint wrist driven, flexor hinge splint shoulder driven, casting / measurement & fabrication of EO elbow wrist & hand orthoses, elbow brace appliances to allow mobilization / immobilization, appliances for flail elbows, casting / measurement & fabrication of shoulder orthoses, the shoulder joint braces & splints, abduction splint & braces, traction splint of humerus, all types of shoulder elbow wrist & hand orthoses which also includes both body powered & externally powered, all type of fracture orthoses, temporary splinting, feeder, & other assistive appliances. Spinal orthoses: historical development of spinal orthotics, anatomical & physiological principles of construction & fitting of spinal orthoses, bio mechanical principle & function of spinal orthoses. Cervical orthoses: principle, material, measurement / casting, fabrication of all type of Cervical orthoses especially different type of cervical collar, semi – rigid / rigid cervical orthoses both temporary & permanent, cervical traction – various types. Thoraco-lumbar sacral orthoses : flexible spinal orthoses, rigid spinal orthoses, principle, material , measurement / casting, fabrication of all type of Thoraco lumbar sacral orthoses (TLSO) especially all types of orthoses for scoliosis .All type of under arm orthoses & variants, various types of immobilizer, fitting, donning & doffing techniques, check out procedure, testing & training . Lumbo sacral orthoses: principle, material, measurement / casting, fabrication of all type of lumbo-sacral orthoses (LSO), especially corset & all types of orthoses for lordosis & scoliosis, pelvic traction & its use.