अखिलभारतीयआयुर्विज्ञानसंस्थान
All India Institute of Medical Sciences
मंगलगिरि, आंध्रप्रदेश
Mangalagiri, Andhra Pradesh
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AIIMS/MG/Admin/Recruit Matt/03/Non Faculty/2024/01C Date: 08 /11/2024

IMPORTANT NOTICE

SCHEME AND SYLLABUS OF EXAMINATION FOR RECRUITMENT OF VARIOUS GROUP 'B' & GROUP 'C' POSTS ON DIRECT RECRUITMENT BASIS IN AIIMS, MANGALAGIRI.

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In reference to advertisement No. AIIMS/MG/Admin/Recruit Matt/03/Non Faculty/2024/01A, Dated: 08.10.2024, for recruitment of following Group 'B' & Group 'C' post on direct recruitment basis in AIIMS Mangalagiri, the Scheme & Syllabus of examination is as follows:

I. SCHEME AND SYLLABUS OF EXAMINATION:

Computer Based Test (CBT)				
Part	**Particular**	**No. of Questions**	**Marks**	**Duration**
Part - I	Subject knowledge of concerned post	100	100	90 Minutes
Part – II	General Aptitude			
	General Intelligence & Reasoning			
	English Language			
	General Awareness			
	Basic Computer Knowledge			
Part – III	Skill Test (Wherever applicable)			

- One mark for each correct answer and 0.25 negative mark for each wrong answer.
- *Syllabus for Part – II (General Topics) is attached at **'Annexure – I'**.*
- *Syllabus for each post is attached at **'Annexure – II'.***

***Note:** The Examination Schedules and Computer Based Test (CBT) related information will be provided shortly.*

- ***Candidates are advised to visit AIIMS Mangalagiri website regularly for any updates or important notices of this advertisement.***

ANNEXURE-I

INDICATIVE SYLLABUS OF CBT FOR RECRUITMENT TO VARIOUS NON-FACULTY POSTS (GROUP B & GROUP C) ON DIRECT RECRUITMENT BASIS AT AIIMS MANGALAGIRI.

Part II: General Topics

A. **General 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 Allegation, 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.

B. **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, judgment, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical General Intelligence & Reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic General Intelligence & 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 & decoding, 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 center codes/roll numbers, small & capital letters/numbers coding, decoding and classification, embedded figures, critical thinking, emotional intelligence, social intelligence, other sub-topics.

C. **English Language:** Candidates' ability to understand correct English Language, his basic comprehension and writing ability, etc. would be tested. Topics covered are Rules For Tenses, Rules For Prepositions, List of Prepositions, Rules and List of Conjunctions, Active And Passive Voice, Rules List of One Word Substitutions, List of Homophones/Homonyms, List of Synonyms and Antonyms, Idioms And Phrases, Spotting the Error, Reading Comprehension, Cloze Test, Letter Writing Format, Precise Writing, Sentence Correction Questions, Adjective Degree Of Comparison Rules, Article Rules, Direct & Indirect Speech Rules, Sentence Rearrangement & Para jumbles

D. **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.

E. **Basic Computer Knowledge:** Fundamentals of Basic Computer Knowledge, Internet, Characteristics of Computer, Computer Organization including RAM, ROM, File System, Input Devices, Computer Software, Operating System, MS-Office (exposure of Word, Excel/spreadsheet, Power point), Professional Software & Hardware System.

ANNEXURE-II

INDICATIVE SYLLABUS OF CBT FOR RECRUITMENT TO VARIOUS NON-FACULTY POSTS (GROUP B & GROUP C) ON DIRECT RECRUITMENT BASIS AT AIIMS MANGALAGIRI.

Post Name	Syllabus
Programmer	***Part I*:Subject Knowledge(70 Marks)** Problem-Solving and Programming using C/C++ (Problem - Solving Techniques, Design of Algorithms, Efficiency, Complexity, Data Structure/Representation, Loops (simple/complex), Multilevel Decision making, Computer Organization (The Basic Computer, The Data Representation, Logic Gates, Memory System, I/O Technology including latest in use, Input/output System, Secondary Storage System, Theory of Computing, Discrete Mathematics (Propositional Calculus, Boolean Algebra and Circuits), Systems Analysis and Design, Implementation and Maintenance of Systems, Internet Concepts and Web Design (The Internet, Intranet, World Wide Web, HTML, JavaScript. XML), Data and File structures, Operating System Concepts and Networking Management/Concepts, Database Management Systems (Basic Concepts, Relational and ER Models, NORMALIZATION, Structured Query Language (SQL) and Transaction Management, Stored Procedure, Backup, Recovery and Security, Distributed and Client Server Databases, SQL, Server/Postgres, Technology/Concepts, SQL/MYSOL), Python .DOT, Object Oriented NET(C#/ASP.NET), Software Engineering. Data Communication and Networks, Artificial Intelligence and Knowledge Management. ***Part II*:** **A. General Aptitude: (5 Marks)** **B. General Intelligence & Reasoning: (5 Marks)** **C. English Language:(10 Marks)** **D. General Awareness:(10 Marks)**
Store Keeper	***Part I*: Subject Knowledge (50 Marks)** Questions to be based on Graduate and Post Graduate Degree/Diploma in Material Management course broadly covering the following topics:- **1. Purchase Management (as per General Financial Rules 2017):** Purchase of Goods and Services, Fundamental Principles of Public Buying, Purchase of Goods without quotation, Purchase of Goods by Purchase Committee, Purchase of Goods under Rate Contract, Purchase of Goods by Obtaining Bids, Advertised Tender Enquiry, Limited Tender enquiry, Two-Stage Bidding, Single Tender Enquiry, Electronic Reverse Auction, E-Publishing, E-Procurement, Government E-Market Place (GeM), Registration of Suppliers, Department from bidding, Contents of binding document, Maintenance Contract, Bid Security and Performance Security, Efficiency, Economy and Accountability in Public Procurement System, Buy-Back Offer, International trade (Imports, Customs, Incoterms) **2. Inventory Management:** Types of Inventory, Cost of associates with inventories, Forecasting technics, Inventory Control and Service Level, Replenishment of Inventory, Inventory Management System, Materials Requirement Planning, Spare Parts Inventories, Wire House and Inventory Operations Systems, Receipt of Goods and materials from private suppliers, Receipt/Issue of goods and materials from internal divisions of the same Organization, Customs of goods and materials, Lists and Accounts, Procedure of Physical verification and Consumables and Assets, Buffer Stuck, Disposal of goods and Modes of disposals, Total Quality Management **3. Inventory Management:** Objectives of Logistics, Supply Chain Management, Ware House Management, Material Handling systems, Storage Systems 4. Packaging and Distribution Introduction to Packaging, Packaging Material, Forms of Packaging, Bar Codes and FRID Packaging. **4. Packaging and Distribution:** Introduction to Packaging, Packaging Material, Forms of Packaging, Bar Codes and FRID Packaging.

Post Name	Syllabus
	Part II: **A. General Aptitude: (10 Marks)** **B. General Intelligence & Reasoning: (10 Marks)** **C. English Language: (10 Marks)** **D. General Awareness:(10 Marks)** **E. Basic Computer Knowledge:(10 Marks)**
Junior Engineer (A/c & R)	***Part I:*** **Subject Knowledge(50 Marks)** **General** Knowledge of Indian Electricity Act, Indian Elect. Rules as amended up-to date. General conditions of supply and charges to be paid to licensees 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. Specifications for equipment, Sub-Station earthling's, 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, polyphaser 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. **INTERNAL COMBUSTION ENGINES** Fuels and Combustion. Fuels and their properties, combustion calculations. Analysis of products of combustion. Power cycles. Vapors 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. feel injection and carburation. Lubrication and cooling system performance and testing of IC engines. Pollution control requirements/standards.

Post Name	Syllabus
	HEATING, AIR CONDITIONING AND REFRIGERATION Refrigeration — Refrigeration and heat pump cycles. Vapors compression, absorption Cycles. Refrigerants and their characteristics. Air Conditioning - Psychometric chart, comfort air conditioning, 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 equipment's 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. **GENERAL SPECIFICATION OF AIR-CONDITIONING, REFRIGERATION &VENTILATION:-** Execution of installation, drawings and manual, air conditioning equipment, duet work, air handling and treatment, automatic control, general control and monitoring systems, general refrigeration machine, electric motors and electrical equipment noise vibration control, pipe work, valves, cocks and strainers, system monitoring instruments, thermal insulation, unitary air conditioners, water handling equipment, indoor air quality (IAQ), inspection and commissioning, operation and maintenance, painting, finishing and protective treatment. ***Part II*****:** Same as Store Keeper
Library and Information Assistant	***Part I*****: Subject Knowledge(60 Marks)** **Unit-1: Foundations of Library and Science** Five Laws of library Science; Types of Libraries and their functions; Library Movement in India, Important libraries in India; Library Legislation in India; Library Extension Services; Library Association in India, UK and USA - ILA, IASLIC, SIS, LA and ALA; National & International Organization Promoting Library Development - RRRLF, NASSDOC, NISCAIR (CSIR - NIScPR), DESIDOC, IFLA and UNESCO **Unit-2: Information, Communication and Society** Data, and Knowledge; Information as a Resource / Commodity; Role of information in Socio – Economic Development; Information Society, Knowledge Society; Knowledge Management; Information Life Cycle - Generation, Collection, Storage and Dissemination; Communication - Channels, Barriers; National Knowledge Commission; Intellectual Property Rights; Copyright; Right to Information Act; Scholarly Communication - Open Access; Open Education Resources; Creative Commons **Unit-3: Information Sources** Source of Information - Primary, Secondary and Tertiary; Documentary and Non-documentary; Reference Sources- Dictionaries; Encyclopaedias; Geographical Sources; Biographical Sources; Year Books / Almanacs, Directories and Handbooks; Statistical sources; Bibliographies, Union Catalogues, Indexing and Abstracting Periodicals; Serial Publications; e-Books; E-Journals: Databases- Bibliographic; Numeric; and full text **Unit-4: Information Services** Information services- Bibliographic services, Indexing and Abstracting services, CAS, SDI, Document Delivery Services, Referral services; Online Services - Virtual Reference etc; User Education and User Studies; Information. Seeking Behaviour and Information Needs; Information Literacy. **Unit-5: Information Processing (Classification and Cataloguing)** Organization of knowledge/information; Modes of formation of subjects; Library classification-Canons, Laws and Principles; Notation & Mnemonics; Fundamental categories; Call Number; Common isolates; Library classification Schemes-DDC, UDC, and CC; Library

Post Name	Syllabus
	Cataloguing-Canons, Laws and Principles; Library catalogue codes- CCC and AACR-II, RDA; FRBR; Bibliographic standards: ISBD, MARC,CCF, and MARC-21; Indexing Systems-Pre-Coordinate, Post-Coordinate: Vocabulary control - Thesaurus, Lists of Subjects Headings; Information Storage & Retrieval (ISAR): Search Strategies; Boolean Operators; Evaluation of ISAR Systems **Unit-6: Library Management** Management-Principles, Functions, Schools of Thought; Organizational Structure; Planning; Decision making; Systems study-Analysis, evaluation and design; Collection Development (Books, Serials, Non-book, Material)- Principles of book selection; acquisition procedures; ISBN, ISSN; DOI; Maintenance; Preservation & Conservation; Human Resources Management; Financial Management-Resources generation, Budgeting, Cost and Cost-Benefit analysis; PERT, CPM; Library Buildings, equipment & furniture; Marketing information products and services; Total Quality Management (TQM); MIS **Unit-7: Fundamentals of Information Technology** Information Technology -Software and Hardware; storage devices; Software - Operating Systems: Application Software; Client-Server Technology; Different types of Servers.; Communication Technology - Telecommunications; Modem; Router; Wi Fi; Transmission Media; Networking Concepts - Topologies- LAN, MAN, WAN; Communication Tools and Techniques - Fax, E-mail, Tele Conferencing, Video Conferencing, Voice Mail. Hyper Text and Hyper Media. Standards; Protocols and Formats: Interoperability: Internet Basics - WWW: Web Browsers: Search Engines: Internet Connectivity; Data Security- Computer Viruses. **Unit-8: Library Automation and Networks** Library Automation -Areas of Automation; Hardware and Software selection; OPAC; Resource Sharing and Library Networks-ERNET, NICNET, DELNET, INFLIBNET; OCLC; Library Consortia; Information systems- INIS, AGRIS, PUBMED, INSPEC; Software for Library Automation; Artificial Intelligence & Expert Systems; Social Media -Academic Social Networks **Unit-9: Digital Libraries** Digital Library Initiatives; Digitization - Software & hardware; Standards; File formats; Metadata; Digital Collection Management - e-books; e-journals; Databases; Electronic Thesis & Dissertations; Resource Discovery - Federated Search; Search engines; search tools & techniques; Digital Rights Management, copyright & plagiarism ***Part II*:** **A. General Aptitude: (5 Marks)** **B. General Intelligence & Reasoning: (5 Marks)** **C. English Language:(5 Marks)** **D. General Awareness:(5 Marks)** **E. Basic Computer Knowledge:(20 Marks)**
Medical Social Service Officer Grade II	***Part I*: Subject Knowledge (50 Marks)** **A. Nature and development of social work** **B. Sociological concepts and contemporary concerns**: Sociological concepts and contemporary concerns urban community development Human rights and social work practice, social policy **C. Human behavior and social environment:** 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:** 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:** Research in social work, qualitative approaches. **F. Administration of welfare and development services:** Administration of welfare and development services, organizational behavior and employee development, social defense and correctional services, rural community development **G. Social justice and empowerment:** 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

Post Name	Syllabus
	practice in mental health settings **H. Social work and disaster management:** Social work and disaster management, conflict mitigation and peace building, gender and development. **I. Counseling:** Counseling theory and practice **J. HIV/AIDS:** HIV/AIDS and social work practice, health care social work practice. ***Part II:*** **A. General Aptitude: (5 Marks)** **B. General Intelligence & Reasoning: (10 Marks)** **C. English Language:(5 Marks)** **D. General Awareness:(15 Marks)** **E. Basic Computer Knowledge: (15 Marks)**
Perfusionist	***Part I:*** **Subject Knowledge (70 Marks)** **Anatomy:** Heart, Blood Vessels Lungs Kidneys Liver Nervous system (Central & Autonomous) Endocrine system **Physiology** Blood, its elements & clotting system Body volume, oncotic pressure Circulation : Physics, factors controlling, blood supply of vital organs. Cardiac cycle Physics of gas diffusion Kidney function & electrolyte balance Acid base balance Autonomic nervous system Endocrine system : Catecholamine's, Adrenocortical Hormone. Hypothermia & Oxygen consumption Liver function & renal function tests **Pathology:** Ischemic, congenital & valvar heart disease Atherosclerosis, Arteritis, Aneurysm of Aorta Tumors of heart Cardiogenic shock Infective endocarditis Pulmonary hypertension Emphysema Pulmonary embolism Anemias Clotting disorders Renal failure & acute tubular necrosis Liver cell failure **Pharmacology**: Inotropes & vasopressors Vasodilators & hypotensive agents Treatment of hypertension Plasma expanders Anti arrhythmic agents Anesthetic agent & muscle relaxants Anticoagulants Drugs affecting coagulation Thrombolytic Steroids Buffers Diuretics Insulins Antibiotics **Bacteriology &Sterilization:** Bacteriology of common gram +ve& gram -ve bacteria **Perfusion Technology:** Calculation of BSA, circulating PCV, SVR Priming solutions Oxygenators Tubings, reservoirs, heat exchanger, cannula, circuits pumps Cooling & rewarming on bypass Body response to CPB & pathophysiology of CPB Conduct of CPB Myocardial preservation & cardioplegia Safety devices Complications during CPB & management Pediatric perfusion Preventive maintenance & sterilization Assist devices Blood conservation & perfusion Organ preservation, ECMO **Simulation**: Handling of sterile components Priming techniques, Assembly of circuit Leakage detection Air bubble removal Roller pump calibration Wet runs Monitoring parameters Sampling and data recording Drug management Equipment maintenance Coordination with Surgeon and Anesthetist **Neurological, Renal, GI and Infectious diseases:** Neurological diseases-Polio myelitis, Gullian Barre Syndrome, Myasthenia Gravis, epilepsy / seizure disorder, cerebro vascular accident / stroke Renal Diseases-Acute kidney injury, Chronic Kidney Disease, Gastro intestinal and Liver Diseases, Gastritis / APD, peptic ulcer, Acute gastroenteritis, Hepatitis, Hepatic failure, alcoholic liver disease, Infectious diseases: Dengue, malaria, leptospirosis **Cardiac and Respiratory diseases:** Cardio vascular diseases-Hypertension, Ischemic heart diseases, Myocardial Infarction, arrhythmias, Heart failure, shock - types, causes, Respiratory diseases, Pneumonia, tuberculosis, Chronic obstructive pulmonary disease, asthma, Pleural effusion, pneumothorax, Interstitial lung disease **Decision making on management**: Revascularization PTCA or CABG, Planning review of protocol **Post procedure care**, Drugs, Groin care (femoral approach), Wrist care (radial approach) Complications and management **Myocardial protection:** Crystalloid Cardioplegia - St Thomas solution, Del Nido solution, Custodial HTK solution -Histidine-Tryptophan-Ketoglutarate Blood cardioplegia delivery Devices-MPS myocardial protection system, Cardioplegia reservoir. Drugs used in CPB: Vasodilators- Sodium Nitroprusside, Nitrogycerine,Vasoconstrictors-

Post Name	Syllabus
	Phenylephrine, Anti Arrhythmics- Amiodarone, Magnesium, Lignocaine Diuretic- Frusemide, Mannitol. Anticoagulants- Heparin, Low molecular Weight heparin, DabagantrinArgatroban, Protamine, Steroids- Dexamethasone. Coagulation management during CPB and its reversal Heparin Pharmacology Heparin Dosing And Monitoring Heparin Resistance Alternatives To Unfractionated Heparin –Heparin Induced Thrombocytopenia Protamine Pharmacology Protamine reaction Temperature management during CPB Temperature monitoring sites Types of hypothermia Temperature gradient. **Inhalation agents:** Sevoflurane, Isoflurane, Analgesics- Fentanyl, Morphine, Sedatives- Midazolam, Thiopentone, Antiplatelets- Aspirin, Clopidogrel, Ticlopidine, Prasugrel. **Cardiac, Thoracic and Vascular Surgical Disorders:** IHD (Ischaemic Heart Disease), ACS - angina types - typical, atypical, STEMI, NSTEMI, MI, Cardiomyopathy-Types, presentation, diagnosis and management of Presentation, Diagnosis and Management of Left ventricular failure, Right ventricular failure. Rheumatic Heart Disease-Causes, presentation, diagnosis and management of Mitral stenosis, Mitral regurgitation, Aortic regurgitation, Aortic stenosis, Tricuspid, regurgitation, Tricuspid stenosis. Congenital Heart Disease, presentation, diagnosis and management of, Atrial septal defect, VSD, PDA,TOF, TGA, TAPVC, Coarctation of aorta. Vascular Diseases-Classification, presentation, diagnosis and management of Aneurysms and dissections, Ascending aorta, Arch of aorta, Descending thoracic aorta. Respiratory System, Presentation, Diagnosis and Management, Chronic obstructive airway diseases, Bronchial asthma, Pneumonia, HINI, Pneumothorax, Haemothorax, Basics of PFT and its interpretation **Special Situations in Perfusion Technology:** CPB CHECK LIST, Pre-by-pass check list, Initiation of CPB, Maintenance of CPB, Weaning of CPB**,** CPB special conditions, Foetal circulation, CPB in pregnancy, Reperfusion injury CPB in Infants & Children, Selection of circuit, Selection of cannulae Blood prime Management of CPB in Cyanotic patients, Blood Gas Management, ABG, VBG calculation of circulating haematocrit, Various priming options Hemo-concentration, Conventional ultrafiltration CUF, Modified Ultra filtration MUF ***Part II:*** **A. General Aptitude: (10 Marks)** **B. General Intelligence & Reasoning: (5 Marks)** **C. English Language: (5 Marks)** **D. General Awareness:(5 Marks)** **E. Basic Computer Knowledge:(5 Marks)**
Assistant Dietician	***Part I:*** **Subject Knowledge (70 Marks)** **Human Physiology:** 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, Diarrhea. • Excretory System – Structure and Functions of (a) Kidney (b) Ureter (c) Bladder (d)

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	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 Regulation of Hormone Secretion **Biochemistry:** • Introduction to Biochemistry – Significance of pH, Acid-Base Balance, Cell Structure, Composition, Organelles, Membrane and Function Alterations and Significance. • Carbohydrates – Structure and properties of Mono-saccharides, Disaccharides, 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. • 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. • 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. • Enzymes – Definition, Classification specificity of enzymes -Intracellular distribution, kinetics, inhibition, Factors affecting enzyme activity, Enzymes in clinical diagnosis. • 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. • Biological Oxidation, Electron Transport Chain, Oxidative Phosphorylation. • Hormones– Mode of Action, Regulation of Metabolism Biochemical parameters. Endocrinological abnormalities and clinical diagnosis. **Food Microbiology, Sanitation And Hygiene:** • 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. • 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. • Primary sources of micro-organisms in foods – Physical and chemical methods used in the destruction of micro-organisms, pasteurization, sterilization. • 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

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	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. • Food spoilage and contamination indifferent 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. • 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. • Microbes used in biotechnology – Useful micro-organisms, Fermented foods – raw material used, organisms and the product obtained, Benefits of fermentation. • 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. • 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. • 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. • Rodents and Insects as carriers of food-borne diseases. Control techniques. • 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. • Waste disposal, collection, storage and proper disposal from the premises. • Legal administration and quality control, laws relating to food hygiene. **Human Nutrition and Meal Management:** • Concept and Definition of terms – Nutrition, Malnutrition, Health, Brief history of Nutritional Science. • Scope of Nutrition. • Minimum Nutritional Requirements and RDA. Formulation of RDA and Dietary Guidelines – Reference Man and Reference Woman. • Body Composition and Changes through the Life Cycle. • Energy in Human Nutrition – Energy Balance, Assessment of Energy Requirements. • Proteins – Protein Quality (BV, PER, NPU), Digestion and Absorption, Factors affecting protein bio-availability including Anti nutritional factors. • Requirements. • 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, glycaemic 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. **Community Nutrition:** • 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,

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	• Nutritional considerations in brief for the following: Military, naval personnel, Astronauts and food for space travel, • Concept and Scope of Community Nutrition, • 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. • 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. Food security and adequacy of diets. • Use of other sources of information for assessment • Sources of relevant statistics • Infant, child and maternal mortality rates • Epidemiology of nutritionally related diseases • Nutritional problems of communities and implications for public health. Common Nutritional Problems in India. Incidence – National, Regional. • Causes: Nutritional and Non Nutritional signs, symptoms, effect of deficiency and treatment • PEM • Micronutrient Deficiencies 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. • Hazards to Community Health and Nutritional status • Adulteration in food, Pollution of water, air, Waste management, Industrial effluents, sewage, Pesticide residue in food, Toxins present in food – my cotoxins etc. • Nutrition Policy of India and Plan of Action. • Health and Nutrition Education – Steps in planning, implementation, and evaluations. Use of educational aids – visual, audio, audio-visual, traditional media etc **Diet Therapy:** • 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 • 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 • Interactions between Drugs, Food Nutrients and Nutritional Status • Effect of drugs on Food and Intake, Nutrient Absorption, Metabolism, and Requirements. i. Drugs affecting intake of food and nutrients ii. Absorption iii. Metabolism and excretion iv. Nutritional status v. Summary of action of some common drugs vi. Effect of food, nutrients and nutritional status on absorption and metabolism of drugs • Disease of the G. I. System – Nutritional Assessment • Pathogenesis of G.I. Disease with special reference to upper G. I. Tract and ulcers. • Diseases of esophagus and dietary care • Diseases of stomach and dietary care • Gastric and duodenal ulcers • Predisposing factors and Treatment

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	• Brief medical therapy, rest, antacids, other drugs and dietary care • Food acidity, foods that cause flatulence, factors that damage G. I. Mucosa • Foods stimulating G. I. Secretion • Diet and Eating Pattern • Diet Recommendations • Liberal Approach Vs Traditional Approach • Possible nutritional and dietary inadequacies • Gastrostomy • Intestinal Diseases • Flatulence, Constipation, Irritable Bowel, Haemorrhoids,Diarrhoea, Steatorrhoea, Diverticular disease, Inflammatory Bowel Disease, Ulcerative Colitis. • Treatment and Dietary Care in the above mentioned conditions. • Malabsorption Syndrome • Celiac Sprue, Tropical Sprue • Intestinal Brush border deficiencies (Acquired Disaccharide Intolerance) • Protein Losing Enteropathy • Dietary Care Process • 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. • Belier Dyskinesia, Cholelithiasis, Cholecystitis, Cholecystectomy, Pancreatitis, Zollinger- Ellison Syndrome. • Diet in Disease of the Endocrine Pancreas Diabetes Mellitus and Hypoglycaemia 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 • Hypoglycaemia -classification, symptoms, fasting state hypoglycaemia, Postprandial or reactive hypoglycaemia, Early alimentary and late reactive hypoglycaemia, Idiopathic hypoglycaemia, Dietary treatment in reactive hypoglycaemia. • 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 toother forms of therapy • Adrenal cortex insufficiency, Hyper and Hypothyroidism (goitre), Hypoglycaemia. • 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

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	• Diets in 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 • 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) • Anemia • Resulting from Acute Haemorrhage • Nutritional anaemia • Sickle cell anaemia • Thalassemia • Pathogenesis and dietary management in the above conditions • 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 typeshaemodialysis, 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 • Nephrolithiasis – Etiology, types of stones, Nutritional care, alkaline-ash diets • Allergy • Definitions, symptoms, mechanism of food allergy • Diagnosis– History, Food record • Biochemical and Immunotesting (Brief) • Elimination diets • Food selection Medications (brief)

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	• Prognosis food Allergy in infancy • Milk sensitive enteropathy; Colic, Intolerance to breast milk, prevention of Food Allergy. • Diseases of Nervous System, Behavioural Disorders and Muscular Skeletal System • Neuritis and polyneuritis • Migraine, headache • Epilepsy • Multiple sclerosis • Hyperkinetic Behaviour Syndrome Orthomolecular psychiatry and mental illness (Brief) Definition, etiology, dietary treatment and prognosis in the above conditions. • Arthritis– Rheumatoid Arthritis, Osteoarthritis, Symptoms, dietary management • 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 • Paediatric patients with cancer • The terminal cancer patient • 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 **Nutrition Education and Dietetic Counselling:** • 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 • Paediatric patients with cancer • The terminal cancer patient • Misconceptions in nutritional care • Dietician as part of the Medical Team and Outreach Services. • 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. • The Care Process – Setting goals and objectives short term and long term, Counselling and Patient Education, Dietary Prescription, Motivating Patients, Working with – Hospitalized patients (adults, paediatric, elderly, and handicapped), adjusting and adopting to individual needs. • Outpatients (adults, paediatric, elderly, handicapped), patients' education, techniques and modes. • 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.

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	Food Services Management: • 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 /Dietician. • Organizations – Types of organizations and characteristics. • Organizational charts. • Catering Management Definition, Principles and Functions, Tools of Management Resources. Attributes of a successful manager. • Approaches to Management Traditional, Systems Approach, Total Quality Management. • Management of Resources – Capital, Space, Equipment and Furniture, Materials, Staff, Time and Energy, Procedures Physical facility design and planning. Equipment selection. • Purchase and store room management – Purchase systems, specifications, food requisition and inventory systems, quality assurance. • Human Resource Management • Definition, Development and policies • Recruitment Selection, Induction • Employment procedures: Employee Benefits, Training and Development, Human Relations, Job description, Job specifications, Job evaluation, Personnel appraisal. • Trade Union • Negotiations and Settlement. • 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. • Food Production and Service Operations • General Planning • Preliminary planning • Consideration of patients with specific nutritional and dietary needs, labour use and productivity. • Flow pattern. ***Part II:*** **A. General Aptitude: (10 Marks)** **B. General Intelligence & Reasoning:(10 Marks)** **C. English Language:(5 Marks)** **D. General Awareness: (5 Marks)**
Technicians (Laboratory)	***Part I:*** **Subject Knowledge (70 Marks)** **Biochemistry –** • Cleaning and care of general laboratory glass ware and equipment. Types of pipettes, calibration of pipettes. • Distilled water. Method of preparation and storage of distilled water. Type of water distillation plants. • Preparation of solutions – units of weights and volume, Calculation of concentration and methods of expressing concentration of solution. • Units of Measurement- S.I unit and CGS units. Normality, Molarity, Molality • Calibration of volumetric apparatus • Principle, working and maintenance of Analytical balance • Quality control and quality assurance in a clinical biochemistry laboratory • Laboratory organization, management and maintenance of records • Principles of assay procedures, Normal range in blood, Serum, Plasma and Urine and reference values. • pH – Definition, Henderson Hasselbach equation, pKa value, pH indicator, Methods of

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	measurement of pH, pH paper, pH meter, Principle, working, maintenance and calibration of pH meter • Volumetric analysis- Normal and molar solutions, Standard solutions, Preparation of reagents, Storage of chemicals • Working principles Types and applications of Electrophoresis – Paper, Agarose Gel, Cellulose Acetate and PAGE. • Working principles, types and applications of Chromatography - Paper Chromatography, TLC, Ion Exchange, Affinity Gel, Filtration, Gas Chromatography and HPLC. • Working principles, types and application of centrifugation • Working Principles and application of photometry, and atomic absorption, Spectrophotometry and colorimetry. • Definition, basic concepts of classification mechanism of action and properties of enzymes, factors influencing enzyme action • Basic and elementary concepts of chemistry and properties of carbohydrates as applicable to the human body. (Classification, Digestion and Absorption, Metabolism, Disorders of metabolism) • Overview of metabolism of carbohydrates – Methods for determining glucose, ketones, lactate, pyruvate reducing sugars and mucopolysaccharides and their clinical significance. • Biochemistry, types, criteria parameters in diagnosis and prognosis of Diabetes mellitus. • Basic and elementary concepts of chemistry and properties of lipids as applicable to the human body. (Classification, Digestion and Absorption, Metabolism, Disorders of metabolism) • Overview of lipid. Importance of lipids in the body in body basic metabolic aspects and analytical importance. Disorders of lipid metabolism. Lipoproteins patterns in disease – analytical methods and procedures applicable to detecting and monitoring such disorders. • Basic and elementary concepts of chemistry and properties of proteins & amino acids as applicable to the human body. (Classification, Digestion and Absorption, Metabolism, Disorders of metabolism) • Overview of metabolism of amino acids and proteins – current methodologists for their determination and identification in biological specimens – disease associated with alternation in or deficiencies of amino acids and proteins. • Basic and elementary concepts of chemistry and properties of nucleic Acids as applicable to the human body. • Basic concepts of principles of nutrition and nutrients macro and micro nutrients. Vitamins & Minerals. Vitamins- Fat soluble vitamins , Water soluble vitamins sources, Biochemical role, RDA, deficiency manifestations Minerals – Calcium, Phosphorous, Iron, Copper, Zinc, Magnesium, Manganese, Iodine. • Analytical methods and recommendations for testing and assessing nutritional deficiency • Methods for assessing concentration of vitamins in biological samples. • General requirements for laboratory assessment of trace elements including specimen collection, handling, selection of analytical methodology and establishing quality. • Overview of Biochemical roles of major electrolytes and blood gases and their changes in pathological states – relationship between major electrolytes and acid base balance – application of physical and chemical principles to biological system – laboratory measurements of electrolytes and blood gases. Acid base balance disorders • Overview of current concepts in endocrinology RIA, ELISA, chemiluminescence assay procedure for hormones – physiological effects produced by normal and abnormal levels of various hormones. Thyroid function test and Adrenal function test. • Introduction to molecular Biology. Recombinant DNA technology, Role of recombinant DNA technology as diagnostic tool. Polymerase chain reaction. • Overview of porphyrins, their precursors, primary and secondary disorders of porphyrin metabolism – diagnostic laboratory methodologies including appropriate specimen collection and preservation techniques related to porphyrins • Laboratory tests and analytical methods used in identification and evaluation of hepatobiliary disorders, renal disorders and disorders of Stomach, pancreas and intestinal tract • Overview of calcium and inorganic phosphate metabolism current laboratory analytical

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	Microbiology – • History of Medical Microbiology - Host-Microbe relationship. • Safety Measures in clinical microbiology • Cleaning, care and handling of glassware • Care and maintenance of Equipment in Microbiology. • Microscopy: Principle, types and uses of microscope • Sterilization and Disinfection - Definition, Types, principles, mode of action and methods. Qualities of a good disinfectant. Assay for various disinfectants . • Biomedical waste management in a lab • General characteristics & classification of Microbes: Classification of microbes. Morphological classification of bacteria, Bacterial anatomy (Bacterial cell structures) • Growth and nutrition of bacteria, Culture media and culture methods-aerobic and anaerobic • Quality control and safety in microbiology. • Handling and care of laboratory animals. • Antimicrobial agents, Antimicrobial susceptibility tests. • Stains used in bacteriology Principle, procedures, significance and interpretation – Simple staining, Gram stain, Ziehl –Neelsen staining, Albert's stain, Capsule staining. • Principle, procedures and interpretation of the biochemical tests for identification of differentbacteria. • Immunity – innate and acquired immunity, humoral and cell mediated. • Antigen antibody reactions and their applications • Complement • Hypersensitivity • Vaccines • Gram positive &Gram negative cocci – Staphylococci, Streptococci, Enterococci,Pneumococci, Neisseria • Gram positive bacilli – Corynebacterium, Mycobacterium, Actinomyces, Listeria, Bacillus, Clostridia • Gram negative bacilli – Enterobacteriaceae, Pseudomonas, Vibrio, Aeromonas, Plesiomonas, Campylobacter, Bacteroides, Fusobacterium, Brucella, Haemophilus, Bordetella, Pasteurella, Francisella • Spirochaetes, Chlamydia, Rickettsia, Mycoplasma, L forms • General properties of viruses – Structure, classification and replication. • Laboratory diagnosis of virus • DNA virus –Adenovirus, Papova virus, Herpes virus, Varicella zoster virus, Cytomegalo virus, Hepatitis B virus • RNA virus – Polio virus, Influenza virus, Para influenza virus, Mumps virus, Measles virus, Rubella virus, Respiratory syncital virus, Rhinovirus, Rotavirus, Hepatitis virus, Arbo viruses prevalent in India (Dengue, West Nile, Japanese Encephalitis, KFD), HIV, Rabies virus, SARS virus. • Bacteriophage • Introduction to Parasitology –Common definitions, Types and Classification of parasites. • Collection transport and preservation of specimens for parasitological examination • Protozoa: Entamoeba Trichomonas, Trypnosomes, Leishmania, Giardia, Plasmodium, Isospora, Balantidium, and Toxoplasma. • Cestodes - Diphyllobothrium, Taenia, Echinococcus, Hymenolepis. • Trematodes - Schistosoma, Fasciola, Fasciolopsis, Clonorchis, Paragonimus • Intestinal Nematodes - Ascaris, Ancylostoma, Necator, Strongloides, Trichinella Enterobius, Trichuris • Tissue Nematodes - Wucherei, Brugia, Loa loa, Onchocerca, Dracunculus • Collection and preservation of specimens for parasitological examination, preservation of specimens of parasitic eggs and embryos, Preserving Fluids, Transport of specimens. • Morphology and classification of fungus • Laboratory diagnosis of fungus- Culture media used in mycology, Direct microscopy in Medical mycology laboratory, Processing of clinical samples for diagnosis of fungal infections i.e. Skin, nail, hair, pus, sputum, CSF and other body fluids. • Superficial fungal infections

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	• Subcutaneous fungal infections • Deep fungal infections • Opportunistic fungal infections • Techniques used for isolation and identification of medically important fungi • Methods for identification of yeasts and moulds • Preservation of fungal cultures **Pathology** • General-Haematology: Origin, development, morphology, maturation, function and fate of blood cells, nomenclature of blood cells. • Various methods of blood collection, anticoagulants-mechanism and uses. • Basic concepts of automation in haematology • Counting chamber- hemocytometry. Enumeration of RBC including various counting chambers, diluting fluids for RBC count. • Haemoglobinometry. Principles and methods of quantitating Hb. Concentration of blood including knowledge of errors and quality control in various method. Abnormal hemoglobin and its investigation. • ESR: introduction, factors affecting ESR, principles and methods of determining ESR, increasing and decreasing conditions of ESR. • WBC: introduction, development of WBC, diluting fluids. Absolute eosinophil count, errors in sampling, mixing, diluting and counting. • Cell counting, advantages and disadvantages, uses and mechanism of cell counting, quality control in cell counts. • Preparation of peripheral smear and bone marrow smear. Thin smear, thick smear. Buffy coat smear, wet preparation. Romanowsky stain. Preparation advantages and disadvantages. • Principle and methods of staining of Blood smears and bone marrow smears. Supravital stain. Recticulocyte count. Heinz bodies. • Description of morphology of normal and abnormal red cells.Blood differential WBC counting. Recognition of abnormal cell. Anaemia –definition etiology classification and laboratory diagnosis. • Methods of identification and estimation of abnormal hemoglobin including spectroscopy. HB electrophoresis. Alkali denaturation Test. Sickle cell preparation. • Various benign leucocyte reaction – Leukocyposis. Neutrophilia, Eosinophilia, Lymphocytosis. Infectious mononucleosis. leucopenias. • Leukemias – definition, causes, classification, detection of leukemia. Total leucocyte count in leukemias. Multiple myeloma. • Blood Coagulation and disorders of hemostasis. Classification of coagulation factors, Principles and methods of assessment of coagulation. BT, CT, Prothrombin time, partial thromboplastin time, thromboplastin regeneration time • Thrombocytopenia, thrombocythemias, platelet function test, platelet count. Clot retraction test. Platelet factor III Test. • LE cell – definition, morphology causative agents. Various methods of demonstrating LE cells. Blood parasites. Malaria, LD bodies, microfilaria and methods of demonstration. • Preparation of donor and collection of blood. Solution and apparatus used. Storage of blood. Preparation and storage of plasma. Preparation of packed red cells. • Principles involved in Blood grouping. ABO system and the methods used. Factors influencing the results of blood grouping, Rh system. Rh antigen. Principles and methods used. • Cross matching. Compatibility test, direct and indirect Coomb's test – Principle involved and the methods used. Blood transfusion and its Hazards. • Definition, sources and types histological specimens, kinds of histological presentations • Labelling, fixation, properties of fixing fluids, classification and composition of fixing fluids. Advantages and disadvantages of secondary fixatives. Post chroming. • Tissue processing, dehydration and cleaning. • Embedding. Water soluble substances, embedding in paraffin nitrocellulose • Equipment for sectioning microtome, knife, honing and stropping. Type microtome. • Technique for sectioning – frozen section. Technique for sectioning – Paraffin embedded tissue. Errors in sectioning and remedies. Attaching blocks to carriers. • Technique of processing bone for histological studies. Mounting and covering. Mounting

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	media. • Staining – theory, types of staining agent. Mordents and differentiation. H & E staining. Types of hematoxillin and its preparation. Eosin stock stain and other counter stain used. • Demonstration of collagen, reticulin, elastin, fat, amyloid, glycogen, mucin, pigments and minerals (malarial, mercury, bile, lipofuscin, calcium, iron, copper). • Principles of histochemistry and its application • Demonstration of neuron, neuroglia, myelin and axon. Processing of eye ball for histology. • Demonstration of fat, iron, amyloid, bile in large sections of tissue. • Cytology – introduction, definition, types of cytological specimen, preparation of slide for microscopic studies, stains used. • Museum technique. Preparation, setting up of and arrangement of museum. • Preparation of cell blocks, mailing of slides. • FNAC, definition, techniques involved in preparation of smear and staining. PAP smear. • Calibration and Validation of Clinical Laboratory instruments. ***<u>Part II</u>:*** **A. General Aptitude: (5 Marks)** **B. General Intelligence & Reasoning: (5 Marks)** **C. English Language:(5 Marks)** **D. General Awareness:(5 Marks)** **E. Basic Computer Knowledge:(10 Marks)**
Technician (OT)	***<u>Part I</u>:* Subject Knowledge (70 Marks)** 1. **BASIC ANATOMY OF HUMAN BODY** **Systemic Anatomy** • Respiratory System: Parts, Nasal cavity and Paranasal air sinuses, trachea, Gross and microscopic structure of lungs, Diaphragm and Pleura • Cardiovascular System: Circulatory system – Structure of the Heart, Structure of Blood Vessels – arterial and venous system • Nervous System: Structure of Neuroglia and neurouns Parts and classification o CNS – Structure of Brain and spinal cord and their functions. o PNS - Cranial nerves and spinal nerves o ANS - Sympathetic and Parasympathetic • Musculoskeletal system: Bones – types, structure, Axial & appendicular skeleton. o Bone formation and growth, o Joints – classification and structure. o Types and structure of muscles. Movements at the joints and muscles producing movements. **2. PHYSIOLOGY** • **Blood**: Blood cells, names of developmental stages of RBC, functions and fate of RBC. Functions of WBC and platelets. Hemoglobin, Haematocrit & ESR, blood groups- ABO & Rh, basics of coagulation, classification of anemia. • **Respiratory System**: Principles of respiration, respiratory muscles, lung volumes and capacities, collection and composition of inspired alveolar and expired airs. Transport of oxygen and carbondioxide. Brief account of respiratory regulation. Definition of hypoxia, Cyanosis, asphyxia. Methods of artificial respiration. • **Cardiovascular system**: Cardiac cycle, heart sounds, definitions of cardiac output, stroke volume,principles of measurements of cardiac output. ECG – methods of recording and ECG waves.Normal values of blood pressure, heart rate and their regulation in brief**.** • **Nervous System**: Structure of neuron, nerve impulse, myelinated and non-myelinated nerve. Brief account of resting membrane potential, action potential and conduction of nerve impulse Neuro-muscle transmission. Various parts of nervous system, C.S.F., Functions of muscle spindleand motor tracts including reflexes , cutaneous receptors, joint receptors, sensory pathways.Ascending reticular formation, EEG, functions of cerebellum, basal ganglia,

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	thalamus &hypothalamus, vestibular apparatus and functions. Autonomic nervous system. • **Sensory System**: Vision: Structure of eyeball, retina, visual pathway, accommodation, visual acuity, error of refraction, color vision. Hearing: Brief account external, middle and inner ear, hearing tests. Taste & smell: receptors, pathways, method of transduction. • **Endocrine System** : Names of endocrine glands & their secretions, functions of various hormones, Brief account of endocrine disorders **3. BIOCHEMISTRY** • Carbohydrates – Glucose and Glycogen Metabolism • Proteins-Classification of proteins and functions • Lipids- Classification of lipids and functions **4. BIOMEDICAL SCIENCE** • Operating Rooms & Anesthetic Equipment • List of OR equipment (Anesthesia machine, Monitor, Defibrillators, Electro cautery, Laparoscopes, Pulse Oximeter, Suction Apparatus etc) • Gas Plant, Oxygen Concentrator Plant- Introduction, usage, safety features & application • Electrodes, Sensors & Transducers: Signal acquisition, transduction, active & passive sensors, sensor technology, electrodes for biophysical sensing, medical surface electrodes, and micro electrodes. Strain Gauges, inductive transducers, quartz pressure sensors, capacitive transducers, temperature transducers and piezoelectric transducers. • Introduction to Electronics &Semi-conductors: Basic terminology & definitions –Voltage, Current, resistance, capacitance, inductance, conductor, semi-conductor, power, energy, rectifier, transformer, impedance. Ohm's law, difference between resistance & impedance, basic network analysis concepts, types of current-AC & DC; electrical receptacle; difference between AC & DC, fuses & circuit breakers. **5. APPLIED BASIC SCIENCES RELATED TO ANAESTHESIA** **5.1 ANATOMY AND PHYSIOLOGY of Respiratory System** • Trachea & Bronchial tree - vessels, nerve supply, respiratory tract, reflexes, bronchospasm. • Respiratory movements under anesthesia • Pulmonary Gas Exchange and Acid Base Status • Pulmonary circulation • Pulmonary oedema • Pulmonary function tests • Respiratory failure, type, clinical features, causes. • Cardiovascular system • Anatomy • Chambers of the heart, major vasculature • Coronary supply, innervation. • Cardiac output - determinants, heart rate, preload, after load • ECG: Arrhythmias, cardiovascular response to anesthetic & surgical procedures. • Hypotension - causes, effects, management • Cardio-pulmonary resuscitation • Myocardial infarction, hypertension • Fluids and electrolytes **5.2 CLINICAL PATHOLOGY** • Oedema, hyperemia or congestion, thrombosis, embolism, infarction shock, ischemia, over hydration, dehydration • Hemorrhage, various types of anemia, leucopenia, leukocytosis, bleeding disorders coagulation mechanism **6. PRINCIPLES OF ANAESTHESIA** **Medical Gas Supply** • Compressed gas cylinders • Color coding • Cylinder valves; pin index • Gas piping system • Recommendations for piping system • Alarms & safety devices • Scavenging of waste anesthetic gases **Anesthesia machine** • Hanger and yoke system • Cylinder pressure gauge

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	• Pressure regulator • Flow meter assembly • Vaporizers - types, hazards, maintenance, filling and draining, etc **Breathing system** • General considerations: humidity & heat • Common components - connectors, adaptors, reservoir bags • Capnography • Pulse oximetry • Methods of humidification • 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 **Face masks & Airway laryngoscopes** • Types, sizes • Endotracheal tubes - Types, sizes • Cuff system • Fixing, removing and inflating cuff, checking tube position, complications **Anesthesia ventilator and working principles** **Monitoring** • Electrocardiography(ECG) • Pulse oximetry(Sp02) • Temperature- central and peripheral • End tidal carbon dioxide(EtCO2) • Anesthesia gas monitoring • Non-invasive blood pressure (NIPB) and Invasive blood pressure(IBP) • Central venous pressure(CVP) • PA Pressure, LA Pressure & cardiac output • Anesthesia depth monitor **Basic techniques of anesthesia** **Resuscitation techniques** • Basic life support (Airway, breathing, circulation) and the equipment used for it • Drugs used in CPR • AED and Defibrillators **Anesthesia drugs and techniques** • Techniques of general anesthesia • Various intravenous and inhalational agents • Regional anesthesia, spinal and epidural, posture and drugs • Local Anaesthetic agents • Neuro muscular blocking agents • Principles of oxygen administration along with the apparatus • Care of patient in the recovery room • Post-operative pain: evaluation and management • Types of fluid and therapy • Blood and blood components transfusion • Preparation of anesthesia machine, intubation kit, suction machine, anesthesia drugs **7. PRINCIPLES OF ANAESTHESIA AND BASIC ANAESTHETIC TECHNIQUES (INCLUDING MEDICAL ETHICS AND MEDICINE)** • Airway management including tracheostomies • Positioning issues under anesthesia • Impact of co-existing diseases on anesthesia • Specifics of invasive and non-invasive monitoring • Monitored anesthesia care • Anesthesia in remote locations • Principles of organ protection **Medical Ethics** • Autonomy and informed consent - Right of patients

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	8. CLINICAL PHARMACOLOGY & MICROBIOLOGY **CLINICAL PHARMACOLOGY** • Antisialagogues: Atropine, Glycopyrrolate • Sedatives & Anxiolytics: Diazepam, Midazolam, Phenergan, Lorazepam, Chlorpromazineand Triclofos • Narcotics: Morphine, Pethidine, Fentanyl, Pentazozine, tramadol • Antiemetics: Metoclopramide, Ondanseteron, Dexamethasone • Induction Agent: Thiopentone, Diazepam, Midazolam, Ketamine, Propofol, Etomidate • Muscle Relaxants: Depolarizing – Suxamethonium; Non depolarizing – Pancuronium,Vecuronium, Atracurium, Rocuronium • Inhalational Gases: Gases-O2, N2O, Air;VolatileAgents-Halothane, Isoflurane, Sevoflurane, Desflurane • Reversal Agents: Neostigmine, Glycopyrrolate, Atropine, Naloxone, Flumazenil • Local Anesthetics: Xylocaine, Bupivacaine; Topical, Prilocaine-jelly, Emla - Ointment,Etidocaine. Ropivacaine. • Emergency Drugs : Mode or administration, dilution, dosage and effects • Adrenaline, Atropine • Ephedrine, Mephentramine, phenyl-epherine • Bicarbonate, calcium, potassium • Inotropes: dopamine, dobutamine, noradrenaline • Anti-arrythmics- amidarone, xyolcard • Aminophylline, hydrocortisone, antihistaminics • Antihypertensive –Beta-blockers, Ca-channel blockers, ACE inhibitors • Vasodilators- nitroglycerin & sodium nitroprusside • Respiratory system- Bronchodilators • Renal system- Diuretics, frusemide, mannitol. **CLINICAL MICROBIOLOGY** • Sterilization and Disinfection • Principles and use of equipment of sterilization namely hot air oven, autoclave and seruminspissator, pasteurization, antiseptic and disinfectants **9. PRINCIPLES OF SURGERY** • Haemorrhage-signs and symptoms of internal and external; classification and management; Identification of types of tourniquets reasons for use and duration of application, dangers of use • Operating tables: structure, material used, maintenance, control, Hydraulic system and Electrical system • Total thyroidectomy—with emphasis on proper positioning • Breast surgery • Positioning of patient for different operations: Problems and hazards • Hypothermia and hyperthermia **CSSD PROCEDURES** • Principles of sterilization and disinfection • Methods of sterilization • Dry Sterilization • Wet sterilization • Gaseous sterilization • Chemical sterilization • Sterilization by radiation (Gamma rays, ultraviolet rays) • Techniques of sterilization of rubber articles. (LMA, FOB, ETT, Laryngoscopes, Anesthesia machines and circuits.) • Methods of disinfection • Boiling • Chemical disinfection • Hazards of sterilization • Prevention of hazards of sterilization • Precautions to be taken during sterilization • Recent advances in the methods of sterilization **10. ADVANCED ANAESTHESIA TECHNIQUES AND ANAESTHESIA FOR SPECIALITYSURGERY** **Advanced anesthesia techniques** • Cardiac Arrhythmias (atrial fibrillation, ventricular tachycardia, extra systoles)

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	• Circulatory shock and its physiology • Measurement of blood flow • Artificial ventilation and related equipment: ○ Physiology of IPPV (Intermittent positive pressure ventilation) ○ General care of a patient on ventilator **ANAESTHESIA FOR SPECIALTY SURGERY** **Neuro-anaesthesia** • Glasgow coma scale • Reinforced Endotracheal tubes • I.C.P • Dealing with the head injury patient **Obstetrics anaesthesia** • Differences between a pregnant and a normal lady • Risks for anaesthesia including full stomach • Check list (WHO Check list) • Regional v/s General Anaesthesia • Antepartum haemorrhage (APH) • Postpartum hemorrhage (PPH) **Paediatric Anaesthesia** • NYHA classification **11. BASIC INTENSIVE CARE** • Care and maintenance of ventilators, suction machine, monitoring devices • Air conditioning and control of pollution in ICU • Care of unconscious adult and pediatric patients • Assist in setting up central venous access, and other forms of invasive monitoring • DVT prophylaxis • Care of bed sores • Antiobiotics in the ICU • Indications for blood and component transfusion • Sepsis and septic shock syndrome **12. Book keeping and Stock maintenance.** ***Part II:*** Same As Technicians (Laboratory)
Embryologist	***Part I*:Subject Knowledge (70 Marks)** **INTRODUCTION TO EMBRYOLOGY** • Basic Human Embryology • Gametogenesis • Meiosis • Implantation and placentation • Preimplantation embryo development • Development of various organs • Anatomy of Male Reproductive System • Anatomy of Female Reproductive System • Anatomy of Brain • Anatomy of Sperms **INFERTILITY AND ITS CLINICAL MANAGEMENT**– • Physiology of Ovulation • Folliculogenesis • Physiology of Menses • Hormonal control of human • Natural Cycle • Various stimulation protocols • Ovarian Hyperstimulation syndrome (OHSS) • Complication of stimulation • Monitoring of patients • Reproductive function and causes of subfertility

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	• Investigating male and female patients • Infertility and its management • Ultrasound • Elderly Patients reproduction • Miscarriage • Ectopic Pregnancies • Multiple Gestation • Heterotrophic Pregnancies • Oocyte Donation Programme • Surrogacy **ANDROLOGY–** • Physiology of Sperm • Spermatogenesis • Male Factor • Lab Set-up for andrology • Sperm separation • Semen analysis • Semen analysis as per WHO criteria • Sperm morphology assessment according to Strict (Kruger) criteria. • Sperm survival test. • Grading of Sperms • Sperm preparation for IUI • Sperm preparation for IVF • Semen preparation for IUI-Classical method, Standard method and Density gradient method. • Semen cryopreservation-both neat and processed sample. • Sperm freezing • Donor Sperm Programme **IVF PROCEDURE: FERTILISATION, EMBRYO PRODUCTION & CRYOPRESERVATION TECHNIQUES (THEORY)** – • Lab Set-up for IVF • Requirements and Protocols • Quality Control and Quality Assurance • Health and safety in the laboratory • Introduction to culture media • Handling and culture techniques • Preparation of media and buffer • Sequential culture media • Co-culture • Normal embryo development • Abnormal embryo development • Metabolism of embryo • Grading of oocyte • Selection of embryo • Grading of embryo • Blastocyst culture –technique • Embryo transfer technique • USG guided embryo transfer • Embryo Reduction • Complication of IVF • Anesthesia • Patient Counseling • History of cryobiology • Physiology of cryobiology • Cryoprotectant and its role • Lab Set-up for cryopreservation

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	• Embryo freezing • Slow freezing technique • Vitrification of gamete of embryo • Recent development in cryobiology **IVF PROCEDURE: FERTILISATION, EMBRYO PRODUCTION & CRYOPRESERVATION TECHNIQUES (PRACTICAL)** – • Introduction to lab • Lab ethics • Aseptic precaution • Introduction to instruments • Handling of instruments • Insemination technique • Identification of oocyte • Grading of oocyte • Insemination of oocyte • Denuding • Ferti-check on day 1 • Classification of 2PN • Growth of embryo on day 2 • Shifting of embryos • Quality of embryo on day 3 • Grading of blastocyst • Selection of blastocyst for embryo transfer • Vitrification of blastocyst • Vitrification of cleaving embryos • Retrieval of vitrified embryos **INTACYTOPLASMIC SPERM INJECTION (ICSI)** – • Historical aspect • Indication for ICSI • Philosophy of ICSI • Introduction to micromanipulator • Physics of micromanipulation • Various equipment required to perform ICSI • Sperm immobilization • Selection of sperm • Preparation of sperm for ICSI from ejaculates and testicular biopsies • Various medias required to perform ICSI • Denuding of oocyte • Micropipette handling • ICSI procedure • Indication and contraindication of ICSI procedure • Obstructive azoospermia and ICSI • PESA, TESA, TESE and ICSI • Risk of anomalies in ICSI • Intracytoplasmic morphologically selected sperm injection (IMSI) • Identification of abnormal sperm • Identification of immature sperm • Sperm separation from testicular biopsy • Identification of spermatids, spermtocytes and other cells • Assessment of fertilization (ferti-check) • Patient Counseling **QC, QA AND RECORD KEEPING IN ART** – • Set up of IVF lab • How to establish and equip an IVF lab • QA and AC for IVF lab • QA and QC practices

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	• Precision of IVF procedure • Designing of IVF lab and its location in the clinic • Record keeping • Lab maintenance protocol • Roster of work • Introduction and maintenance of all instruments in IVF lab • Calibration of all instruments • Quality improvement techniques • Review national and international guidelines • Trouble shooting and its solution **ETHICS AND REGULATION IN ART** – • Current legislation and regulation in ART, India , • Requirement for licensing, accrediting & approving ART clinics , • National guidelines for accreditation of ART clinics in India , • Ethics consideration and legal issues , • Ethical policies , • Indian Society for Assisted Reproduction (ISAR) , • Surrogacy- Ethical and legal issues • Ethical frameworks and principles • Relevant regulatory bodies • Role of ethics in health care • Social and ethical responsibilities with regards to patient care • Patient Consent **CYTOGENETICS –** • Role of genetics in infertility , • Molecular and cellular biology , • Chromosomal and genetic analysis in IVF , • Genetic techniques , • FISH , • Embryo biopsies • Preparation of blastomeres for FISH • Karyotyping • Role of genetics in OATS • Genes and RPL (Recurrent pregnancy losses) **PRACTICAL BASED THEORY QUESTIONS TOPICS:** • Introduction into the IVF laboratory • Laboratory procedures – practicals from Ovum pick up to transfer • The sperm sample – preparation methods • In – Vitro Fertilization & ICSI • Embryo Scoring • Culture Conditions • Equipment • Microscopes • Embryo transfer • Cell Biopsy • Cryopreservation programme& quality assurance • Sperm freezing/thawing • Oocyte freezing/thawing or vitrfication/warming • Embryo freezing/thawing or vitrification/warming • Ovarian freezing/thawing or vitrificaion/warming • Testicular freezing/thawing • Frozen Embryo Transfer • Innovative techniques in human embryo viability assessment • Risks in the IVF Laboratory

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	Part II: **A. General Aptitude: (5 Marks)** **B. General Intelligence & Reasoning: (10 Marks)** **C. English Language:(5 Marks)** **D. General Awareness:(5 Marks)** **E. Basic Computer Knowledge:(5 Marks)**
Dental Technician (Hygienist)	***Part I:*** **Subject Knowledge (70 Marks)** **Anatomy, General and Dental**: General structure of mucous membrane (tongue, pharynx, lips), bones, muscles, blood vessels, lymphatics, glands & nerves. Blood and nerve supply in relation to face in general and teeth and associated structures in particular , Elementary knowledge of development of the jaws and teeth, Structure, nomenclature and morphology of human teeth, Eruption; resorption & occlusion of teeth. Relationship of teeth with investing tissues., Muscles of mastication and facial expression,Temporomandibular Articulation, Course and distribution of 5thand 7thCranial nerves. P**hysiology & Histology, General & Dental**: Cell structure of the human body, Brief description of the histology and function of various dental and oral tissues e.g. Gingiva, Periodontal membrane, Alveolar process, Cementum; Enamel, Dentine, Nasmyths membrane Pulp etc. , Salivary glands, ducts and their functions, Composition and function of Saliva, Blood: Composition & functions, Mastication, deglutition & Phonation, General outlines of the physiological processes of the human body-particularly circulatory. **Pharmacology, General & Dental**: Brief description, nomenclature, derivation, dosage, pharmacological action and therapeutic uses of drugs commonly used in dentistry, astringent, mouth wash, antiseptics. **Pathology & Microbiology, General and Dental:** General principles of Pathology, Inflammation, degeneration and repair, Application of general principles of pathology to tooth and surrounding tissues, Dental Anomalies, Attrition, Abrasion and Erosion, Oral manifestation of systemic diseases like diabetes, syphilis, anemia, vitamin deficiencies and infectious diseases like AIDS & Hepatitis B, Infection Control in Dental Operatory and Bio-Medical Waste Management and Handling Neoplasm with reference to oral cavity, Elementary knowledge of Bacteriology, Asepsis, Infection, Immunity, Brief description of Pathology and Bacteriology of Dental Caries and Gingival infections. **Dental Radiology**: Fundamental and elementary principle of Dental Radiology including X-Ray machine, its components and maintenance. Sadioveseogphy, Basic knowledge of Radio visiography& extra oral radiographs including Panoramic (Orthopantographs and cephalostats. Automatic film processing, Cataloguing & Indexing of IOPA Films. Knowledge of occlusal, bitewing and digital radiography. Technical aspects of Dental Radiographs i.e. the taking, processing and mounting of Dental Radiographs, Characteristics of acceptable image, factors that influence finished radiographs, rules of radiation protection. Radiation Hazards. **Food and Nutrition**: Basic 'food chemistry' in relation to general and Oral Health. Physical nature of diet in prevention of dental diseases, Carbohydrates, fats, proteins, vitamins, minerals and water in relation to dental and oral Health, General food requirements for growth, maintenance and repair of the body, Assessment & charting of individual diet & counselling, Effect of malnutrition on oral health, Special diet and its administration in maxillofacial injury cases. **Dental Hygiene and Oral Prophylaxis**: Definition of hygiene, Objectives of dental hygiene, Oral Prophylaxis - Various methods, Oral Prophylaxis: treatment system, Stains on teeth - extrinsic, intrinsic and their management, Dental plaque, Brushing & Glossing technique, Dental Calculus, Technical knowledge of ultrasonic scaling, Brief description and the role of Oral Prophylaxis in Gingivitis, Periodontitis, Periodontal and Alveolar abscess, Instruments, technique of Oral Prophylaxis, Destining and polishing of teeth, Topical application of fluorides, Care of oral cavity and appliances during treatment of maxillofacial cases. **Dental Health Education, Community Public Health Dentistry & Preventive Dentistry**: Definition of Health and Dental Health, Aims and objectives of Dental Health Education, Dental Health and Children, Steps in preventive program, patient counselling, Dental Health Education-Parents, mothers (anti and post-natal), infant's pre-school Children and grownup Handicapped children, Dental caries- Prevalence and Prevention, Prevention by fluoridation, Periodontal Diseases. Saliva in relation to dental health and disease, Dietary habits and Dental

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	Health, Habits and Malocclusion, Oral Cancer, Brief outline of historical background of public Health, History of dentistry and Public Health Services. Dental Health Team in relation to community health, Technical knowledge of Topical Fluoride Application **Dental Ethics, Jurisprudence and Orientation in Dentistry:** Difference between ethics and law, types of law, Legal impositions in relation to dental practice, code of ethics, Unlicensed practice of dentistry, Regulatory and professional organization, Place and function of dental profession in the society and discussion of economic problems, involved therein,Social factors in dental Progress, income and living standard of people, Objective and scope of dentistry, Dental specialties. **DENTAL MATERIALS**: General knowledge of various material used in Dentistry such as impression material, gypsum products, waxes, investing materials and various filling materials, Temporary and Permanent cements, orthodontic material and implant materials, materials used in maxillofacial and surgical prosthesis. Recognition and knowledge of various dental equipment and stores used in dental establishment. Organisation of dental stores, storage and accounting, handling and maintenance of dental items, assembly and minor repair of dental equipment **Applied Physics:** Specific gravity, density, properties of matter, including cohesion, capillarity, surface tension viscosity, elasticity, diffusion and osmosis, Heat: Temperature and its measurements Thermometers and Pyrometers. General account of expansion by heat of solids, liquids and gases, Thermostats, Pressure gas and hydraulic. Boyle's and Charles Laws. Unit of heat, thermal capacity and specific Heat, Change of State; Latent heat; Melting Point. Properties of vapours, conduction, convection and radiation., Principles of electro-technology applied to dental work room, small motors, constructional features and characteristics, electric furnaces, heaters, thermostats, pyrometers, spot welders, electroplating, electre-fornkag, and anodizing, wiring regulations relating to low voltage supplies. **Applied Mechanics:** Forces, Parallelogram and triangle of forces. Moments, Couples, Centre of gravity, Principles of lever and cantilever work, Energy; Power, Friction, inclined plane, Screw Stress, Strain, Sheating Strain, Torsion, Bending movements, Strength and stiffness of materials. **Applied Chemistry:** Distinction between physical and chemical change; elements, mixtures, and compounds; composition of the atmosphere; Oxygen oxides, burning and rusting; water solvent properties and crystallization; action of water on metals; composition of water hydrogen; Laws of chemical combination; meaning of chemical symbols valency; simple chemical equations; acids, bases and salts. , Electrolysis, The ionic theory of solution. The electro potential series, electroplating, General characteristics of the metals including an elementary study of the common metals and their alloys with special reference to those used in the dental work room. , Alcohol, ethers, aldehydes and ketones, fatty acids and their more important derivatives, amines. Simple treatment of carbohydrates, fats and proteins, Benzenes and its homologues. General characteristics of aromatic substances. Synthetic resins and plastics used in Dentistry. **Applied Oral-Anatomy:** Elementary anatomy and structure of denture/bearing area, Human dentition and occlusion, Functions of teeth and morphology of Crowns of teeth, Muscles of mastication and facial expression, Mastication deglutition and phonation, Movements of temper-mandibular joint. **Dental Mechanics:** Infection control measures for impressions and models, Impression Preservation and Boxing-in, Cast: Preparation, Trimming, including Orthodontic casts, Cast duplication - various methods, Construction of special trays - spacers, Bite blocks- base plates and wax rims, Articulators: Classification, daily uses, and care of articulators, Adjustments, Mounting of casts, Articulation, Occlusal plane, protrusive balance, working bite, balancing bite, curve of space, compensating curve, lateral curve, Principles of selection of teeth, Setting of teeth and wax finishing, Flasking, Dewaxing, Packing, curing and Deflasking, Finishing and polishing of dentures, Additions, repairs, relining and revising of dentures. Immediate denture construction., Making of acrylic teeth, Kennedy's classification of partial dentures, Principles of partial denture, design, clasp surveyor, surveying, path of insertion and removal, Establishment of clasp seat. Clasp's parts, classification, function and reciprocation., Principles of wire bending, Preparation of wrought clasps, occlusal rests and lingual bars, Casting machines: Centrifugal and pressure casting machines, Furnaces, Principles of casting , Casting techniques of partial denture (Skeletal) Clasps, bars, occlusion rest. , Setting of teeth and completion of dentures on metal skeletons. , Mechanical principles of Orthodontic appliances, anchorage, force, tissue changes and retention. , Stainless steel wire-preparation of

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	clasps, springs and Arch wires for Orthodontic appliances. , Use of various types of expansion screws. , Designing - Implant supported Prosthesis (if facilities available for Dental Implants) , Ceramic, laminates and Veneers. W , Fabricating Maxillofacial prosthesis such as eye, nose ear, cheek, obturator and splint , Indirect Resin Restoration preparation techniques. , Porcelain firing techniques , Preparation of removable Orthodontic appliances, Activators, Retention appliances and Oral screen. , Construction of fixed Orthodontic appliances, bands, tubes and arches. , Soldering and spot welding-Soldering of clasps, tags, Strengtheners and lingual bars. , Inlays and Crowns-classification and construction facing & backings. Casting Procedures., Principles of bridge work-types of abutments, abutments and pontics construction of bridges using porcelain and acrylic pontics. **Dental Materials and Metallurgy** **Dental Materials:** Composition, Properties, Uses, Advantages & Disadvantages of the following materials: - Plaster of Paris; Dental Stone, Die Stone , Investment Materials , All Impression Materials Tray Materials , Denture Base Materials, both for cold curing and heat curing, Tooth Materials Waxes, Base Plate Zinc Oxide , Dental Luting Cements Dental Ceramics and indirect resin restoration materials. **Dental Metallurgy:** Metallurgical Terms , Study of Metals used in Dentistry Particularly Gold, Silver, Copper, Zinc, Tin, Lead and Aluminum. , Study of Alloys used in Dentistry particular y, Casting Gold Wrought Gold Silver Alloys, Stainless Steel, Chrome Cobalt Alloys. Heat treatment-annealing and tempering. Solders, Fluxes, Anti Fluxes. Tarnish and Corrosion. Electric Deposition. Dental implant materials. **Basic Knowledge of Basic Computer Knowledge**: General office routine economics, record-keeping services, Professional referrals and computing skill; , Record keeping of materials indented and Audit of use. , Receipt and dispatch of work from clinicians ***Part II:*** Same As Embryologist
Nuclear Medicine Technologist	***Part I:*** **Subject Knowledge (70 Marks)** **Basic Medical Sciences** **Human Anatomy** Musculoskeletal system: Structure of bone, types of bone, skull, PNS, Mastoid, vertebral column, bones of shoulder griddle, bones of superior extremity, thoracic cage, Pelvic griddle, bones of lower extremity, joints – type of joints, movement, important joints – their structure & location, types of muscles (striated, non-striated, cardiac). Origin insertion & function of some important muscles, Radiological anatomy of bones. Cardiovascular system: Heart, major vessels, portal vein &tributaries. Lymphatic system (structure, function): Circulation of lymph, lymph glands, thoracic duct. Abdominal organs / Digestive system: Oral cavity, Pharynx, Esophagus, Stomach, small & large intestine, gall bladder, pancreas, liver, spleen. Respiratory system (Respiratory passage & organs): Larynx, Trachea, Lungs, Bronchus. Nervous System: Brain, Meninges, Ventricles, Spinal Cord. Genitourinary & Reproductive system: Kidney, Ureter, Bladder, Prostate in Males, Male & Female Urethra, Ovary, Fallopian tubes, Uterus, Cervix, Scrotum tests, Vas difference, Seminal vesicle. Endocrine system (Name, Location & Function): Pituitary, Thyroid &Parathyroid Gland, Supra-renal. Ear: Structure Eye: Bony Orbit & soft parts **Health and Disease** Definition of Health, Dimensions of Health, Determinants of Health. Describe characteristics of Agent, Host & Environmental factors in Health & Diseases & multi factorial etiology of Disease. Describe & discuss natural history of diseases Describe application of interventions at various levels of Preventions Dynamics of diseases transmission and modes of diseases transmission Occupational diseases- Industrial situation, Agricultural situation, & prevention of occupational diseases Communicable diseases- Measles, Diphtheria, Tetanus, Poliomyelitis, Whooping cough, Viral Hepatitis, Malaria, Dengue, COVID-19, Filariasis, Tuberculosis, Leprosy, AIDS, Cholera

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	Non-communicable- Cardio Vascular diseases, Diabetes, Obesity, Cancer, Accidents &Injuries. Health hazards of Air, Water, Noise, Radiation Pollution. Health Care Delivery System and National Health Policy: Health Care Delivery System – Primary Health Care, Secondary Health Care and Tertiary Health Care, Provision for health in constitution of India, Health Administration and Management at different levels in India. **Physiology** Circulation & Physiology of Blood, Blood volume, constituents of blood, Bleeding time, Clotting time, Blood Group, Normal Blood Pressure, Physiology of Heart: Systole, diastole, Maintenance of cardiac output, Normal Pulse, Normal respiration: Types of respiratory muscles, abnormal respiration, Normal temperature, Maintenance of body temperature, Kidney function. **Pathology:** Cell Biology: Structure of cell, cell division, Cell growth, Cell deformities, Defense mechanism, Cell damage and cell repair. Definition, Etiology & classification of pathological processes and terms: Infection, Inflammation, Immunity. Neoplasia: Benign & Malignant including its mode of growth & metastasis, Physical and chemical carcinogens Common Neoplasm of different systems: Oral, oropharyngeal, Laryngeal, GI tract, Breast, Cervix, Bone Tumors, Soft tissue sarcoma, Penis, Lymphoma, Leukemia. Fracture, types of fracture, fracture healing, dislocation of joints. **Microbiology:** Classification of bacteria, virus, fungus, Characteristics, shape and arrangements, special characters – Spores, capsules, motility. Antiseptics, Disinfections. **Basic nuclear physics, instrumentation and quality assurance:** **Basic Nuclear Physics:** Atomic Structure: Nucleus, Atomic No, Mass No, Electron orbit and energy levels, Isotopes and isobars. Modes of Radioactive decay: Beta decay, Positron decay, Electron capture, Isomeric transition, Internal conversion, Alpha decay. Radioactivity and decay of radioactivity: Half-life, Decay constant, Average lifetime, Decay factor, decay corrections, Specific activity, Apparent specific activity, Parent-daughter decay - Bateman equation and Types of equilibrium. Radiation quantities and Units: Activity, KERMA, Exposure, Absorbed Dose, Equivalent dose, Effective dose, and Collective Effective Dose. Interaction of radiation with matter: Charged particle interaction - Excitation and ionization, Charged particles track, Linear energy deposition, Bremsstrahlung radiation, Cerenkov effect, Annihilation, Neutron capture and activation, Range of the charged particles; Photon interaction - Photoelectric effect, Compton scatter, Coherent scattering and Pair production; Implications of interaction of radiation with matter: Scintillation - principle, classification, and application; Attenuation coefficient, HVL and TVL; Shielding calculations **Instrumentation and quality assurance:** Gas Filled Detectors: Principles, construction, and functioning of Ionization Chamber, Isotope calibrator, Pocket dosimeter, Proportional Counter, Geiger Müller counter; Voltage calibration of a Geiger Müller tube, optimum operating condition and Dead time correction. Quality control of dose calibrator Scintillation detector: Thallium-activated Sodium Iodide crystal, Construction and functioning of Photomultiplier tube, high voltage supply, pre-amplifier, amplifier, Shielding, and collimation, Liquid scintillation detectors: composition of liquid scintillator (scintillation cocktail): primary solute, secondary solute and organic solvent and solubilizing agents for tissues, Coincidence circuits and display. Semiconductor detectors: Principle, types, and properties of semiconductor detectors. Spectrometer: Principles of Pulse-height analyser, single channel and multichannel analysers, Calibration and Window settings, Determination of gamma energy spectrum, Integral and differential counting and quality parameters Detector Equipments: Well counter: Construction and principles of operation, Crystal characteristics suited for detection of various radionuclides, Signal output, applications;

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	Quality control of well counter; Thyroid uptake probe & Intraoperative Probes: Types, Construction, basic working principles, Quality control of thyroid uptake probe and intraoperative probe; Whole body counters: Construction, basic working principles and quality control; Liquid scintillation counters: Construction, Quenching and quench corrections methods: Internal standard method, external standard method and channel ratio method; Neutron detectors: Basic principles and applications. Gamma camera and SPECT/CT: Construction and principles of operation: Collimators and practical considerations - parallel hole and its types (based on quality parameters: high resolution, high sensitivity, general purpose; based on energy of incident ray: high/medium/low energy; slat hole), pin hole, diverging/converging, fan beam collimators. SPECT: Parameters of acquisition (linear sampling, angular sampling, degrees of rotation, continuous/step & shoot, circular/elliptical), image reconstruction techniques, filters, artifacts in SPECT (attenuation correction, non-uniformity corrections, correction with combined SPECT-CT system), effect of scatter & scatter correction, partial volume effects, multi detector SPECT, coincidence, SPECT acquisition – step & shoot/continuous. Quality control of gamma camera: Tuning, Uniformity, Linearity, Spatial resolution, Sensitivity, center of rotation Positron Emission Tomography (PET) and PET/CT: Construction and working principles, PET crystals, acquisition protocols, 3D PET acquisition, time of flight, Hybrid PET/CT, Quality control of PET. Computed Tomography: Construction and working principles, CT detectors, helical CT, acquisition protocols, CT reconstruction, CT based attenuation correction. Dose parameters and. Quality control of CT. **Radiochemistry and Radiopharmacy:** **Production of radionuclides:** Nuclear reactor-produced radionuclides: Construction and functioning of nuclear reactor, nuclear fission reactions, fission products, Nuclear activation, and cross sections, Methods of radionuclide separation and purification, Characteristics of reactor-produced radionuclides. Cyclotron-produced radionuclides: Construction and functioning of medical cyclotrons, types of cyclotrons, Methods of radionuclide separation and purification, Characteristics of cyclotron-produced radionuclides, Production of some commonly available radionuclides such as F-18, C-11, O-15, N-13, Tl-201, Ga-67, In-111, I-123. Radionuclide generators: Principles and construction of generator systems, Sterilization, Yield of a generator, commonly available generator systems such as Mo-99/Tc-99m, Ge-68/Ga-68, Sr-82/Rb-82, etc. **Pathophysiologic basis of Nuclear Medicine:** Applied pathophysiologic concepts in Nuclear Medicine: Inflammation, Haematology, Musculoskeletal system, Endocrine system (Thyroid, Parathyroid, Adrenal glands), Digestive system, Genitourinary system, Respiratory system, Cardiovascular system, Central Nervous system, Oncology and Radionuclide therapy. **Radiopharmacy:** Tracer concept, ideal characteristics of a radiopharmaceutical, factors influencing design of radiopharmaceutical, Mechanism of localisation; Radiolabelling: Methods of radiolabeling, radiolabelling of cells and proteins; Radioiodination: Methods and purification, commonly used radioiodinated compounds for diagnosis and therapy; Radiopharmaceuticals chemistry of Tc-99m: Physical characteristics, Oxidation states, Chelation, ligand exchange reactions, Production of Cold kits for radiopharmaceutical preparation; Labeling of therapeutic radiopharmaceuticals; Quality control of radiopharmaceuticals: Physicochemical tests, Radionuclidic purity, Radiochemical purity, Sterilisation of radiopharmaceuticals, biological tests such as Sterility, Toxicity &Apyrogenicity testing. **Tracer kinetic modeling**: Basic concept of tracer kinetic modeling. Flow, Diffusion, Extraction, Kinetic modeling based on receptors, enzyme action, and metabolism. **Drug interactions with radiopharmaceuticals:** Known interactions of drugs with radiopharmaceuticals and their effects **Radiobiology and radiation protection:** **Radiobiology:** General Cell Biology and mammalian cell growth and replication cycles, interaction of radiation with cells, mechanism of damage, nature of damage; Effect of radiation on cells: Directly and indirectly ionising radiation, Direct and Indirect action of radiation, Deterministic (Tissue reaction) and Stochastic effects of radiation, Mechanisms of chromosomal & DNA damage and repair; Cell survival curve, Linear-quadratic and multitarget models of cell

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	damage, Mechanisms of cell killing, Relationship of dose, dose rate, oxygen, and cell age to radiosensitivity; Linear energy transfer and Relative Biological effectiveness of radiation; Acute effects of radiation: Acute radiation syndrome, Prodromal, Cerebrovascular, Gastrointestinal, and Haematopoietic syndromes, Acute effects on lungs and skin; Medical countermeasures to radiation exposure (radioprotectors); Radiation cataractogenesis; Radiation carcinogenesis: Mechanism of carcinogenesis and the role of radiation, Types of radiation-induced cancers and their temporal relation to the exposure, Cancer risk estimate to radiation, Dose and Dose-rate effectiveness factor (DDREF); Heritable effects of radiation: Mechanisms of radiation-induced heritable effects (Mendelian disorders, Chromosomal aberrations, and multifactorial disorders), Examples of such disorders in human beings; Effects of radiation on the embryo and foetus: Radiation-induced death and disorders and their relation to the radiation dose & gestational time; Radiation risks in diagnostic and therapeutic Nuclear Medicine procedures: Effective whole body and organ doses to patients during Nuclear Medicine and relevant radiological diagnostic procedures; Occupational exposures to radiation workers. **Radiation protection:** Principles of radiation protection, Safe handling of radioactive materials, recommendations (ICRP, NCRP) and the regulatory requirements (IAEA, AERB), Negligible individual dose, Radiation detriment, ALARA, Dose limits to radiation workers, caregivers, and public, Annual limit of intake, Derived air concentration. Radiation protective equipment: Shielding - lead barriers, syringe shields, lead aprons, lead gloves. Radiation monitoring devices: Personnel monitoring systems - pocket dosimeters, film badges and thermoluminescent dosimeters (chest, wrist, ring, eye, etc). Survey meters, Contamination monitors, zone monitors and phantoms Radiation monitoring procedures: Wipe test, Area monitoring and radiation survey of nuclear medicine lab. Radioactive materials: Types of radioactive material packaging and testing; Transport of radioactive materials (Categories of radioactive materials and Transport Index), TREMCARD, Receipt of radioactive material - procedure and test for contamination, and maintenance of records. Procedure for handling spills - Minor and major spills, Measures for containment, Decontamination procedure of Personnel, equipment and work area, decontamination kit, radiation emergencies and preparedness. Radioactive waste management: Solid, Liquid, and Gaseous wastes, Principles of waste management, disposal of corpses containing therapeutic doses of radionuclides. Misadministration: Definition, procedure for reporting, and measures to minimize such events. Planning of Nuclear Medicine (NM) facilities: Classification and general features of NM laboratories (site, typical floor plan, ventilation, fume hood, surface walls, floor and ceiling); Planning of radiation installation (Radiopharmacy, gamma camera, SPECT/CT, PET/CT, radionuclide therapy wards): protection from primary, leakage, and scattered radiation. Concepts of workload use factor, occupancy factor & distance. Barrier design: barrier materials-concrete, brick and lead, Primary & secondary barrier design calculations, design of doors, control of radiation-effects of time, distance and shielding. Regulatory requirements: AERB safety code and ethics, No Objection Certificates for facilities, radionuclides, and radiation equipment Procedure for Commissioning, Operation, and Decommissioning of equipment, Calibration of radiation detection equipment (survey meters, area zone monitors, dose calibrators). **<u>Diagnostic Nuclear Medicine Techniques:</u>(15 Marks)** Indications, Patient preparation, Study acquisition, Processing and Display ofRenal system: Renogram, diuretic renogram, renogram to detect renovascular hypertension (ACE inhibitor, Angiotensin receptor antagonist, Aspirin and Exercise renograms), Vesicoureteric reflux study (Direct and Indirect), evaluation of donors and renal transplant recipients, and renal cortical imaging. Musculoskeletal system: Bone imaging - three phase, whole body and spot for various malignant and benign conditions (benign tumors, metabolic bone disease, trauma, vascular, infection and inflammation) F-18 Fluoride PET/CT, bone marrow imaging. Liver and Hepatobiliary system: Liver-spleen study, blood pool imaging, spleen imaging with denatured RBCs, Hepatobiliary imaging for function, bile leak, obstruction, neonatal cholestasis, biliary reflux, and Gallbladder functional evaluation. Gastrointestinal system: Salivary scintigraphy, Gastrointestinal motility studies (esophageal

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	transit, gastro-oesophageal reflux, gastric emptying, small & large bowel transit), Meckel's scan, and GI bleed study. Lung imaging system: Ventilation scan using Tc-99m DTPA aerosol, evaluation of aerosols generators, evaluation of COPD & Pulmonary permeability, lung perfusion imaging. Cardiovascular system: ERNA, First pass RNA, Stress-Rest myocardial perfusion imaging, myocardial viability studies (Tc-99m MIBI, Tl-201, F-18 FDG), cardiac inflammation imaging, sympathetic innervation imaging, and infarct imaging. Central nervous system: Brain perfusion/metabolism/Dopamine transporter imaging, Evaluation of epilepsy, cerebrovascular accident, dementia, motor neuron disorders, etc. CSF cisternography for CSF leak, patency of ventriculoperitoneal shunt, Evaluation of brain tumors (GHA, FDG, etc) and brain death. Endocrine system: Thyroid imaging and uptake (99mTc and 131I), 131I whole-body imaging, Parathyroid imaging, insulinoma, adrenal cortical and medullary imaging. Oncology: lymphoma, cancers of breast/lung/gastrointestinal system/genitourinary tract, bone tumours, neuroendocrine tumours, brain tumours, etc. (such as F-18 FDG, F-18 Fluoride PET/CT, Ga-68 DOTANOC, I-131 MIBG) Miscellaneous: gastrointestinal protein loss estimation, Lymphoscintigraphy, Sentinel Lymph Node Imaging, Radioimmunoscintigraphy (RIS), Scrotal scintigraphy, pleuroperitoneal shunt, Hysterosalpingo Scintigraphy, Scintimammography, Dacryoscintigraphy, Infection and inflammation imaging (Ga-67 citrate, Tc-99m labelled WBCs, F-18 FDG, F-18 FDG WBCs). Contrast-enhanced CT: types of contrast and precautions, multiphasic CT. Non-imaging procedures: In-vivo diagnostic procedures: Thyroid uptake study and Perchlorate discharge test In-vitro diagnostic studies: Radioimmunoassay (RIA) and Immunoradiometric assay (IRMA), Renal clearance measurements (GFR, ERPF), Urea breath analysis, Blood volume measurement, red blood cell life span, Intrinsic factor assay, Ferrokinetic studies. **Therapeutic Nuclear Medicine Techniques and Recent advances:** **Therapeutic Nuclear Medicine Techniques:** Ideal characteristics of therapeutic radionuclide. Choosing an appropriate radionuclide based on its physical characteristics, target requirements and mechanism of cell killing. Radiation dosimetry: Basic concept of internal radiation dosimetry, MIRD method, Phantoms and software used for dosimetry, Quantitation of activity, Small scale dosimetry and microdosimetry, Dosimetry of various radionuclide therapies. Treatment of thyrotoxicosis: Indications, Patient preparation, dose calculations, administration of I-131 sodium iodide, post-treatment advice and follow up. Treatment of differentiated thyroid cancers of follicular origin: Indications, pre-requisites, patient preparation, dose calculation, administration of I-131 sodium iodide, need for isolation, post-therapy scan, post-treatment advice and follow up. mIBG therapy: Treatment of neuroblastoma and metastatic pheochromocytoma/paraganglioma. Peptide receptor radionuclide therapy: Indications (Neuroendocrine tumors, Prostate cancer), choice of radionuclide and ligand, pre-requisites, patient preparation, dose calculation, administration of radiopharmaceutical, need for isolation, post-therapy scan, post-treatment advice and follow up. Bone pain palliation: Indications, choice of radiopharmaceutical, pre-requisites, patient preparation, post-therapy scan, post-treatment advice and follow up. Radiation synovectomy: Indications, choice of radiopharmaceutical, pre-requisites, administration techniques, post-therapy scan, post-treatment advice and follow up. Radioimmunotherapy: Merits of radioimmunotherapy, monoclonal antibodies, tumor antigens, biotin-avidin system pretargeting, cancers suitable for radioimmunotherapy, choice of radiopharmaceutical, pre-requisites, patient preparation, post-therapy scan, post-treatment advice and follow up. Treatment of liver tumors with microspheres: Indications, choice of radiopharmaceutical, pre-requisites, patient preparation, post-therapy scan, post treatment advice and follow up; Miscellaneous: Treatment of polycythaemia vera, malignant ascites, skin lesions including basal cell carcinoma. **Recent advances:** Instrumentation: Digital PET systems, Total body PET/CT, PET/MRI, Breast-specific gamma cameras, Positron Emission Mammography, Cardiac specific gamma cameras, small animal imaging systems, PET-guided biopsy. Image processing techniques: Introduction to newer reconstruction algorithms, partial-volume correction, and collimator-detector response recovery; PET: List mode, Dynamic PET, 4D

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	imaging (Respiratory gating methods) Image-guided radiotherapy: Principles and applications Artificial intelligence in Nuclear imaging: Basic concept of artificial intelligence, Classification, and applications in nuclear imaging, processing, and analysis. Radionuclide therapy: Theragnostics, Personalized Nuclear Medicine, Patient-specific dosimetry, Alpha therapy. ***Part II:*** Same As Technicians (Laboratory)
Medical Record Technician	***Part I:*** **Subject Knowledge (50 Marks)** • Hospital and Patient-care Appraisal Objectives of Hospital, Parameters of Good Medical Care/Patterns of Patient Care, Functions of Hospital • Role of a Hospital in Health is- Delivery Systems (HCDS) • Classification of Hospitals • Hospitals Organization and its analysis Chart of Organization, Board and Committees, Duties and responsibilities thereof • Departmental Administration Delegation, Decentralization Patient Care Appraisal (PCA) • History of Medical Audit, Tools and Techniques, Various Phases of Medical Audit • Departments and Service Units Clinical Departments, Diagnostic and therapeutic Services (including Clinical Laboratories, Radiology, Physical Medicine and Rehabilitation and Pharmacy Services), Nursing Department, Dietary Department, Outpatient Department, Accident and Emergency Services Department, Medical Social Service Department (viii) General and Medical Stores, Blood Bank, Medical Library Services, Service units in a Hospital Laundry, Housekeeping, CSSD, Miscellaneous Services : Engineering, Mortuary and Transport Services. • Basic Anatomy Definition of Anatomy & Physiology, Types of Anatomy (including systemic), Definition of topographic term/term used to describe the body, Descriptions of various regions of the body. • Basic Physiology 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, Digestive System and Metabolism Endocrinology, Reproductive System, Nervous System, Special Senses, Muscles • Basic Pathology and Microbiology 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, disease of RBCs, WBCs, Platelets, Coagulation factors and disorders, Blood groups and cross matching, Blood transfusion, Urine Composition: variation in common disease, CSF and body fluids, Gastris and Duodenal contents, Fasces, Parasites, Introduction and historical background, Classification special, Characteristics of organisms bacteria's, Asepis, Disinfection Antiseptics, Allergy study of pathogenic organisms, Non-pathology organisms, Virus and fungus, Parasitic diseases- their stance in India with lab Diagnosis. • Medical Terminology: - Objective - Basic Elements of Medical Terms: - Roots, Prefixes, Suffixes, Colours, Numerals, Symbols, Abbreviation Terms pertaining to Body as a whole. Terms relate to Investigations, and operation, treatment of conditions, disorders Skin and Breast (integumentary system), Musculoskeletal, Neurological and Psychiatric, Cardio-vascular, Blood and blood forming organs, Respiratory, Digestive, Uro-genital, Gynecological, Maternal, Antenatal and Neonatal conditions, Endocrine and Metabolic, Senseorgans of: Vision, Hearing. **Systemic**: Infectious diseases, Immunological diseases, Diseases of the Connective Tissues, Diseases of the Connective Tissues, Geriatrics and Psycho geriatrics.

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	Supplementary terms: Selected terms relating Oncology, Anesthesiology, Physical Medicine and Rehabilitation, Nuclear Medicine, Plastic Surgery of Bums and Maxillofacial, Radio-diagnosis, Radiotherapy. **Biostatistics:** - Introduction to Statistics - Methods of collection of data - Measures of central tendency (simple average, G.M., H.M., Mode and Median) - Measures of dispersion (Standard deviation, Range, variance, average deviation) - Sampling; Definition, Methods of sampling (randoin systematic, stratified, cluster) - Correlation and regression: Significance, linear correlation, correlation coefficient, linear regression. - Time series analysis- concept and its utility, component of time series. - Test of significance. - Graphical presentation of data. - Probability- concept and definition. - Uses of statistics. - Sources of hospital statistics (In- Patient census, Out — Patient Dept, and Special Clinics). - Definitions (live, birth, foetal death, immaturity, cause of death, underlying cause of deathinpatient bed etc) - Analysis of hospital services and discharges. - Indices (Bed occupancy, average length of stay, bed turn — over internal, death rate birth rateetc.) - Vital statistics. - Uses and Limitations of hospital data. - Method of compilation of various Health Returns/Statistical Returns. Healthcare Organization: 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 Public Health Structure in India: With relation to public Health & medical Care, Constitutional lists, various five years plans and priorities Role of Voluntary Health Organization Basic facts of Health in India. Current Objectives and strategies: Population Dynamics, Community Health Worker schemes. National Health Programmes of Medicine and Homeopathy. Other programmes of relevance to Health Sector: Family Welfare, Medical Termination of Pregnancy, National Population Policy, Maternity and Child Health. Medical Record Science Introduction to Medical Record Science, Development, Analysis and Uses of Medical Record. Development Medical Record Forms, basic and special. Order of Arrangements: Ward, Medical Record Department, Source Oriented Medical Record, Problem oriented Medical Record, Integrated Medical Record. Analysis of Medical Record: Quantitative, Qualitative. Uses of Medical Records: As a personal document, As impersonal document. Values of the Medical Record International classification of Diseases Classification of diseases as per I.C.D ***Part II:*** **A. General Aptitude: (5 Marks)** **B. General Intelligence & Reasoning: (10 Marks)** **C. English Language: (10 Marks)** **D. General Awareness: (5 Marks)** **E. Basic Computer Knowledge: (20 Marks)** ***Part III:*** **Skill Test** The Skill Test will be of qualifying nature. Candidates will have to qualify the test for English or Hindi at the prescribed speed on Computer as per the advertisement.

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Lower Division Clerk	***Part I:*** **Subject Knowledge (Not Applicable)** ***Part II:*** **A. General Aptitude**: **(20 Marks)** **B. General Intelligence & Reasoning:(30 Marks)** **C. English Language**: **(20 Marks)** **D. General Awareness**: **(10 Marks)** **E. Basic Computer Knowledge:(20 Marks)** ***PART III:*** **Skill Test** The Skill Test will be of qualifying nature. Candidates will have to qualify the test for English or Hindi at the prescribed speed on Computer as per the advertisement.
Lab Attendant Grade II	***Part I:*** **Subject Knowledge (50 Marks)** • Biomedical Waste Management • Infection Prevention and Control • Basic Medical Terms • Common Laboratory associated Hazards & Bio-safety measures. • Concept of Quality care in laboratory • Quality Improvement Tools • NABH Guidelines • Basic Biochemistry including Normal values • HIV, Hepatitis-B and Hepatitis-C, Pre and Post exposure guidelines. • Medical Ethics • Basic Anatomy and Physiology ***Part II:*** Same As Store Keeper
Hospital Attendant Grade III (Nursing Orderly)	***Part I:*** **Subject Knowledge (50 Marks)** 1. Meeting the Basic Needs of a patient (a) **Physical needs-** - Comfort, rest, sleep and exercise - Body mechanics- moving, lifting, transferring - Position and posture maintenance - Beds and Bed making – Principles of bed making, types and care of bed linen - Safety devices, restraints and splints' (b) **Hygienic needs** - Personal and environmental hygiene - Attendants role in maintaining personal and environmental hygiene c) **Elimination needs** - Problems- constipation and diarrhea, retention and incontinence of urine - Offering bed-pan, urinal. 2. First Aid- Definition, Aim and Importance, rules/general principles of First Aid, first aid in emergencies 3. Procedures and Techniques in First Aid - Preparation of first aid kit - Dressing, bandaging and splinting etc. - Transportation of the injured - CPR and Basic Life Support. ***Part II:*** Same As Store Keeper
Mortuary Attendant	***Part I:*** **Subject Knowledge: (70 Marks)** • Principles of Forensic Medicine • Mortuary laws and Ethics

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	• Psycho social aspects of Grief • Human Anatomy • Mortuary care • Pathology& Microbiology (Basic) • Toxicology • Psychology of Death and Dying • Fundamentals of Autopsy (Evidence collection & preservation) • Thanatochemistry • Restorative Art and Embalming • Funeral Service Management & Accounting ***Part II:*** **A. General Aptitude: (5 Marks)** **B. General Intelligence & Reasoning: (10 Marks)** **C. English Language:(5 Marks)** **D. General Awareness:(5 Marks)** **E. Basic Computer Knowledge:(5 Marks)** ***Part III:*** **Skill Test** The Skill Test will be of qualifying nature. Candidates will have to qualify test for Mortuary Instruments & Equipment, Dead body Handling, Exhibit preservation, Embalming Techniques and Biomedical Waste Handling.
Executive Assistant (NS)	***Part I:*** **Subject Knowledge: (70 Marks)** **Central Govt. Service Rules:** Central Government Rules: Questions relating to CCS (Leave) Rule, CCS (Conduct) Rules, GFR, FR/SR, General Service Condition, Office Procedures, Types of correspondence, General Knowledge about BNS/BNSS, CPC/CAT/High Court, RTI Act 2005, Establishment, Reservation, Roster, LTC, Travelling Allowance etc. ***Part II:*** Same As Technicians (Laboratory)
Personal Assistant (S)	***Part I:*****Subject Knowledge (50 Marks)** **Central Govt. Service Rules:** Central Government Rules: Questions relating to CCS (Leave) Rule, CCS (Conduct) Rules, GFR, FR/SR, General Service Condition, Office Procedures, Types of correspondence, General Knowledge about BNS/BNSS, CPC/CAT/High Court, RTI Act 2005, Establishment, Reservation, Roster, LTC, Travelling Allowance etc. ***Part II:*** **A. General Aptitude: (5 Marks)** **B. General Intelligence & Reasoning: (5 Marks)** **C. English Language: (20 Marks)** **D. General Awareness:(10 Marks)** **E. Basic Computer Knowledge:(10 Marks)** ***Part III:*** **Skill Test** The Skill Test will be of qualifying nature. Candidates will have to qualify the test for English or Hindi at the prescribed speed on Computer as per the advertisement.
Stenographer	***Part I:*** **Subject Knowledge (40 Marks)** **Central Govt. Service Rules:** Central Government Rules: Questions relating to CCS (Leave) Rule, CCS (Conduct) Rules,

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	GFR, FR/SR, General Service Condition, Office Procedures, Types of correspondence, General Knowledge about BNS/BNSS, CPC/CAT/High Court, RTI Act 2005, Establishment, Reservation, Roster, LTC, Travelling Allowance etc. ***Part II*:** **A. General Aptitude: (10 Marks)** **B. General Intelligence & Reasoning: (10 Marks)** **C. English Language:(20 Marks)** **D. General Awareness:(10 Marks)** **E. Basic Computer Knowledge:(10 Marks)** ***Part III:*** **Skill Test** The Skill Test will be of qualifying nature. Candidates will have to qualify the test for English or Hindi at the prescribed speed on Computer as per the advertisement.
Library Attendant Grade-II	***Part I:*****Subjective Knowledge (40 Marks)** Library and Information Centres: Concept and Role in Society;Types of Libraries and information Centres: Public, Academic, Special and National; Modern Library: Automated, Digital, and Virtual ;Five Laws of Library Science; Overview of Information Sources; Types of Information Source; Reference Sources;E-Resources; Organization of Library Material: Concept, Need and Purpose; Processing of Library Material: Classification and Cataloguing Arrangement and Maintenance of Library Material; Library and Information Services for the Users; Traditional Library Services: Responsive and Anticipatory Modern Library Services; Library System and Management; Library Staff; Library Users; Librarianship as a Career; Information Retrieval Concept of Scope Information Retrieval Tools: Catalogue, Index, Subject Heading Lists; Search Techniques: Basic and Advanced; Web Based Search ***Part II*:** **A. General Aptitude: (10 Marks)** **B. General Intelligence & Reasoning: (10 Marks)** **C. English Language:(10 Marks)** **D. General Awareness:(10 Marks)** **E. Basic Computer Knowledge: (20 Marks)**

Sd/-
Director& CEO
AIIMS, Mangalagiri.