



Sanjay Gandhi Postgraduate Institute of Medical Sciences
Raebareli Road, Lucknow 226 014

Assistant Security Officer (Core Subject)

Advt No. I/28/1/Rectt/2023-24

(Syllabus is only Indicative. The questions can assess any aspect of knowledge, aptitude, attitude and practical skills, which is expected from a trained person to work efficiently at the advertised post)

- Role & Aim of Security Department
- Organisation of Security Setup
- Designation & Batches of Rank
- Security cadre Scheme
- Uniform/Dress Regulation applicable for security department
- Hospital Security
- Theft/Pilferage- Preventive steps thereof
- Security Arrangements
- Duties & Responsibilities of Assistant Security officer
- Surface fire fighting arrangement
- Utilization of Techno Gadgets
- Security Reports & Returns
- Importance of Physical Fitness in Uniformed Forces
- Lodging of FIR with Local Police in given situation
- Induction of Contractual Security



CSSD Assistant

Advt No. I/28/4/Rectt/2023-24

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Basic Anatomy:

1. General Introduction–Definition of Anatomy & Physiology–Types of Anatomy (including systemic)–Definition of topographic term/term used to describe the body.–Description of Various regions of the body.
2. Cells and tissues of body and general histology.
3. Anatomical description of the following:-Skin and breast–Ontology–Joints–Ligaments–Fasciae and Bursae–Musculoskeletal system–Cardiovascular system–Respiratory system–Lymphatic system–Blood and blood forming organs–congenital system–Endocrine system–Organs of special senses (ear, eye, etc.)–Digestive system–Embryology

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 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

Operation theatre techniques:

- Operation theatre techniques
- Surgical Procedures Organize and set up trolleys for theatre Tracking and recall of equipment and items Surgical Instruments
- Criteria for Purchase and Maintenance
- Checking in and out of loan instruments
- Decontamination Process
- Scientific Principles
- Recommended Practices



Disinfection:

- Principles of Disinfection
- Cleaning of equipment
- Use of detergents
- Ultra Sonic washers /Mechanical cleaning apparatus
- Cleaning of catheters and tubings, cleaning glass ware, cleaning syringes and needles
- Preparation and Supplies for Terminal Sterilization

Cleaning, Washing, Packaging and assembly line:

- Precautions while handling instruments and line Assembly and packing
- Packaging selection and Materials used for wrapping and packing assembling pack contents.
- Types of packs prepared.
- Inclusion of trays and gallipots in packs.
- Method of wrapping and making use of indications to show that a pack of container has been through a sterilization process date stamping.

Sterilization methods:

- Different Methods of Sterilization
- High Temperature Sterilization–Dry Heat Moist heat sterilization
- EO gas sterilization
- H2O2gas plasma vapour sterilization
- Endoscopes and their Sterilization
- Sterilization Recommended Practices for Flash Sterilization
- Use of Sterilization indicators like in different process
 - a) Biological Indicator
 - b) Chemical Indicator
 - c) Bowie Dick Test
 - d) Thermal Tape
 - e) Incubator to test Biological indication. Efficiency 60 min/90 min.

Classification of CSSD working areas as per:

- **Colour Code**
 - a) Red Colour Dirty Area
 - b) Yellow Colour/Blue Clean Area
 - c) Green Sterilized area

Sterilization record keeping:

- Sterile storage Call back system in case of detection of failure HVAC system



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- Records & register maintenance

Quality assurance:

- Quality assurance
- Biological indication and quality control
- Quality measurement methods and its standards

Quality Standards: International Organization for Standardization (ISO) standards Water Quality and its impact in CSSD process Biomedical waste disposal protocols



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Junior Engineer (AC) (Core Subject)

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(Air conditioning & Refrigeration): General Knowledge of Indian Electricity Act, Indian Elect. Rules as amended up-to date. General conditions of supply and charges to be paid to licencees for obtaining connection. CPWD General Specifications for Electrical Works, Principles of analysis of rates. General Principles in preparation of estimates, project reports, award of works and execution of works and measurement. ISI/BIS Standards and Codes of practices. Internal Electrical Installations Systems of wiring and their design, distribution system. Apparatus for control, protection and Testing. Earthing, Lighting Protection, Safety & Maintenance Necessity of earthing, earthing resistance, type of earthing. Lighting protection design, layout, material and installation. Safety procedures and practices, principles of equipment installation, preventive maintenance and testing of equipment. Sub-Station up to 33 KV and Distribution Layout and Design for indoor and outdoor application. Specifications for equipment, Sub-Station earthlings, stand-by generating sets, commissioning procedures and tests.

Distribution: Design of overhead line and underground distribution systems. Specification for cables, conductors, Supports etc. Cable joining and termination methods, power factor improvement, service connection to buildings. Air-Conditioning Ventilation General principles of Refrigeration, Air Conditioning, evaporative cooling and ventilation, Heating and cooling load estimation. Classification of systems, their design and application, structural requirements, specifications for installations. Water Supply Types of pumps and their characteristics. Prime movers, pumping systems and application. Specification for equipment and installation. ELECTRICAL APPARATUS: (i) Single and poly phase A.C. Circuit. Effects of resistance inductance and capacitance. (ii) Single and poly phase transformers—constructional features, equivalent circuits performance, parallel operation, phase conversion. Separation of losses and determination of efficiency by various methods. Auto transformers. (iii) Alternators, Constructional features, regulation, parallel operation and Protection. Automatic Voltage regulators, Emergency generating sets, automatic change over. (iv) Induction machines, polyphase motor and its principle of operation and equivalent circuit. Torque, slip characteristics. Crawling, methods of starting, single phase motor, its theory, characteristics and application.

INSTRUMENT TRANSFORMERS, PROTECTIVE RELAYING, MEASUREMENTS Current, Voltage transformers. Constructional features of IDMT relays, instantaneous relays including knowledge of overload earth fault, undervoltage, Bucholz relays. Connection diagrams, settings. Electrical instruments and Measurements, principles of construction and theory of measuring instruments for



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direct and alternating currents. Commercial types. Measurement of resistance, Voltage, current, power, power factor and energy. Watt meters, energy meters. Thermos couples, Resistance Thermometers, Pyro-meters. Fault locating bridges for cables. Measurements of resistance, inductance and capacitance, Wheatstone bridge.

INTERNAL COMBUSTION ENGINES Fuels and Combustion. Fuels and their properties, combustion calculations. Analysis of products of combustion. Power cycles. Vapor power cycles Carnot and Rankine. Gas Power-Otto and Diesel cycles. Deviation of actual cycles from theoretical cycles. Internal combustion engines—Two and four stroke compression ignition and spark ignition engines. Combustion phenomena. Detonation, Knocking, scavenging of two stroke engines. Fuel injection and carburation. Lubrication and cooling system performance and testing of IC engines. Pollution control requirements/standards.

HEATING, AIR CONDITIONING AND REFRIGERATION Refrigeration—Refrigeration and heat pump cycles. Vapour compression, absorption Cycles. Refrigerants and their characteristics. Air Conditioning Psychrometric chart, comfort airconditioning, comfort indices, ventilation requirements. Cooling and dehumidification methods. Industrial air-conditioning processes. Different methods of electric heating. Construction and performance of Electric heating equipment.

WORKSHOP TECHNOLOGY Estimation of power and energy requirements of electric welding, different types of equipments used and their characteristics. Manufacturing and Fabricating methods and practices for various electrical and mechanical equipment such as pumps, switch boards, light fittings, AHUs etc.

ENERGY CONSERVATION, POWER FACTOR IMPROVEMENT Comparison of different types of lamps from the point of energy conservation, calculation of payback period. Power factor improvement, Reduction of load current and transformer losses due to power factor improvements. KVA requirement for power factor improvement.

SOLAR ENERGY UTILISATION Solar Hot Water system, principles, constructional features, constituent parts, installation, operation & maintenance, solar photo voltaic system, advantages/disadvantages of solar heating & solar photo voltaic system.



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Junior Engineer (Civil) (Core Subject)

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Civil Engineering: Building Materials: Physical and Chemical properties, classification, standard tests, uses and manufacture/quarrying of materials e.g. building stones, silicate based materials, cement (Portland), asbestos products, timber and wood based products, laminates, bituminous materials, paints, varnishes. Estimating, Costing and Valuation: estimate, glossary of technical terms, analysis of rates, methods and unit of measurement, Items of work earth work, Brick work (Modular & Traditional bricks), RCC work, Shuttering, Timber work, Painting, Flooring, Plastering. Boundary wall, Brick building, Water Tank, Septic tank, Bar bending schedule, Centre line method, Mid-section formula, Trapezoidal formula, Simpson's rule. Cost estimate of Septic tank, flexible pavements, Tube well, isolates and combined footings, Steel Truss, Piles and pile-caps. Valuation—Value and cost, scrap value, salvage value, assessed value, sinking fund, depreciation and obsolescence, methods of valuation. Surveying : Principles of surveying, measurement of distance, chain surveying, working of prismatic compass, compass traversing, bearings, local attraction, plane table surveying, theodolite traversing, adjustment of theodolite, Levelling, Definition of terms used in levelling, contouring, curvature and refraction corrections, temporary and permanent adjustments of dumpy level, methods of contouring, uses of contour map, tachometric survey, curve setting, earth work calculation, advanced surveying equipment.

Soil Mechanics: Origin of soil, phase diagram, Definitions-void ratio, porosity, degree of saturation, water content, specific gravity of soil grains, unit weights, density index and interrelationship of different parameters, Grain size distribution curves and their uses. Index properties of soils, Atterberg's limits, ISI soil classification and plasticity chart. Permeability of soil, coefficient of permeability, determination of coefficient of permeability, Unconfined and confined aquifers, effective stress, quick sand, consolidation of soils, Principles of consolidation, degree of consolidation, pre-consolidation pressure, normally consolidated soil, e-log p curve, computation of ultimate settlement. Shear strength of soils, direct shear test, Vane shear test, Triaxial test. Soil compaction, Laboratory compaction test, Maximum dry density and optimum moisture content, earth pressure theories, active and passive earth pressures, Bearing capacity of soils, plate load test, standard penetration test.

Hydraulics: Fluid properties, hydrostatics, measurements of flow, Bernoulli's theorem and its application, flow through pipes, flow in open channels, weirs, flumes, spillways, pumps and turbines.



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Irrigation Engineering: Definition, necessity, benefits, 211 effects of irrigation, types and methods of irrigation, Hydrology–Measurement of rainfall, run off coefficient, rain gauge, losses from precipitation–evaporation, infiltration, etc. Water requirement of crops, duty, delta and base period, Kharif and Rabi Crops, Command area, Time factor, Crop ratio, Overlap allowance, Irrigation efficiencies. Different type of canals, types of canal irrigation, loss of water in canals. Canal lining–types and advantages. Shallow and deep to wells, yield from a well. Weir and barrage, Failure of weirs and permeable foundation, Slit and Scour, Kennedy’s theory of critical velocity. Lacey’s theory of uniform flow. Definition of flood, causes and effects, methods of flood control, water logging, preventive measure. Land reclamation, Characteristics of affecting fertility of soils, purposes, methods, description of land and reclamation processes. Major irrigation projects in India.

Transportation Engineering: Highway Engineering–cross sectional elements, geometric design, types of pavements, pavement materials–aggregates and bitumen, different tests, Design of flexible and rigid pavements–Water Bound Macadam (WBM) and Wet Mix Macadam (WMM), Gravel Road, Bituminous construction, Rigid pavement joint, pavement maintenance, Highway drainage, Railway Engineering-Components of permanent way–sleepers, ballast, fixtures and fastening, track geometry, points and crossings, track junction, stations and yards. Traffic Engineering–Different traffic survey, speed-flow-density and their interrelationships, intersections and interchanges, traffic signals, traffic operation, traffic signs and markings, road safety.

Environmental Engineering: Quality of water, source of water supply, purification of water, distribution of water, need of sanitation, sewerage systems, circular sewer, oval sewer, sewer appurtenances, sewage treatments. Surface water drainage. Solid waste management–types, effects, engineered management system. Air pollution–pollutants, causes, effects, control. Noise pollution–cause, health effects, control. Structural Engineering Theory of structures: Elasticity constants, types of beams–determinate and indeterminate, bending moment and shear force diagrams of simply supported, cantilever and over hanging beams. Moment of area and moment of inertia for rectangular & circular sections, bending moment and shear stress for tee, channel and compound sections, chimneys, dams and retaining walls, eccentric loads, slope deflection of simply supported and cantilever beams, critical load and columns, Torsion of circular section.



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Junior Engineer (Electrical) (Core Subject)

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Electrical Engineering:

Basic concepts: Concepts of resistance, inductance, capacitance, and various factors affecting them. Concepts of current, voltage, power, energy and their units.

Circuit law : Kirchoffs law, Simple Circuit solution using network theorems.

Magnetic Circuit: Concepts of flux, mmf, reluctance, Different kinds of magnetic materials, Magnetic calculations for conductors of different configuration e.g. straight, circular, solenoidal, etc. Electromagnetic induction, self and mutual induction.

AC Fundamentals: Instantaneous, peak, R.M.S. and average values of alternating waves, Representation of sinusoidal wave form, simple series and parallel AC Circuits consisting of R.L. and C, Resonance, Tank Circuit. Poly Phase system–star and delta connection, 3 phase power, DC and sinusoidal response of R-L and R-C circuit.

Measurement and measuring instruments: Measurement of power (1 phase and 3 phase, both active and reactive) and energy, 2 wattmeter method of 3 phase power measurement. Measurement of frequency and phase angle. Ammeter and voltmeter (both moving coil and moving iron type), extension of range wattmeter, Multimeters, Megger, Energy meter AC Bridges. Use of CRO, Signal Generator, CT, PT and their uses. Earth Fault detection.

Electrical Machines: (a) D.C. Machine–Construction, Basic Principles of D.C. motors and generators, their characteristics, speed control and starting of D.C. Motors. Method of braking motor, Losses and efficiency of D.C. Machines. (b) 1 phase and 3 phase transformers–Construction, Principles of operation, equivalent circuit, voltage regulation, O.C. and S.C. Tests, Losses and efficiency. Effect of voltage, frequency and wave form on losses. Parallel operation of 1 phase /3 phase transformers. Auto transformers. (c) 3 phase induction motors, rotating magnetic field, principle of operation, equivalent circuit, torque-speed characteristics, starting and speed control of 3 phase induction motors. Methods of braking, effect of voltage and frequency variation on torque speed characteristics. Fractional Kilowatt Motors and Single Phase

Induction Motors: Characteristics and applications. Synchronous Machines-Generation of 3-phase e.m.f. armature reaction, voltage regulation, parallel operation of two alternators, synchronizing,



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control of active and reactive power. Starting and applications of synchronous motors. Generation, Transmission and Distribution—Different types of power stations, Load factor, diversity factor, demand factor, cost of generation, interconnection of power stations. Power factor improvement, various types of tariffs, types of faults, short circuit current for symmetrical faults. Switchgears—rating of circuit breakers, Principles of arc extinction by oil and air, H.R.C. Fuses, Protection against earth leakage / over current, etc. Buchholtz relay, Merz-Price system of protection of generators & transformers, protection of feeders and bus bars. Lightning arresters, various transmission and distribution system, comparison of conductor materials, efficiency of different system. Cable Different type of cables, cable rating and derating factor.

Estimation and costing: Estimation of lighting scheme, electric installation of machines and relevant IE rules. Earthing practices and IE Rules.

Utilization of Electrical Energy: Illumination, Electric heating, Electric welding, Electroplating, Electric drives and motors.

Basic Electronics: Working of various electronic devices e.g. P N Junction diodes, Transistors (NPN and PNP type), BJT and JFET. Simple circuits using these devices.



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Junior Engineer (Mechanical) (Core Subject) Advt No. I/28/2/Rectt/2023-24

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Mechanical Engineering:

Theory of Machines and Machine Design

Concept of simple machine, Four bar linkage and link motion, Flywheels and fluctuation of energy, Power transmission by belts – V-belts and Flat belts, Clutches – Plate and Conical clutch, Gears – Type of gears, gear profile and gear ratio calculation, Governors – Principles and classification, Riveted joint, Cams, Bearings, Friction in collars and pivots.

Engineering Mechanics and Strength of Materials

Equilibrium of Forces, Law of motion, Friction, Concepts of stress and strain, Elastic limit and elastic constants, Bending moments and shear force diagram, Stress in composite bars, Torsion of circular shafts, Bucking of columns – Euler's and Rankin's theories, Thin walled pressure vessels.

Thermal Engineering

Properties of Pure Substances: p-v & P-T diagrams of pure substance like H₂O, Introduction of steamtable with respect to steam generation process; definition of saturation, wet & superheated status. Definition of dryness fraction of steam, degree of superheat of steam. H-s chart of steam (Mollier's Chart).

1st Law of Thermodynamics: Definition of stored energy & internal energy, 1st Law of Thermodynamics of cyclic process, Non Flow Energy Equation, Flow Energy & Definition of Enthalpy, Conditions for Steady State Steady Flow; Steady State Steady Flow Energy Equation.

2nd Law of Thermodynamics: Definition of Sink, Source Reservoir of Heat, Heat Engine, Heat Pump & Refrigerator; Thermal Efficiency of Heat Engines & co-efficient of performance of Refrigerators, Kelvin – Planck & Clausius Statements of 2nd Law of Thermodynamics, Absolute or Thermodynamic Scale of temperature, Clausius Integral, Entropy, Entropy change calculation of ideal gas processes. Carnot Cycle & Carnot Efficiency, PMM-2; definition & its impossibility.

Air standard Cycles for IC engines: Otto cycle; plot on P-V, T-S Planes; Thermal Efficiency, Diesel Cycle; Plot on P-V, T-S planes; Thermal efficiency.

IC Engine Performance, IC Engine Combustion, IC Engine Cooling & Lubrication.

Rankine cycle of steam: Simple Rankine cycle plot on P-V, T-S, h-s planes, Rankine cycle efficiency



with & without pump work.

Boilers; Classification; Specification; Fittings & Accessories: Fire Tube & Water Tube Boilers.

Air Compressors & their cycles; Refrigeration cycles; Principle of a Refrigeration Plant; Nozzles & Steam Turbines

Fluid Mechanics & Machinery

Properties & Classification of Fluid: ideal & real fluids, Newton's law of viscosity, Newtonian and Non-Newtonian fluids, compressible and incompressible fluids.

Fluid Statics: Pressure at a point.

Measurement of Fluid Pressure: Manometers, U-tube, Inclined tube.

Fluid Kinematics: Stream line, laminar & turbulent flow, external & internal flow, continuity equation.

Dynamics of ideal fluids: Bernoulli's equation, Total head; Velocity head; Pressure head; Application of Bernoulli's equation.

Measurement of Flow rate Basic Principles: Venturimeter, Pilot tube **Hydraulic**

Turbines: Classifications, Principles.

Centrifugal Pumps: Classifications, Principles,

Performance. Production Engineering

Classification of Steels: mild steel & alloy steel, Heat treatment of steel, Welding – Arc Welding, Gas Welding, Resistance Welding, Special Welding Techniques i.e. TIG, MIG, etc. (Brazing & Soldering), Welding Defects & Testing; NDT, Foundry & Casting – methods, defects, different casting processes, Forging, Extrusion, etc, Metal cutting principles, cutting tools, Basic Principles of machining with (i) Lathe (ii) Milling (iii) Drilling (iv) Shaping (v) Grinding, Machines, tools & manufacturing processes.



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Junior Engineer (Telecom) (Core Subject) Advt No. I/28/2/Rectt/2023-24

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Computer Architecture: Computer architecture, basic computer organization and design programming, CPO, I/Q organization, memory organization. Control unit design. Familiarization with DOS and Window-concept of file, directly, folder, Number system, Programming-Elements of high-level programming Language, PASCAL, C: Use of basic data structure. Web Page Design: Scripting Language – Perl/CGI/Java Script; Fundamentals of JAVA Programming; Advanced Features of JAVA Programming.

Data Communication and Computer Network: Data Network and Networking Basics; MAC& Data Link Layer Network, Transport (TCP/IP). Introduction to Computer Network, LAN,MAN,WAN, Network essentials, Internet addresses, ARP, RARP, Internet protocols, user data, gram protocol, transmission control protocol, internet multi testing, socket interface, domain name system, applications.

Data Structure and Algorithms: Basis concept of data representation, introduction to algorithms design and data structure, Arrays stacks and queues, linked lists, storage allocation and garbage collection, symbol tables, Searching, Sorting and Merging Techniques.

Database Management System: Database, Data models, rational algebra and normalization, statistical quality level, distributed and object data basis. Introduction to the Relational Model; Normalisation and Query Processing; Recovery, Concurrency Management and Database Security.

Electronic/Electrical Measurement & Measuring Instrument: Electrical Measuring instrument, Watt meters and energy meters, measurement of resistance , measurement of inductance and capacitance, electronic voltmeters, audio and radio frequency measurements, A F & R F Power measurement, digital measurement.

Electrical Installation & Maintenance: Single Phase supply vs. 3 phase, Star Delta connection, relation between phase & line voltage power factor. All types of motor and generators-AC & DC Transformers, starters, rectifiers, inverters, batteries. Installation commissioning, earthing insulation. Testing and maintenance, preventive maintenance, electrical accidents and safety measures, switchgear, sub-station maintenance of relays and circuit breakers. A.C. Circuits, Circuit theorems, four terminal passive Networks, Coupled circuits and their analysis, Passive filters, lightning protection, power electronics application in control of drivers, Refrigeration & air-conditioning.



Fundamentals of Digital Circuits : Fundamentals of digital electronics, Transistor as a switching elements; Boolean algebra, simplification of Boolean functions, Karnaugh Maps AND APPLICATIONS; Number system, IC Logic Gates, Logic-Circuits, Encoders and Decoders, binary code converters , Arithmetic logic units (ALU), DTL, TTL, NMOS, PMOS and CMOS gates and their comparison; combination logic circuits; Half adder, full adder; Digital comparator, multiplexer Demultiplexer; ROM and applications. Flip-flops, R-S, J-K,D and T flip-flops; different type of counters and registers; A/D and D/A converters;

Communication Systems: Amplitude, frequency and phase modulation, generation and demodulation, Noise. PCM, basic principles of SPC Exchanges. Quantization & Coding; time division and frequency division multiplexing; Equalization; optical communication in free space & fibre optic; propagation of signals at HF, VHF, UHF and microwave frequency; Satellite Communication.

Foundation in Information Technology:

Information system—Hardware; Software; Software Engineering; Operating systems.

Computing: An Object-Oriented Approach: Introduction to object-oriented concepts; object-oriented programming language; object-oriented analysis and design.

Discrete Electronic Devices & Circuits: The P-N Junction, Junction Diode, Zener Diode, B.J.T. configurations and biasing, low frequency low signal Hybrid models of BJT; JFET, MOSFET, CMOS, photo-electric devices, feedback amplifiers, Oscillators, R.F. Voltage amplifiers using BJT, special semiconductor devices.

Microprocessors: Architecture & programming of 8086/8088, microprocessor-based data acquisition, memory address & DMA controllers, arithmetic co-processor, other microprocessor applications. Study of Peripheral Chips: 8255, 8279, 8155, 8259. Study of ADC 0808, DAC 0800.

Radio Communication Systems: Principles of Radio Communication, A.M., F.M., Radio, Phase Modulation. Signal conditioning and Transmission study of special chips, output interfacing, output instruments-indicators, recorders, data acquisition systems, data loggers, servo mechanism, electronic process control instrumentation. Wave propagation, Microwave devices & components, microwave measurements, antenna fundamental & their characteristic. Audio engineering, sound transducers, sound recording & reproduction, sound transmission, radio transmission, radio reception.



Pharmacist Grade-II (Core Subject) Advt No. I/28/3/Rectt/2023-24

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Introduction of different dosage forms. Their classification with examples-their relative applications. Familiarization with new drug delivery systems. Introduction to Pharmacopoeias with special reference to the Indian Pharmacopoeia.

Metrology-System of weights and measures. Calculations including conversion from one to another system. Percentage calculations and adjustment of products. Use of allegation method in calculations, Isotonic solutions.

Packaging of pharmaceuticals-Desirable features of a container and types of containers. Study of glass & plastics as materials for containers and rubber as a material for closure-their merits and demerits. Introduction to aerosol packaging. Size reduction, objectives, and factors affecting size reduction, methods of size reduction- study of Hammer mill, ball mill, Fluid energy mill and Disintegrator.

Size separation-size separation by sifting. Official standards for powders. Sedimentation methods of size separation. Construction and working of Cyclone separator.

Mixing and Homogenization-Liquid mixing and powder mixing, Mixing of semisolids. Study of silverson Mixer Homogenizer, planetary Mixer; Agitated powder mixer; Triple Roller Mill; Propeller Mixer, colloid Mill and Hand Homogeniser. Double cone mixer.

Clarification and Filtration-Theory of filtration, Filter media; Filter aids and selection of filters. Study of the following filtration equipments Filter Press, sintered filters, Filter candles, Meta filter.

Extraction and Galenicals-

Study of percolation and maceration and their modification, continuous hot extraction- Application in the preparation of tinctures and extracts.

Introduction to Ayurvedic dosage forms.

Heat process-Evaporation-Definition-Factors affecting evaporation-study of evaporating still and Evaporating pan.

Distillation-Simple distillation and Fractional distillation, steam distillation and vacuum distillation. Study of vacuum still, preparation of purified water I.P. and water for Injection I.P. construction and working of the still used for the same.

Introduction to drying process-Study of Tray Dryers; Fluidized Bed Dryer, Vacuum Dryer and Freeze Dryer.

Sterilization-Concept of sterilization and its differences from disinfection Thermal resistance of microorganisms. Detailed study of the following sterilization process. Sterilization with moist heat, Dry heat sterilization, Sterilization by radiation, Sterilization by filtration And Gaseous sterilization.

Aseptic techniques-Applications of sterilization process in hospitals particularly with reference to surgical dressings and intravenous fluids. Precautions for safe and effective handling of sterilization equipment.

Processing of Tablets-Definition; different type of compressed tables and their properties. Processes involved in the production of tablets; Tablets excipients; Defects in tablets; Evaluation of Tablets; Physical standards including Disintegration and Dissolution. Tablet coating-sugar coating; films coating, enteric coating and micro-encapsulation (Tablet coating may be done in an elementary manner.



Processing of Capsules-Hard and soft gelatin capsules; different sizes of capsules; filling of capsules; handling and storage of capsules. Special applications of capsules.

Study of immunological products like sera, vaccines, toxoids & their preparations.

PHARMACOGNOSY

1. Definition, history and scope of Pharmacognosy including indigenous system *of: medicine*.
2. Various systems of *classification* of drugs and natural origin.
3. Adulteration and drug evaluation; significance of pharmacopoeial standards.
4. Brief outline of occurrence, distribution, outline of isolation, identification tests, therapeutic effects and pharmaceutical application of alkaloids, terpenoids, glycosides, *volatile* oils, tannins and resins.
5. Occurrence, distribution, organoleptic evaluation, chemical constituents including tests wherever applicable and therapeutic efficacy of following categories of drugs.
 - **Laxatives**- Aloes, Rhubarb, Castor oil, Ispaghula, Senna.
 - **Cardiotonics**- Digitalis, Arjuna.
 - **Carminatives & G.I. regulators**- Umbelliferous fruits, Coriander, Fennel, Ajowan, Cardamom, Ginger, Blackpepper, Asafoetida, Nutmeg, Cinnamon, Clove.
 - **Astringents**- Catecheu.
 - **Drugs acting on nervous system**- Hyoscyamus, Belladonna, Aconite, Ashwagand ha, Ephedra, Opium, Cannabis, Nux -vomica.
 - **Antihypertensive**- Rauwolfia.
 - **Antitussives**- Vasaka, Tolu balsam, Tulsi.
 - **Antirheumatics**- Guggal, Colchicum.
 - **Antitumour** Vinca.
 - **Antileprotics**- Chaulmoogra *oil*.
 - Antidiabetics Pterocarpus, Gymnema sylvestro.
 - **Diuretics**- Gokhru, Punarnava.
 - Antidysenterics- Ipecacuanha.
 - Antiseptics and disinfectants Benzoin, Myrrh, Neem, Curcuma.
 - **Antimalarials**- Cinchona.
 - **Oxytocics**- Ergot.
 - **Vitamins**- Shark liver oil and Amla.
 - **Enzymes**- Papaya, Diastase, Yeast.
 - **Perfumes and flavoring agents**- peppermint oil, Lemon oil, Orange oil, lemon *grass* oil, sandalwood.

Pharmaceutical aids-Honey, Arachis oil, starch, kaolin, pectin, olive oil. Lanolin, Beeswax, Acacia, Tragacanth, sodium Alginate, Agar, Guar gum, Gelatin.

Miscellaneous- Liquorice, Garlic, picrorhiza, Dirscorea, Linseed, shatavari, shankhpushpi, pyrethrum, Tobacco. Collection and preparation of crude drugs for the market as exemplified by Ergot, opium, Rauwalfia, Digitalis, senna. Study of source, preparation and identification of fibers used in sutures and surgical dressings cotton, silk, wool and regenerated fibers.

Gross anatomical studies *al-senna*, Datura, cinnamon, cinchona, fennel, clove, Ginger, Nuxvomica & ipecacuanha.

BIOCHEMISTRY AND CLINICAL PATHOLOGY



Introduction to biochemistry. Brief chemistry and *role* of proteins, polypeptides and amino acids, classification, Qualitative tests, Biological value, Deficiency diseases.

Carbohydrates: Brief chemistry and role of carbohydrates, classification, qualitative tests, Diseases related to carbohydrate metabolism.

Lipids: Brief chemistry and role of lipids, classification and qualitative tests. Diseases related to lipids metabolism.

Vitamins: Brief chemistry and role of vitamins and coenzymes. Role of minerals and water in life processes.

Enzymes: Brief concept of enzymatic action. Factors affecting it.

Therapeutics: Introduction to pathology of blood and urine. Lymphocytes and platelets, their role in health and disease.

HUMAN ANATOMY AND PHYSIOLOGY

Definition of various terms used in Anatomy. Structure of cell, function of its components with special reference to mitochondria and microsomes.

Elementary tissues: Elementary tissues of the body, i.e. epithelial tissue, muscular tissue, connective tissue and nervous tissue.

Skeletal System: Structure and function of Skelton. Classification of joints and their function. Joint disorders.

Cardiovascular System: Composition of blood, functions of blood elements. Blood group and coagulation of blood. Brief information regarding disorders of blood. Name and functions of lymph glands. Structure and functions of various parts of the heart. Arterial and venous system with special reference to the names and positions of main arteries and veins. Blood pressure and its recording. Brief information about cardiovascular disorders.

Respiratory system: Various parts of respiratory system and their functions, physiology of respiration.

Urinary System: Various parts of urinary system and their functions, structure and functions of kidney. Physiology of urine formation. Patho-physiology of renal diseases and edema.

Muscular System: Structure of skeletal muscle, physiology of muscle contraction. Names, positions, attachments and functions of various skeletal muscles. Physiology of neuromuscular junction.

Central Nervous System: Various parts of central nervous system, brain and its parts, functions and reflex action. Anatomy and physiology of automatic nervous system.

Sensory Organs: Elementary knowledge of structure and functions of the organs of taste, smell, ear, eye and skin. Physiology of pain.

Digestive System: names of various parts of digestive system and their functions. Structure and functions of liver, physiology of digestion and absorption.

Endocrine System: Endocrine glands and Hormones. Location of glands, their hormones and functions. Pituitary, thyroid, Adrenal and pancreas.

Reproductive system: Physiology and Anatomy of Reproductive system.

HEALTH EDUCATION AND COMMUNITY PHARMACY

Concept of health: Definition of physical health, mental health, social health, spiritual health determinants of health, indicatory of health, concept of disease, natural history of diseases, the disease agents, concept of prevention of diseases.

Nutrition and health: Classification of foods, requirements, diseases induced due to deficiency of proteins, vitamins and minerals-treatment and prevention.

Demography and family planning: Demography cycle, fertility, family planning, contraceptive methods, behavioral methods, natural family planning methods, chemical methods, mechanical methods, hormonal contraceptives, population problem of India.

First aid: Emergency treatment in shock, snake-bite, burns, poisoning, heart disease, fractures and resuscitation methods, Elements of minor surgery and dressings.

Environment and health: Source of water supply, water pollution, purification of water, health and air, noise, light-solid waste disposal and control-medical entomology, arthropod borne diseases and their control. Rodents, animals and diseases.



Fundamental principles of microbiology: Classification of microbes, isolation, staining techniques of organisms of common diseases.

Communicable diseases: Causative agents, mode of transmission and prevention. Respiratory infections- chicken pox, measles, influenza, diphtheria, whooping cough and tuberculosis.

Intestinal infection- poliomyelitis, Hepatitis, cholera, Typhoid, food poisoning, Hookworm infection.

Arthropod borne infections- plague, Malaria, filariases.

Surface infection- Rabies, Trachoma, Tetanus, Leprosy.

Sexually transmitted diseases- syphilis, Gonorrhoea, AIDS.

Non-communicable diseases: causative agents, prevention, care and control.

Epidemiology: Its scope, methods, uses, dynamics of disease transmission. Immunity and immunization. Immunological products and their dose schedule. Principles of disease control and prevention, hospital acquired infection, prevention and *control*. Disinfection, types of disinfection procedures, for-faces, urine, sputum, room linen, dead-bodies, instruments.

PHARMACEUTICS (Dispensing Pharmacy)

Prescriptions- Reading and understanding of prescriptions; Latin terms commonly used (Detailed study is not necessary), Modern methods of prescribing, adoption of metric system. Calculations involved in dispensing.

Incompatibilities in prescriptions- study of various types of incompatibilities-physical, chemical and therapeutic.

Posology- Dose and dosage of drugs, factors influencing dose, calculations of doses on the basis of age, sex, surface area and veterinary doses.

Dispensed Medications: (Note: A detailed *study* of the following dispensed medication is necessary. Methods of preparation with theoretical and practical aspects, use of appropriate containers and closures. Special labeling requirements and storage conditions should be highlighted).

Powders- Type of powders-Advantages and disadvantages of powders, *Granules*, cachets and tablet triturates. Preparation of different types of powders encountered in prescriptions. Weighing methods, possible errors in weighing, minimum weighable amounts and weighing of a material below the minimum weighable amount, geometric dilution and proper usage and care of dispensing balance.

Liquid oral Dosage forms:

Monophasic- Theoretical aspects including commonly used vehicles, essential adjuvant like stabilizers, colorants and flavors, with examples.

Review of the following monophasic liquids with details of formulation and practical methods. Liquids for internal administration Liquids for external administration or used on mucous membranes

Mixtures and concentrates, Gargles, Syrups, Mouth *washes*, Throat-paints, Elixirs, *Doucyes*, Ear Drops, Nasal Drops, Sprays, Liniments & Lotions.

Biphasic Liquid Dosage Forms:

Suspensions (elementary study)-Suspensions containing diffusible solids and liquids and their preparations. Study of the adjuvant used like thickening agents, wetting agents, their necessity and quantity to be incorporated, suspensions of precipitate forming liquids like tinctures, their preparations and stability. Suspensions produced by *chemical* reaction. An introduction to flocculated /non-flocculated suspension system.

Emulsions-Types of emulsions, identification of emulsion system, formulation of emulsions, selection of emulsifying agent. Instabilities in emulsions, preservation of emulsions.

Semi-Solid Dosage Forms:

Ointments: Types of ointments, classification and selection of dermatological vehicles.

Preparation and stability of ointments by the following *processes*.

Titration fusion

Chemical reaction

Emulsification.



Pastes. Differences between ointments and pastes, Bases of pastes. Preparation of pastes and their preservation.

bellies: An introduction to the different types of jellies and their preparation. An elementary study of poultice.

Suppositories and pessaries-Their relative merits and demerits, types of suppositories, suppository bases, classification, properties, preparation and packing of suppositories. Use of suppositories of drug absorption.

Dental and cosmetic preparations: Introduction to Dentifrices, *facial cosmetics*, Deodorants. *Anti-* per spirants, shampoo, Hair *dressings* and Hair removers.

Sterile Dosage forms:

Parenteral dosage forms-Definition, General requirements for parenteral dosage forms. Types of parenteral formulations, vehicles, adjuvant, processing and personnel, Facilities and quality control.

Preparation of Intravenous fluids and admixtures-Total parenteral nutrition, Dialysis fluids.

Sterility testing: particulate matter monitoring- F-acuity seal packaging.

Ophthalmic products: study of essential characteristics of different ophthalmic preparations.

PHARMACEUTICAL CHEMISTRY

1. Introduction to the nomenclature of organic chemical systems with particular reference to hetero-cyclic system containing up to 3 rings.

2. The chemistry of following pharmaceutical organic compounds covering their nomenclature, chemical structure, uses and the important physical and chemical properties (chemical structure of only those compounds marked with asterisk (*)). The stability and storage conditions and the different type of pharmaceutical formulations of these drugs and their popular brand names.

Antiseptics and Disinfectants-Proflavine*, Benzalkonium chloride, Cetrimide, Phenol, chloroxylenol, Formaldehyde solution, Hexachlophene, Nitrofurantoin.

Sulphonamides-Sulphadiazine, Sulphaguanidine, Phthalylsulphathiazole, Succinylsulphathiazole, Sulphadimethoxine, Sulphamethoxy pyridazine, Co-trimoxazole, sulfacetamide"

Antileprotic Drugs- Clofazimine, Thiambutosine, Dapsone", solapsone,

Anti-tubercular Drugs- Isoniazid*, PAS*, Streptomycin, Rifampicin, Ethambutol*, Thiacetazone, Ethionamide, cycloserine, pyrazinamide".

Antimoebic and Anthelmintic Drugs- Emetine, Metronidazole, Halogenated hydroxyquinolines, Diloxanide furoate, Paromomycin, Piperazine*, Mebendazole, D.E.C."

Antibiotics- Benzyl penicillin", Phenoxy methyl penicillin*, Benzathine penicillin, Ampicillin*, Cloxacillin, Carbencicillin, Gentamicin, Neomycin, Erythromycin, Tetracycline, Cephalexin, Cephaloridine, Cephalothin, Griseofulvin, Chloramphenicol, Anti-Protozoal, Anti-Helminth.

Antifungal agents- Udecylenic acid, Tolnaftate, Nystatin, Amphotericin, Hamycin.

Antimalarial Drugs-Chloroquine*, Amodiaquine, Primaquine, Proguanil, Pyrimethamine", Quinine, Trimethoprim.

Tranquilizers-Chlorpromazine", Prochlorperazine, Trifluoperazine, Thiothixene, Haloperidol", Triperiodol, Oxypertine, Chlordizepoxide, Diazepam*, Lorazepam, Meprobamate.

Hypnotics-Phenobarbitone", Butobarbitone, Cylobarbitone, Nitrazepam, Glutethimide*, Methypylon, Paraldehyde, Triclofosodium.

General Anaesthetics-Halothane", Cyclopropane", Diethyl ether", Methohexital sodium, Thiopecal sodium, Trichloroethylene.

Antidepressant Drugs- Amitriptyline, Nortriptyline, Imperamine", Phepelzine, Tranlycypromine.

Analeptics- Theophylline, Caffeine*, Coramine', Dextro-amphetamine.

Adrenergic drugs Adrenaline", Noradrenaline, Isoprenaline", Phenylephrine, Salbutamol, Terbutaline, Ephedrine*, Pseudoephedrine.

Autonomic Nervous System (Drugs acting on Autonomic Nervous System)

Adrenergic Drugs & Biochems

Diuretic Drugs- Furosemide", Chlorothiazide, Hydrochlorothiazide", Benzthiazide, Urea*, Mannitol*, Ethacrynic Acid.

Cardiovascular Drugs- Ethylnitrite', Glyceryl trinitrate, Alpha methyl dopa, Guanethidine, Clofibrate, Quinidine.

Hypoglycemic Agents- Insulin, Chlorpropamide", Tolbutamide, Glibenclamide, Phenformin*, Metformin.

Coagulants and Anti coagulants- Heparin, Thrombin, Menadiol ne*, Bisphydroxycoumarin, Warfarin



sodium.

Local Anaesthetics- Lignocaine, Procaine", Benzocaine.

Histamine and anti-Histaminic Agents Histamine, Diphenhydramine", Promethazine, Cyproheptadine, Mepyramine", Pheniramine, Chlorpheniramine*

Analgesics and Anti-pyretics- Morphine, Pethidine, Codeine, Mathadone, Aspirin*, Paracetamol, Analgin, Dextropropoxphene, Pentazocine.

Non-steroidal anti-inflammatory agents- Indomethacin", Phenylbutazone", Oxyphenbutazone, Ibuprofen.

Thyroxine and Antithyroids- Thyroxine", Methimazole, Methyl thiouracil, Propylthiouracil.

Diagnostic Agents- Lopanoic Acid, Propyliodone, Sulfobromophthalein-sodium, Indigotindisulfonate, indigo Carmine, Evans blue, Congo Red, Fluorescein sodium.

Anticonvulsants, cardiac glycosides, Antiarrhythmic, Antihypertensives & Vitamins.

Steroidal Drugs Betamethasone, Cortisone, Hydrocortisone, Prednisolone, Progesterone, Testosterone, Oestradiol, Nandrolone.

Anti-Neoplastic Drugs- Actinomycin, Azathioprie, Busulphan, Chloramubucil, Cisplatin, Cyclophosphamide, Daunorubicin Hydrochloride, Fluorouracil, Mercaptopurine, Methotrexate, Mytomycin.

PHARMACOLOGY & TOXICOLOGY

Introduction to Pharmacology, Scope of Pharmacology.

Routes of administration of drugs, their advantages and disadvantages. Various processes of absorption of drugs and the factors affecting them. Metabolism, distribution and excretion of drugs.

General mechanism of drugs action and their factors which modify drugs action. Pharmacological classification of drugs.

The discussion of drugs should emphasize the following aspects:

Drugs acting on the central Nervous system.

General anaesthetics- adjunction to anaesthesia, *intravenous* anaesthetics. Analgesic antipyretics and non-steroidal.

Anti-inflammatory drugs- Narcotic analgesics. Antirheumatic and anti-gout remedies.

Sedatives and Hypnotics, psychopharmacological agents, anticonvulsants, analeptics. Centrally acting muscle relaxants and anti-parkinsonism agents. Local anesthetics.

Drugs acting on autonomic nervous system.

Neurone blockers and ganglion blockers. Neuromuscular blockers, used in myasthenia gravis.

Drugs acting on eye: Mydriatics, drugs used in glaucoma.

Drugs acting on respiratory system, Respiratory stimulants, Bronchodilators, Nasal decongestants, Expectorants and Antitussive agents.

Autocoids: physiological role of histamine and serotonin, Histamine and Antihistamines, prostaglandins.

Cardio vascular drugs

Cardiotonics, Antiarrhythmic agents, Anti-anginal agents, Antihypertensive agents, peripheral Vasodilators and drugs used in atherosclerosis.

Drugs acting on the blood and blood forming organs. Haematinics, coagulants and anticoagulants, Haemostatic, Blood substitutes and plasma expanders.

Drugs affecting renal function Diuretics and anti-diuretics.

Hormones and hormone antagonists Hypoglycemic agents, Anti--thyroid drugs, sex hormones and oral contraceptives, corticosteroids.

Drugs acting on digestive system carminatives, digest ants, Bitters, Antacids and drugs *used* in peptic ulcer, purgatives and laxatives, Anti-diarrohoeals, Emetics, Anti-emetics, Antispasmodics.

Prescription (Parts), Parts of Prescription.

PHARMACEUTICAL JURISPRUDENCE

Origin and nature of pharmaceutical legislation in India, its *scope* and objectives. Evolution of the "Concept of pharmacy" *as an* integral part of the Health care system.



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Principles and significance of professional Ethics. Critical study of the code of pharmaceutical Ethics drafted by pharmacy council of India.

Pharmacy Act, 1948-The General study of the pharmacy Act with special reference to Education Regulations, Working of state and central councils, constitution of these councils and functions, Registration procedures under the Act.

The Drugs and Cosmetics Act, 1940-General study of the Drugs and cosmetics Act and the Rules there under. *Definitions* and salient features related to retail and whole sale distribution of drugs. The powers of Inspectors, the sampling procedures and the procedure and formalities in obtaining licenses under the rule. Facilities to be provided for running a pharmacy effectively. General study of the schedules with special reference to schedules C,C1,F,G,J,H,P and X and salient features of labeling and storage conditions of drugs.

The Drugs and Magic Remedies (objectionable Advenisement) Act, 1954 General study of thc Act, objectives, special reference to be laid on Advertisements, magic remedies and objections 1 and permitted advertisements- diseases which cannot be claimed to be cured.

Narcotic Drugs and psychotropic substances Act, 1985-A brief study of the act with special reference to its objectives, offences and punishment.

Medicinal and Toilet preparations (excise Duties) Act, 1955 (as amended to date).**Medical Termination of Pregnancy Act, 1971.**

DRUG STORE AND BUSINESS MANAGEMENT

Introduction-Trade, Industry and commerce, Functions and subdivision of commerce, Introduction to Elements for Economics and Management. Forms of Business Organizations. Channels of Distribution.

Drug House Management-selection of site, space Lay-out and legal requirements. Importance and objectives of purchasing, selection of suppliers, credit information, tenders, contracts and price determination and legal requirements thereto. Codification, handling of drug stores and other hospital supplies. Inventory Control objects and importance, modern techniques like ABC,VED analysis, the lead time, inventory carrying cost, safety stock, minimum and maxim um stock levels, economic order quantity, scrap and surplus disposal.

Sales promotion, Market Research, Salesmanship, qualities of a salesman, Advertising and Window Display.

Recruitment, training, evaluation and compensation of the pharmacist.

Banking and Finance-Service and functions of bank, Finance planning and sources of finance.

HOSPITAL AND CLINICAL PHARMACY

Hospital-Definition, Function, classifications based on various criteria, organization, Management and health delivery system in India.

Hospital Pharmacy: Definition Functions and objectives of Hospital pharmaceutical services. Location, Layout, Flow chart of materials and men. Personnel and facilities requirements including equipments based on individual and basic needs. Requirements and abilities required for Hospital pharmacists.

Drug Distribution system in Hospitals. Out-patient service, In-patient services- types of services detailed discussion of unit Dose system, Floor ward stock system,satellite pharmacy services, central sterile services, Bed side pharmacy.

Manufacturing: Economical considerations, estimation of demand.

Sterile manufacture-Large and small volume parenterals, facilities, requirements, layout production planning, man-power requirements.

Non-sterile manufacture-Liquid orals, externals, Bulk concentrates. Procurement of stores and testing of raw materials. Nomenclature and uses of surgical instruments and Hospital Equipments and health accessories.

Hospital Formulary system and their organization, functioning, composition.

Drug Information service and Drug Information Bulletin.

Surgical dressing like cotton, gauze, bandages and adhesive tapes including their pharmacopoeial tests for quality. Other hospital supply eg. I.V.sets, B.G. sets, Ryals tubes, Catheters, Syringes etc.

Application of computers in maintenance of records, inventory control, medication monitoring, drug information and data storage and retrieval in hospital retail pharmacy establishment.



Clinical Pharmacy:

Introduction to Clinical pharmacy practice- Definition, scope.

Modern dispensing aspects- Pharmacists and patient counseling and advice for the use of common drugs, medication history.

Common daily terminology used in the practice of Medicine.

Disease, manifestation and patho-physiology including salient symptoms to understand the disease like Tuberculosis, Hepatitis, Rheumatoid Arthritis, Cardio-vascular diseases, Epilepsy, Diabetes, Peptic Ulcer, Hypertension.

Physiological parameters with their significance.

Drug interactions: Definition and introduction. IV Mechanism of Drug Interaction. Drug-drug interaction with reference to analgesics, diuretics, cardiovascular drugs, Gastro-intestinal agents. Vitamins and Hypoglycemic agents. Drug-food interaction.

Adverse Drug Reaction: Definition and significance. Drug-Induced *diseases* and Teratogenicity.

Drugs in Clinical Toxicity- Introduction, general treatment of poisoning, systemic antidotes, Treatment of insecticide poisoning, heavy metal poison, Narcotic drugs, Barbiturate, Organophosphorus poisons.

Drug **dependences**, drug abuse, addictive drugs and their treatment, complications.

Bio-availability of drugs, including factors affecting it.



Hospital Attendant Grade-II (Core Subject)

Advt No. I/29/5/Rectt/2023-24

(Syllabus is only Indicative. The questions can assess any aspect of knowledge, aptitude, attitude and practical skills, which is expected from a trained person to work efficiently at the advertised post)

1. Meeting the Basic needs of the patient
 - a. **Physical needs-**
 - Comfort, rest, sleep & exercise
 - Body Mechanics- Moving, Lifting, transferring
 - Position & Posture maintenance
 - Beds & bed making- Principles of Bed making, types and care of bed linen
 - Safety devices, restraints Splints
 - b. **Hygienic needs**
 - Personal and environmental hygiene
 - Attendants' role in maintaining personal and environmental hygiene.
 - c. **Elimination needs**
 - Problems- constipation and diarrhoea, retention and incontinence of urine.
 - Offering Bedpan, Urinal
2. First Aid- Definition, Aim and importance, rules/general principles of First Aid, first aid in emergencies.
3. Procedures & Techniques in First Aid
 - Preparation of First aid kit
 - Dressing, bandaging & splinting etc
 - Transportation of the Injured
 - CPR & Basic Life support
4. Communication Skills
 - How to communicate with patients & their relatives.



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हॉस्पिटल अटेंडेंट ग्रेड 2 (मुख्य विषय)

Advt No. I/29/5/Rectt/2023-24

1. रोगी की बुनियादी जरूरतों को पूरा करना

a. शारीरिक आवश्यकताएँ-

- आराम, नींद और व्यायाम
- शारीरिक यांत्रिकी-चलना, उठाना, स्थानांतरित करना
- स्थिति और आसन रखरखाव
- बिस्तर और बिस्तर बनाना- बिस्तर बनाने के सिद्धांत, बिस्तर लिनन के प्रकार और देखभाल
- सुरक्षा उपकरण, निरोधक स्प्लिन्ट्स

b. स्वच्छ आवश्यकताएँ

- व्यक्तिगत और पर्यावरणीय स्वच्छता
- व्यक्तिगत और पर्यावरणीय स्वच्छता बनाए रखने में परिचारकों की भूमिका।

c. उन्मूलन की जरूरतें

- समस्याएं-कब्ज और दस्त, मूत्र का रुकना और असञ्चम।
- बिस्तर पैन की पेशकश मूत्रालय की पेशकश

2. प्राथमिक सहायता - परिभाषा, उद्देश्य और महत्व, प्राथमिक चिकित्सा के नियम/सामान्य सिद्धांत, आपात स्थिति में प्राथमिक चिकित्सा।

3. प्राथमिक चिकित्सा में प्रक्रियाएं और तकनीकें

- प्राथमिक चिकित्सा किट तैयार करना



- ड्रेसिंग, बैंडिज और स्प्लिटिंग आदि
- घायलों का परिवहन
- सीपीआर और बेसिक लाइफ सपोर्ट

4. सञ्चार कौशल

- मरीजों और उनके रिश्तेदारों के साथ कैसे सञ्वाद करें



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Technical Officer (Perfusion)
Advt No. I/28/7/Rectt/2023-24

(Syllabus is only Indicative. The questions can assess any aspect of knowledge, aptitude, attitude and practical skills, which is expected from a trained person to work efficiently at the advertised post)

Core Subject

- General concepts of patient care and nursing
- Basics of human anatomy / physiology/ pathology/ microbiology / Biochemistry
- *Basics of Central Sterilization Services*
- Basics of Cardiopulmonary bypass, priming solutions, transducers, cannulation techniques, mechanics of pumps and oxygenators
- Effects on various organs during CPB and introduction to IABP (Intra-aortic balloon pump) and ECMO (Extra corporeal membrane oxygenation devices)
- Clinical Monitoring, problem detection and problem solving during bypass and understanding of complications.
- Basics of cardiac physiology, respiratory physiology in normal and diseased states, basics of ECG, fundamentals of Echocardiography, and Pulmonary function testing
- Knowledge about transfusion of blood and blood products and maintaining and monitoring anticoagulation during bypass.
- Applied Perfusion Technology, Introduction to Perfusion Technology, Perfusion Equipments, Biomedical Electronics



Tutor- Community Medicine (Core Subject)
Advt No.I/28/6/Rectt/2023-24

(Syllabus is only Indicative. The questions can assess any aspect of knowledge, aptitude, attitude and practical skills, which is expected from a trained person to work efficiently at the advertised post)

- 1. Conceptual (and applied) understanding of Public Health, Community Medicine, clinical disease-oriented approach, Preventive approach & Health promotion, disease control & promotion.**
 - i. Understand and explain the concept & application and give suitable analogies/examples related to Public Health/Community Medicine (with differences), Disease-oriented v/s Preventive approach, health promotion disease control & prevention.
 - ii. Explain correlation between health and human development with analogies/ examples.
 - iii. Explain concept of Primordial, Primary, Secondary and Tertiary prevention with examples.
 - iv. Evolutionary History and mile-stones in Public Health – National and International levels.

- 2. Communicable and Non-Communicable diseases, emerging and re-emerging diseases Learning objectives:**
 - i. Understand and explain Epidemiology of Communicable/Non-communicable diseases- its causes, precipitating factors, social & other non- health causes, mechanisms of transmission, signs/systems, management, control & prevention measures, related national Health Programmes & national Guidelines, Directives, special projects, if any.
 - ii. Explain application of Disease surveillance system in control of Communicable/Non-communicable diseases.
 - iii. Explain & undertake steps to investigate & control outbreaks, epidemics and take measures to prevent the same
 - iv. Evolve prevention & control measures based on local & regional epidemiological funding, synchronizing with National guidelines

- 3. Applied Epidemiology, Health research, Bio-statistics**
 - i. Explain the concept & application of Epidemiology of Disease and Health giving suitable examples.
 - ii. Explain Epidemiological approach, the terms Distribution & Determinants, uses, types of Epidemiological studies, interpretation, merits/demerits and limitations, odds ratio, relative risk, attributable & population attributable risks, Hybrid designs (with examples), validity of Epidemiological Data and application in practice at field level.
 - iii. Explain Epidemiological Research methods, Research related protocols, Literature review, estimating sample size, data collection/ compilation/Analysis/ Research,



- interpretation.
- iv. Develop Health interventional programs based on Epidemiological Finding & create evidence for Public Health action.
 - v. Understand difference between data, information & intelligence, types of data, survey methods, formulating questionnaires, interview schedule, data presentation types & analysis.
 - vi. Apply computer based software application for data designing, data management & collation analysis e.g. SPSS, Epi-info, MS office and other advanced versions.

4. Nutrition

- i. Identify various nutritional problems in the region, state and country and contributing factors for the same, with due emphasis on ecology perspectives.
- ii. Explain importance of various nutrients (including micronutrients) in health, their sources, requirements and problems associated with their deficiencies as well as over consumption.
- iii. Plan balanced diet and dietary requirements of various age and sex groups.
- iv. Dietary/nutritional concerns of vulnerable groups – young children, adolescents, ANC/PNC/Lactating mothers/senior citizens/individuals with various health problems e.g hypertension, diabetes, renal problems etc.
- v. Classification of food, food additives, food fortification, food enrichment, food toxins and food adulteration.
- vi. Explain Food production, Food hygiene and safety, food storage, food preparation, food wastage and feeding practices.
- vii. Assessment of nutritional status of a community by adopting different methodologies.
- viii. Nutritional supplementation, surveillance, education and rehabilitation.
- ix. National programmes in nutrition and their evaluation
- x. National nutrition policy.

5. Environmental health

- i. Highlight importance of external environment (air, water, noise, radiation, temperature, ventilation, solid waste disposal, insects and vectors, domestic and country yard pests, industrial waste disposal etc. and its impact on ecology and human health.
- ii. Elaborate on health issues related to housing, air, water, noise, radiation pollution i.e. size of problems, area and specific groups affected, measurement of pollution levels and health impact of the same, corrective measures
- iii. Elaborate on requirements of water, water chlorination and household purification measures, measurement of chlorine demand, Break-point chlorination levels, water quality.
- iv. Assessment of quality of water and air, control of air pollution
- v. Explain environmental sanitation and control measures (including appropriate technologies) – modern methods of sewage disposal, mechanical ventilation, soakage pits, gobar gas plants, smokeless Chula, solar energy, rainwater harvesting,



- sewage water recycling plants at society level etc.
- vi. Explain global warming and its health impact.
- vii. Elaborate on forest reserves, social forestry and health
- viii. Study vectors of medical importance and integrated control measures against them.
- ix. Explain dynamics of transmission of vector borne diseases
- x. Explain pest control measures
- xi. Explain environmental health issues in urban and rural areas
- xii. Understand functioning of public sector measures to safeguard environmental health e.g water purification plant
- xiii. Explain Legislative measures for protection of environmental health

6. Primary Health Care System, Panchayat Raj, National Health Programmes including RCH, Demography & Family Welfare:

- i. Explain the meaning of Primary Health Care with suitable analogies with reference to India, and be able to define the systems approach for implementation of Primary Health Care.
- ii. Enumerate the elements, principles, population coverage norms, staff patterns, day to day activities, programme schedule, stakeholders at PHC level.
- iii. Explain the scope and implications of 3-tier system of Primary Health Care.
- iv. Understand functioning of Rural Panchayat Raj system of development and its co-relation with health.
- v. Promote community participation in Primary Health Care programme and motivate various stakeholders for the same.
- vi. Understand and comply with medico-legal procedures related to Primary Health Care activities.
- vii. Integrate, coordinate both health and non-health sectors for implementing various national health programmes.
- viii. Deliver the provisions of various health schemes to eligible beneficiaries such as Janani Suraksha Yojana, Rashtriya Swasthya Beema Yojana, Rajiv Gandhi Jeevandayi ArogyaYojana etc.
- ix. Impart training in health programmes for paramedical workers, lab technicians, community health volunteer's, interns and provide health education in the community.
- x. Implement Public Health Skills for investigations and containment of outbreaks & epidemics.
- xi. Understand history of evolution of public health, important milestones in the world and in India.
- xii. Enumerate the various health committees established and their major recommendations since 1947-48 to till date.

7. Health Care Administration, Health Management and Public Health Leadership

- i. Explain the conceptual difference between Administration and Management, Power and Authority with reference to health care.



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- ii. Explain the role of fundamental principles of constitution, principles of Democracy and its correlation with health care administration.
- iii. Explain the role of Bureaucracy, Technocracy, Political system, Judiciary, Media and people in health care administration.
- iv. Explain and identify the key positions and their role in health administration at State, District, Taluka (Tehsil block) and village level.
- v. Explain the frame work of health care system at State, District, Taluka & village level and understand the mechanism of coordination between bureaucrats, technocrats, political, judiciary and media at each of these levels.
- vi. Enumerate functions of a manager, explain concepts of management and leadership styles, various management techniques, planning process, monitoring & evaluation skills.
- vii. Should be sensitive to quality issues in health care management and comply with relevant quality management techniques.
- viii. Formulate and manage team approach for implementing health programmes.
- ix. Apply skills of effective human resource management and identify relevant roles, responsibilities and duties of functionaries.
- x. Implement skills of motivation, communication, negotiation and conflict management at PHC level.
- xi. Develop budgetary statements based on evidence of needs assessment and be able to maintain account of expenditure as per norms.
- xii. Undertake community health needs survey, conduct training & communication needs assessment of paramedical and health workers, identify vulnerable, underprivileged communities, implements high risk approach.

8. Health Policy, Medical Education, Integrating Alternative system of Medicine

- i. Understand and elaborate implications of the policy provision with reference to the current health scenario in the country.
- ii. Explain the role of health policy in promotion of Primary Health care, ensuring equity, inter- sectoral co-ordination, appropriate technology and community participation.
- iii. Explain the various provisions for promotion of preventive and curative health services including National Health Mission, National Health Programs, and Quality Hospital based services, Medical Education and AYUSH.
- iv. Critically appreciate merits and demerits of the Health Policy.
- v. Explain SWOT analysis of the policy and debate on evidence based recommendations, additions, deletions.
- vi. Debate on suggestions or recommendations for future inclusions.

9. Social and behavioral sciences Learning objectives:

- i. Understand influence of social and behavioral practices on health.
- ii. Understand principles of behavior change of an individual and community. Clearly understand difference between knowledge, attitude and practices..



- iii. Understand importance of social medicine and health.
- iv. Importance of behavior change communication (BCC).
- v. Socio-cultural factors influencing behavior change.
- vi. Formal and informal organizations in the community.
- vii. Influence of peer pressure.
- viii. Know the health problems, where BCC interventions are necessary.
- ix. Understand factors promoting and detrimental to BCC.

10. Public Health Legislations Learning objectives:

- i. Explain public health legislations and need for the same.
- ii. Know in detail each public health law – when, why, implementation, impact, issues etc.
- iii. Enforcement of various public health laws.
- iv. Judiciary mechanism for ensuring proper implementation of public health laws.
- v. Scope for integrated approach for implementation of public health laws.

11. International Health Learning Objectives:

- i. Understand the need and scope for international health measures.
- ii. Enlist and understand functioning of various UN agencies (including WHO) playing key role in international health.
- iii. Enlist and understand functioning of bilateral vs multilateral international donor agencies.
- iv. Provide advice to international travelers and vaccination requirements,
- v. Understand International health control measures e.g. quarantine, airport management etc.
- vi. Understand the management of international ports from health perspectives.

12. Occupational Health Learning Objectives:

- i. Understand the concept of occupational health and its importance, Occupational environment and work dynamics.
- ii. Know different types of occupational exposures at various settings.
- iii. Enlist various occupational hazards and their relative magnitude.
- iv. Understand measurement of exposure levels to harmful influences during occupation.
- v. Understand preventive and control measures against various occupational hazards – global, national and local level measures.
- vi. Understand individual and community responses towards preventing exposure to occupational hazards.
- vii. Understand and advise occupational safety measures.
- viii. Understand legislative measures to prevent exposures to occupational hazards.



- ix. Advice compensation provisions to persons exposed to various occupational hazards.
- x. Understand occupational health problems amongst people in unorganized sector
- xi. Understand and advise social security and welfare provisions for workers – ESIS, Factory's Act, Role of ILO, Ministry of Labor, DGFASLI.

13. The recent advances in Public Health & miscellaneous issues Learning Objectives:

- i. Identify & enlist events at local, district, national & global levels influencing or adversely affecting health /medical issues of the population.
- ii. Adopt & practice skills related to utilization of modern technology, software, IT application in the interest of health promotion & disease prevention.

14. Health Economics Learning Objectives:

- i. Describe the scope of health economics.
- ii. Understand health market & its characteristics.
- iii. Understand & apply economic evaluation techniques.
- iv. Assess the mechanism of Funding Health Care services, especially health insurance.
- v. Advise on allocation of resources appropriately in their work area.

15. MOLECULES AND THEIR INTERACTION RELEVANT TO BIOLOGY

- i. Structure of atoms, molecules and chemical bonds.
- ii. Composition, structure and function of biomolecules (carbohydrates, lipids, proteins, nucleic acids and vitamins).
- iii. Stabilizing interactions (Vander Waals, electrostatic, hydrogen bonding, hydrophobic interaction, etc.).
- iv. Principles of biophysical chemistry (pH, buffer, reaction kinetics,
- v. thermodynamics, colligative properties).
- vi. Bioenergetics, glycolysis, oxidative phosphorylation, coupled reaction
- vii. group transfer, biological energy transducers.
- viii. Principles of catalysis, enzymes and enzyme kinetics, enzyme regulation, mechanism of enzyme catalysis, isozymes
- ix. Conformation of proteins (Ramachandran plot, secondary structure, domains, motif and folds).
- x. Conformation of nucleic acids (helix(A, B,Z), t-RNA, micro-RNA).
- xi. Stability of proteins and nucleic acids.
- xii. Metabolism of carbohydrates, lipids, amino acids nucleotides and vitamins.
- xiii.



16. CELLULAR ORGANIZATION

- i. **Membrane structure and function**
(Structure of model membrane, lipid bilayer and membrane protein diffusion, osmosis, ion channels, active transport, membrane pumps, mechanism of sorting and regulation of intracellular transport, electrical properties of membranes).
- ii. **Structural organization and function of intracellular organelles** (Cell wall, nucleus, mitochondria, Golgibodies, lysosomes, endoplasmic reticulum, peroxisomes, plastids, vacuoles, chloroplast, structure & function of cytoskeleton and its role in motility).
- iii. **Organization of genes and chromosomes** (Operon, unique and repetitive DNA, interrupted genes, gene families, structure of chromatin and chromosomes, heterochromatin, euchromatin, transposons).
- iv. **Cell division and cell cycle** (Mitosis and meiosis, their regulation, steps in cell cycle, regulation and control of cell cycle).
- v. **Microbial Physiology** (Growth yield and characteristics, strategies of cell division, stress response)

17. FUNDAMENTAL PROCESSES

- i. **DNA replication, repair and recombination** (Unit of replication, enzymes involved, replication origin and replication fork, fidelity of replication, extra chromosomal replicons, DNA damage and repair mechanisms, homologous and site-specific recombination).
- ii. **RNA synthesis and processing** (transcription factors and machinery, formation of initiation complex, transcription activator and repressor, RNA polymerases, capping, Elongation, and termination, RNA processing, RNA editing, splicing, and polyadenylation, structure and function of different types of RNA, RNA transport).
- iii. **Protein synthesis and processing** (Ribosome, formation of initiation complex, initiation factors and their regulation, elongation and elongation factors, termination, genetic code, amino acylation, tRNA, tRNA-identity, aminoacyl-tRNA synthetase, and translational proof-reading, translation inhibitors, Post-translational modification of proteins).
- iv. **Control of gene expression at transcription and translation level** (regulating the expression of phages, viruses, prokaryotic and eukaryotic genes, role of chromatin in gene expression and gene silencing).

18. Cell communication and cell signaling

- i. **Host parasite interaction** Recognition and entry processes of different pathogens like bacteria, viruses into animal and plant host cells, alteration of host cell behavior by pathogens, virus-



induced cell transformation, pathogen-induced diseases in animals and plants, cell-cell fusion in both normal and abnormal cells.

- ii. **Cell signaling** Hormones and their receptors, cell surface receptor, signaling through G-protein coupled receptors, signal transduction pathways, second messengers, regulation of signaling pathways, bacterial and plant two- component systems, light signaling in plants, bacterial chemotaxis and quorum sensing.
- iii. **Cellular communication** Regulation of hematopoiesis, general principles of cell communication, cell adhesion and roles of different adhesion molecules, gap junctions, extracellular matrix, integrins, neurotransmission and its regulation.
- iv. **Cancer**
Genetic rearrangements in progenitor cells, on cogenes, tumor suppressor genes, cancer and the cell cycle, virus-induced cancer, metastasis, interaction of cancer cells with normal cells, apoptosis, therapeutic interventions of uncontrolled cell growth.
- v. **Innate and adaptive immune system** Cells and molecules involved in innate and adaptive immunity, antigens, antigenicity and immunogenicity. Band Tcell epitopes, structure and function of antibody molecules. generation of antibody diversity, monoclonal antibodies, antibody engineering, antigen-antibody interactions, MHC molecules, antigen processing and presentation, activation and differentiation of BandT cells, BandT cell receptors, humoral and cell- mediated immune responses, primary and secondary immune modulation, the complement system, Toll-like receptors, cell-mediated effector functions, inflammation, hypersensitivity and auto immunity, immune response during bacterial (tuberculosis), parasitic(malaria) and viral(HIV) infections, congenital and acquired immune deficiencies, vaccines.

19. DEVELOPMENTAL BIOLOGY

i. **Basic concepts of development:** Potency, commitment, specification, induction, competence, determination and differentiation; morpho genetic gradients; cell fate and cell lineages; stemcells; genomic equivalence and the cytoplasmic determinants; imprinting; mutants and transgenics in analysis of development

ii. **Gametogenesis, fertilization and early development:** Production of gametes, cell surface molecules in sperm-egg recognition in animals; embryo sac development and double fertilization in plants; zygote formation, cleavage, blastula formation, embryonic fields, gastrulation and formation of germ layers in animals; embryogenesis, establishment of symmetry in plants; seed formation and germination.

iii. **Morphogenesis and organogenesis in animals:** Cell aggregation and differentiation in *Dictyostelium*; axes and pattern formation in *Drosophila*, amphibia and chick; organogenesis– vulva formation in *Caenor habditi selegans*, eyelens induction, limb development and regeneration



invertebrates; differentiation of neurons, post embryonic development-larval formation, metamorphosis; environmental regulation of normal development sex determination.

iv. Morphogenesis and organogenesis in plants: Organization of shoot and root apical meristem; shoot and root development; leaf development and phyllotaxy; transition to flowering, floral meristems and floral development in *Arabidopsis* and *Antirrhinum*

v. Programmed cell Death, aging & senescence

20. SYSTEM PHYSIOLOGY-PLANT

- i. Photosynthesis**-Light harvesting complexes; mechanisms of electron transport; photo protective mechanisms; CO₂ fixation-C₃, C₄ and CAM pathways.
- ii. Respiration and photo respiration**-Citric acid cycle; plant mitochondrial electron transport and ATP synthesis; alternate oxidase; photo respiratory pathway.
- iii. Nitrogen metabolism** -Nitrate and ammonium assimilation; amino acid biosynthesis.
- iv. Plant hormones**- Biosynthesis, storage, breakdown and transport; physiological effects and mechanisms of action.
- v. Sensory photobiology**- Structure, function and mechanisms of action of phyto chromes, cryptochromes and phototropins; stomatal movement; photoperiodism and biological clocks.
- vi. Solute transport and photo assimilate translocation**-uptake, transport and translocation of water, ions, solute and macromolecules from soil, through cells, across membranes, through xylem and phloem; transpiration; mechanisms of loading and unloading of photo assimilates.
- vii. Secondary metabolites**-Bio synthesis of terpenes, phenols and nitrogenous compounds and their roles.
- viii. Stress physiology**-Responses of plants to biotic (pathogen and insects) and abiotic (water, temperature and salt) stresses.

21. SYSTEM PHYSIOLOGY- ANIMAL

- i. Blood and circulation**- Blood corpuscles, haemopoiesis and formed elements, plasma function, blood volume, blood volume regulation, blood groups, hemoglobin, immunity, haemostasis.
- ii. Cardiovascular System:** Comparative anatomy of heart structure, myogenic heart, specialized tissue, ECG-its principle and significance, cardiac cycle, heart as a pump, blood pressure,



neural and chemical regulation of all above.

- iii. **Respiratory system**- Comparison of respiration in different species, anatomical considerations, transport of gases, exchange of gases, waste elimination, neural and chemical regulation of respiration.
- iv. **Nervous system**-Neurons, action potential, gross neuro anatomy of the brain and spinal cord, central and peripheral nervous system, neural control of muscle tone and posture.
- v. **Sense organs**-Vision, hearing and tactile response.
- vi. **Excretory system**- Comparative physiology of excretion, kidney, urine formation, urine concentration, waste elimination, micturition, regulation of water balance, blood volume, blood pressure, electrolyte balance, acid-base balance.
- vii. **Thermoregulation**- Comfort zone, body temperature–physical, chemical, neural regulation, acclimatization.
- viii. **Stress and adaptation**
- ix. **Digestive system** - Digestion, absorption, energy balance, BMR.
- x. **Endocrinology and reproduction**- Endocrine glands, basic mechanism of hormone action, hormones and diseases; reproductive processes, gametogenesis, ovulation, neuro endocrine regulation

22. INHERITANCE BIOLOGY

- i. **Mendelian principles:** Dominance, segregation, independent assortment.
- ii. **Concept of gene:** Allele, multiple alleles, pseudoallele, complementation tests
- iii. **Extensions of Mendelian principles:** Codominance, incomplete dominance, gene interactions, pleiotropy, genomic imprinting, penetrance and expressivity, phenocopy, linkage and crossing over, sex linkage, sex limited and sex influenced characters.
- iv. **Gene mapping methods:** Linkage maps, tetrad analysis, mapping with molecular markers, mapping by using somatic cell hybrids, development of mapping population in plants.
- v. **Extra chromosomal inheritance :** Inheritance of Mitochondrial and chloroplast genes, maternal inheritance.
- vi. **Microbialgenetics:**Methods of genetic transfers–transformation, conjugation, transduction and



sex-duction, mapping genes by interrupted mating, fine structure analysis of genes.

vii. Human genetics: Pedigree analysis, lod score for linkage testing, karyotypes, genetic disorders.

viii. Quantitative genetics: Polygenic inheritance, heritability and its measurements, QTL mapping.

ix. Mutation: Types, causes and detection, mutant types—lethal, conditional, biochemical, loss of function, gain of function, germinal verses somatic mutants, insertional mutagenesis.

x. Structural and numerical alterations of chromosomes: Deletion, duplication, inversion, translocation, ploidy and their genetic implications.

xi. Recombination : Homologous and non-homologous recombination including trans position.

23. DIVERSITY OF LIFE FORMS:

i. Principles & method of taxonomy:

Concepts of species and hierarchical taxa, biological nomenclature, classical & quantitative methods of taxonomy of plants, animals and micro organisms.

ii. Levels of structural organization:

Unicellular, colonial and multi cellular forms. Levels of organization of tissues, organs & systems. Comparative anatomy, adaptive radiation, adaptive modifications.

iii. Outline classification of plants, animals & micro organisms:

Important criteria used for classification in each taxon. Classification of plants, animals and micro organisms. Evolutionary relationships among taxa.

iv. Natural history of Indian subcontinent:

Major habitat types of the subcontinent, geographic origins and migrations of species. Common Indian mammals, birds. Seasonality and phenology of the subcontinent.

v. Organisms of health & agricultural importance:

Common parasites and pathogens of humans, domestic animals and crops.

vi. Organisms of conservation concern:

Rare, endangered species. Conservation strategies.

24. ECOLOGICAL PRINCIPLES



The Environment: Physical environment; biotic environment; biotic and abiotic interactions.

Habitat and Niche: Concept of habitat and niche; niche width and overlap; fundamental and realized niche; resource partitioning; character displacement.

Population Ecology: Characteristics of a population; population growth curves; population regulation; life history strategies (*r* and *K* selection); concept of meta population—demes and dispersal, interdemec extinctions, age structured populations.

Species Interactions: Types of interactions, inter specific competition, herbivory, carnivory, pollination, symbiosis.

Community Ecology: Nature of communities; community structure and attributes; levels of species diversity and its measurement; edges and ecotones.

Ecological Succession: Types; mechanisms; changes involved in succession; concept of climax.

Ecosystem Ecology: Ecosystem structure; ecosystem function; energy flow and mineral cycling (C, N, P); primary production and decomposition; structure and function of some Indian ecosystems: terrestrial (forest, grassland) and aquatic (fresh water, marine, eustarine).

Biogeography: Major terrestrial biomes; theory of island biogeography; bio geographical zones of India.

Applied Ecology: Environmental Pollution; global environmental change; biodiversity: status, monitoring and documentation; major drivers of biodiversity change; biodiversity management approaches.

Conservation Biology: Principles of conservation, major approaches to management, Indian case studies on conservation/management strategy (Project Tiger, Biosphere reserves).

25. EVOLUTION AND BEHAVIOUR

i. Emergence of evolutionary thoughts

Lamarck; Darwin—concepts of variation, adaptation, struggle, fitness and natural selection; Mendelism; Spontaneity of mutations; The evolutionary synthesis.

ii. Origin of cells and unicellular evolution:

Origin of basic biological molecules; Abiotic synthesis of organic monomers and polymers; Concept of Oparin and Haldane; Experiment of Miller (1953); The first cell;



Evolution of prokaryotes; Origin of eukaryotic cells; Evolution of unicellular eukaryotes; anaerobic metabolism, photosynthesis and aerobic metabolism.

iii. Paleontology and Evolutionary History:

The evolutionary time scale; Eras, periods and epoch; Major events in the evolutionary time scale; Origins of unicellular and multicellular organisms; Major groups of plants and animals; Stages in primate evolution including Homo.

iv. Molecular Evolution:

Concepts of neutral evolution, molecular divergence and molecular clocks; Molecular tools in phylogeny, classification and identification; Protein and nucleotide sequence analysis; origin of new genes and proteins; Gene duplication and divergence.

v. The Mechanisms:

Population genetics – Populations, Genepool, Gene frequency; Hardy-Weinberg Law; concepts and rate of change in gene frequency through natural selection, migration and random genetic drift; Adaptive radiation; Isolating mechanisms; Speciation; Allopatricity and Sympatricity; Convergent evolution; Sexual selection; Co-evolution.

vi. Brain, Behavior and Evolution:

Approaches and methods in study of behavior; Proximate and ultimate causation; Altruism and devolution-Group selection, Kinselection, Reciprocal altruism; Neural basis of learning, memory, cognition, sleep and arousal; Biological clocks; Development of behavior; Social communication; Social dominance; Use of space and territoriality; Mating systems, Parental investment and Reproductive success; Parental care; Aggressive behavior; Habitat selection and optimality in foraging; Migration, orientation and navigation; Domestication and behavioral changes.



26. **APPLIED BIOLOGY:**

- i. Microbial fermentation and production of small and macro molecules.
- ii. Application of immunological principles, vaccines, diagnostics. Tissue and cell culture methods for plants and animals.
- iii. Transgenic animals and plants, molecular approaches to diagnosis and strain identification.
- iv. Genomics and its application to health and agriculture, including gene therapy.
- v. Bio resource and uses of biodiversity.
- vi. Breeding in plants and animals, including marker– assisted selection
- vii. Bioremediation and phytoremediation
- viii. Biosensors

27. **METHODS IN BIOLOGY**

i. Molecular Biology and Recombinant DNA methods:

Isolation and purification of RNA, DNA (genomic and plasmid) and proteins, different separation methods.

Analysis of RNA, DNA and proteins by one and two dimensional gel electrophoresis, Iso electric focusing gels.

Molecular cloning of DNA or RNA fragments in bacterial and eukaryotic systems.

Expression of recombinant protein using bacterial, animal and plant vectors.

Isolation of specific nucleic acid sequences

Generation of genomic and cDNA libraries in plasmid, phage, cosmid, BAC and YAC vectors.

In vitro mutagenesis and deletion techniques, gene knock out in bacterial and eukaryotic organisms.

Protein sequencing methods, detection of post translation modification of proteins.

DNA sequencing methods, strategies for genome sequencing.

Methods for analysis of gene expression at RNA and protein level, large scale expression, such as micro array based techniques

Isolation, separation and analysis of carbohydrate and lipid molecules

RFLP, RAPD and AFLP techniques



ii. **Histochemical and Immuno techniques**

Anti body generation, Detection of molecules using ELISA, RIA, western blot, immune precipitation, fluocytometry and immune fluorescence microscopy, detection of molecules in living cells, in situ localization by techniques such as FISH and GISH.

i. **Biophysical Method:**

Molecular analysis using UV/visible, fluorescence, circular dichroism, NMR and ESR spectroscopy Molecular structure determination using X-ray diffraction and NMR, Molecular analysis using light scattering, different types of mass spectrometry and surface plasma resonance methods.

ii. **Statistical Methods:**

Measures of central tendency and dispersal; probability distributions (Binomial, Poisson and normal); Sampling distribution; Difference between parametric and non-parametric statistics; Confidence Interval; Errors; Levels of significance; Regression and Correlation; t-test; Analysis of variance; χ^2 test; Basic introduction to Multivariate statistics, etc.

iii. **Radio labeling techniques:**

Detection and measurement of different types of radioisotopes normally used in biology, incorporation of radioisotopes in biological tissues and cells, molecular imaging of radioactive material, safety guide lines.

iv. **Microscopic techniques:**

Visualization of cells and sub cellular components by light microscopy, resolving powers of different microscopes, microscopy of living cells, scanning and transmission microscopes, different fixation and staining techniques for EM, freeze-etc hand freeze- fracture methods for EM, image processing methods in microscopy.

v. **Electrophysiological methods:**

Single neuron recording, patch-clamp recording, ECG, Brain activity recording, lesion and stimulation of brain, pharmacological testing, PET, MRI, fMRI, CAT

vi. **Methods in field biology:**

Methods of estimating population density of animals and plants, ranging patterns through direct, indirect and remote observations, sampling methods in the study of behavior, habitat characterization: ground and remote sensing methods.



Tutor (Physiotherapy) (Core Subject)
Advt No. I/28/6/Rectt/2023-24

(Syllabus is only Indicative. The questions can assess any aspect of knowledge, aptitude, attitude and practical skills, which is expected from a trained person to work efficiently at the advertised post)

➤ **Biomechanics & Kinesiology**

1. Concepts in Biomechanics: Kinematics and Kinetics
2. Joint structure and Function
3. Muscle structure and function
4. Biomechanics of the Thorax and Chest wall
5. Biomechanics of the vertebral column
6. Analysis of Posture and Gait

➤ **Exercise Therapy**

➤ **Electro Therapy**

➤ **Heating Modalities**

➤ **Physiotherapy in Orthopedics & Sports**

1. PT assessment for Orthopedic conditions, Fractures and dislocations
2. Degenerative and inflammatory conditions
3. Infective conditions
4. Cerebral palsy
5. Poliomyelitis
6. Leprosy
7. Amputations
8. Spinal disorders
9. Only Modern-Spinal Traction
10. Osteoporosis
11. Orthopedic surgeries: Pre and post-operative
12. Arthroplasty & associated Physiotherapy
13. Introduction to Bio-Engineering; Orthosis and prosthesis
14. Sports Physiotherapy
15. Applied Yoga in orthopedic conditions.



Physiotherapy in General Medicine & General Surgery

1. Physiotherapy in mother and child care
2. Geriatrics—handling of old patients and their problems.
3. Physiotherapy in pre and post-operative stages.
4. Physiotherapy in dentistry
5. Burns and its treatment
6. Physiotherapy intervention in the management of Medical, Surgical and Radiation Oncology Cases.

Physiotherapy in Neurology & Psychosomatic Disorder-

1. Neurological Assessment
2. Neuro physiological Techniques
3. Management of Brain and Spinal Cord Disorders
4. Evaluation and Management of Cerebellar, Spinal Cord and Muscle Disorders
5. Evaluation and Management of Peripheral Nerve Injuries

Physiotherapy In Cardiovascular, Pulmonary

1. Investigations and tests – Exercise tolerance Testing – Cardiac & Pulmonary, Radiographs, PFT, ABG, ECG, Hematological and Biochemical Tests.
2. Physiotherapy techniques to increase lung volume, decrease work of breathing, clear secretions
3. Drug therapy
4. Neonatal and Pediatric Physiotherapy
5. Physiotherapy in Obstructive lung conditions, Restrictive Lung Condition
6. Pulmonary Rehabilitation.
7. Physiotherapy following Lung surgeries
8. Respiratory failure—Oxygen Therapy and Mechanical Ventilation.
9. Introduction to ICU
10. Physiotherapy management after cardiac surgeries.
11. Cardiac Rehabilitation.
12. Physiotherapy management following PVD.
13. Applied Yoga in Cardio-respiratory conditions

Community Physiotherapy & Rehabilitation-



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1. Rehabilitation: Definition, Types.
2. Community Based Rehabilitation
3. Planning and management of CBR Programmes
4. Disability Evaluation
5. Role of Physiotherapy in CBR
6. Screening and rehabilitation of pediatrics disorders in the community
7. Extension services and mobile units: Introduction, Need, Camp approach.
8. Vocational training in rehabilitation