YOUTH COMPETITION TIMES

RAJASTHAN CIVIL ENGINEERING SOLVED PAPERS

(English Medium)

USEFULL FOR : ■ **RSSB JE (Diploma/Degree)** ■ **RPSC Lecturer** ■ **RPSC AE** ■ **RIICO AE** ■ **DLB AE** ■ **Asst. Town Planner** ■ **RIICO Draftsman** ■ **RPSC Surveyor** ■ **DLB Senior Draftsman** ■ **RPSC ACF** ■ **HRRL** ■ **JMRC JE** ■ **JDA** ■ **RSPCB (JE, JEE & JSO) etc.**

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Publisher Declaration

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Index

RSMSSB Civil Engineering Syllabus

- **The RSMSSB JE Exam will contain 120 marks and two subjects.**
  - The total duration of the exam will be 2 hours.
  - A total of 120 questions will be asked in the exam and each question will carry one mark.
  - There shall be a negative marking of 1/3rd of the assigned mark for every wrong answer.
  - **Mentioned below is the RSMSSB JE Exam Pattern:**

Name of the Subjects	Marks	Duration
General Knowledge	40	2 hrs
Engineering Degree/Diploma related subjects	80	
Total	**120**	

Part–A : General Knowledge

The GK portion is common for all aspirants. It includes major information from the perspective of the Rajasthan state.
History, Art and Culture, Literature, Traditions, and Heritage of Rajasthan, Geography of Rajasthan, Political and Administrative System of Rajasthan

Part–B : Civil Engineering (Degree)

1. Building Technology And Construction Management

Building Materials, stones, bricks, steel, Timber, lime, cement, sand, aggregates for cement concrete, paints, distempers, use of pozzolana manufacturing of lime concrete, cement for plain, reinforced and pre-stressed concrete work.

Road Materials: Coarse aggregate, screenings and binding materials for WBM, Bricks for soling, Coarse and fine aggregate for bituminous roads, IRC standard size aggregates, Tars and Asphalt, Asphaltic concrete, Asphaltic emulsions, Mastic Asphalt and Minerals fillers.

Construction Management: Plants and equipments, planning for construction using network analysis CPM and PERT techniques.

2. Fluid Mechanics

Fluids: Definition, Ideal fluids, real fluids, Newtonian and Non-Newtonian fluids.

Properties of Fluids: Units of measurement, Mass density, Specific weight, Specific volume, Specific Gravity, Viscosity, Surface tension and Capillarity, Compressibility and Elasticity.

Hydrostatics: Pressure at a point in a static fluid, pressure variation in an incompressible static fluid; atmospheric pressure, Gauge pressure, vacuum pressure, absolute pressure, Manometers Bourdon pressure gauge.

Buoyancy: Forces acting on immersed plane surface. Centre of pressure, forces on curved surfaces. Conditions of equilibrium for floating bodies, meta-centre and metacentric height experimental and analytical determination of metacentric height.

Equilibrium of Fluid particles and flow: Fluid mass subjected to horizontal and vertical acceleration and uniform rotation.

Hydro-kinematics: Types of Flows: Steady and unsteady, uniform and non-uniform, stream lines, path lines, stream tubes, principles of conservation of mass, equation of continuity, acceleration of fluid particles local and connective, Rotational and irrotational motions, free and forced vortex, circulation and voracity velocity potential and stream function, elementary treatment of flow net, Euler's equation of motion and integration of Euler's equations, Bernoulli's equation for incompressible Fluids, assumptions in Bernoulli's equation, Energy correction factor.

Applications of Bernoulli's equation: Pitot tube, Venturi meter, orifice meter, orifices & mouth pieces, time of emptying of tanks by orifices, sharp edged rectangular, triangular and trapezoidal notches, Francis formula. Velocity of approach. End contractions Cippoletti Weir, time of emptying reservoirs by weirs.

Momentum Equation and its Application: Development of momentum equation by control volume concept, Momentum correction factor, applications-Board's mouth pieces, sudden enlargement of flow, pressure of flat plates, Nozzles.

Flow Through Pipes: Laminar flow, Reynolds experiment, transition from laminar to turbulent flow. Turbulent Flow: Laws of fluid friction, friction factor Moody's diagram, loss of head due to friction and other causes. Hydraulic gradient, total energy line Chezzy's, Darcy's and Manning's formula, flow through parallel pipes and pipes in series flow through branched pipes. Flow along a bypass. Power transmission through pipe, condition for maximum power. Elementary water hammer concept.

3. Surveying, Estimating Costing & Field Engineering

Introduction: Importance of surveying to engineers, Plane and geodetic surveying, methods of location of points, principle of surveying from whole to part, conventional signs.

Measurement of Distances: Different types of chains, tapes and their uses. Sources of error and precautions, corrections to tape measurements. Field problems in distance measurement. Advance techniques of distance measurement.

Measurement of Angles & Direction: Different types of direction measuring instruments and their uses. Reference meridians, Bearing and azimuths, magnetic declination and its variation. Use and adjustment of surveyors and prismatic compass.

Vernier and micro optic theodolite, temporary and permanent adjustment of Vernier theodolite Measurement of horizontal and vertical angle by different methods. Application of theodolite in field problems.

Traversing: Different methods of traversing; chain traverse, chain & compass traverse, transit-tape traverse. Methods of computations and adjustment of traverse; transit rule, Bowditch rule, graphical method, axis method. Gales traverse table.

Leveling: Definitions of various terms in leveling. Different types of leveling, sources of errors in leveling curvature and refraction corrections. Temporary and permanent adjustment of dumpy and tilting levels. Computation and adjustment of level. profile leveling L-Section and cross-sections.

Plane Table Surveying: Elements of plane table survey working operations, methods of plane table survey; inter section, traversing and resection, two point and three point problem.

Contouring: Characteristics of contours, contour interval, contour gradient, Methods of locating contours, uses of contour maps.

Trigonometric Leveling: Trigonometric leveling, Objects accessible and non accessible, Determination of levels object-when.

Field Astronomy: Definitions of terminology used in Astronomy.

Introduction to Remote Sensing and GIS Estimation for quantities for various types of construction, Rate Analysis, Preparation of Tender & contract documents, Centre-line diagram, Building layout.

4. Irrigation & Water Resources **8.**

Definition, necessity, benefits, types and method 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.

5. Theory of Structures and Strength of Materials

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. Springs, Vibration.

6. Structural Analysis

Introduction to Indeterminate structures, Degrees of freedom per node, Static and Kinematic indeterminacy (i.e. for beams, frames & portal with & without sway etc), Releases in structures, Maxwell's reciprocal theorem and Betti's theorem, Analysis of Statically Indeterminate Structures using Slope – deflection method. Analysis of structures using Moment-distribution method applied to continuous beams and portal frames with and without inclined members. Unit load method & their applications : deflection of determinate beams and frames, analysis of determinate and redundant frames up to two degree of redundancy, lack of fit in redundant frames.

7. Soil Mechanics and Foundations Engineering

Origin of soil, phase diagram, Definitions-void ratio, porosity, degree of saturation, water content, specific gravity of soil grains, unit weight, 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 pressure, bearing capacity of soils, plate load test, standard penetration test.

Design of R.C. Concrete and Masonry Structures

RCC beams-flexural strength, shear strength, bond strength, design of singly reinforced and double reinforced beams, cantilever beams. T-beams, lintels. One way and two way slabs, isolated footings, Reinforced brick works, columns, staircases, retaining wall, water tanks (RCC design questions may be based on both Limit State and Working Stress methods).

Concrete Technology: Properties, Advantages and uses of concrete, cement aggregates, importance of water quality, water cement ratio, workability, mix design, storage, batching, mixing, placement, compaction, finishing and curing of concrete, quality control of concrete, hot weather and cold weather concreting, repair and maintenance of concrete structures.

9. Design of Steel Structures

Steel Design: Steel design and construction of steel columns, beams roof trusses plate girders.

10. Construction Technology

Stone and Brick Masonry: Ashlar, course and random rubble, stone pillar, dry stone and arch masonry, brick bonds and type of walls.

Lintels: Plastering, pointing, flooring, Expansion and construction joints, Centering and shuttering, General Selection criteria of site, Planning and orientation of buildings.

Roofing: Stone slab, RCC, G.C. Steel, Asbestos cement and jack arch roofing.

Flooring: Cement concrete, flag stone, Terrazzo mosaic terrazzo title, Brick on edge, timber Granolithic and other floorings.

Plastering: Lime, cement, sand, composite and rough coat plaster, Plaster of Paris, painting, Damp proof course, anti-termite treatment.

Centring and Shuttering: Centring form work, shuttering and moulds, timber & steel trestles and false work, scaffolding and shoring, under pinning.

11. Auto-Cad Civil Engineering Drawing

Part–B : Civil Engineering (Diploma)

1. Building Technology And Construction Management

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.

2. Surveying, Estimating & Costing

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. Estimate, glossary of technical terms, analysis of rates, methods and unit of measurement, Items of work – earthwork, Brickwork (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 pavement, 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.

3. Strength of Materials

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.

4. Reinforced Concrete Design

RCC beams-flexural strength, shear strength, bond strength, design of singly reinforced and double reinforced beams, cantilever beams. T-beams, lintels. One way and two way slabs, isolated footings. Reinforced brick works, columns, staircases, retaining wall, water tanks (RCC design questions may be based on both Limit State and Working Stress methods).

5. Irrigation & water resources

Definition, necessity, types and method 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.

6. Soil Engineering

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, Tri-axial 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.

7. Auto-Cad Civil Engineering Drawing

RPSC Scheme for the Assistant Engineer Combined Competitive Examination Syllabus

1. Scheme of Examination: - The Competitive Examination will be held in two successive stages: -

(i) Preliminary Examination
(ii) Main Examination

(i) **Preliminary Examination:** the preliminary Examination will consist of two papers, i.e. one compulsory paper and one optional paper, which will be of objective type and carry a maximum of 400 marks in the subjects mentioned in Section 'A and B'. The Examination is meant to serve as a screening test only. The marks obtained in the Preliminary Examination by the candidates who are declared qualified for admission to the Main examination will not be counted for determining their final order of merit. The number of candidates to be admitted to the main Examination will be 15 times the total approximate number of vacancies to be filled in the year in the various Services and Posts, but in the said range all those candidates who secure the same percentage of marks as may be fixed by the Commission for any lower range will be admitted to the Main Examination.

SECTION – A

COMPULSORY PAPER	**MAX. MARKS**	**TIME**
General knowledge & General Science including General knowledge of Rajasthan its Geography, Economy and culture	200	2 hrs

SECTION – B

S.No.	**Name of Optional Paper (any one paper to be opted by candidate)**	**Max. Marks**	**TIME**
1.	Civil Engineering	200	2 hours
2.	Electrical Engineering	200	2 hours
3.	Mechanical Engineering	200	2 hours
4.	Agricultural Engineering	200	2 hours

(ii) Main examination: - The written examination will consist of the following papers which will be conventional type. A candidate must take all the compulsory subjects and any one of the optional subjects listed below. Each of the optional subject will have two papers. The time allowed for each paper shall be three hours.

	Compulsory Subject	Maximum Marks
Paper – I	Hindi	100
Paper – II	Social aspects of Engineering	100
	Optional Subject	**Maximum Marks**
Paper – III and Paper – IV	(Any one subject to opted by a candidate (200 marks for each papers) from the following list of optional subjects. Each subject will have two papers)	

2. PERSONALITY AND VIVA-VOCE EXAMINATION

Optional Papers (Preliminary Examination)
CIVIL ENGINEERING

A. ENGINEERING MATERIALS & CONSTRUCTION TECHNOLOGY

Selection of site for the construction of various types of buildings: Planning and orientation of buildings. Bonds in masonry. Damp proof course. Scaffolding, underpinning, and racking. Floors. Staircases. Roofs. Doors and Windows. Requirements of fire protection. Ventilation and air conditioning and acoustics. Building and highway materials and their IS codal provisions. Stones, Bricks, timber, Lime, Cement, Mortar, Glass, Plastics, Steel, FRP, Ceramics, Aluminium, Fly Ash, Basic Admixtures, Plain and reinforced Cement Concrete, Bitumen.

B. SURVEYING

Leveling, Use of Theodolite, Total Station, tacheometry, Trigonometrical and Triangulation survey. Traversing and Traverse Adjustment, Contours and contouring, Simple Circular Compound and Transition Curves and their setting out, Theory of errors and survey adjustment. Computations of areas and volumes, Basics of Remote Sensing, Global Positioning System, Geographic Information System, Digital Elevation Method.

C. SOIL/ GEOTECHNICAL ENGINEERING

Classification of soil as per I.S. code, Field identification tests for soils; water content, specific gravity, voids ratio, porosity, degree saturation; unit weight, density index, etc; and their inter-relationships, determinations of various properties of soils as noted above as well as grain size distribution, consistency limits, etc.

Soil permeability and its determination in the laboratory and field; Darcy's law, Flow nets, its Characteristics and uses. Compaction and consolidation of soil, soil stabilization methods. Boussinesq's methods. Newmark's chart and its uses. Shear strength parameters and their determination Bearing capacity, local and general shear failures, design Criteria for shallow foundation, Plate load test and standard penetration test. Earth pressures on retaining wall. Stability of simple slopes. Properties and uses of geosynthetics.

D. STRUCTURAL MECHANICS

Stress and strains, elastic constants, factor of safety, relation among elastic constants. Bending moment and shear force diagrams for cantilever, simply supported and overhanging, fixed and continuous beams subjected to static loads:- concentrated, uniformly distributed and uniformly varying, couple (moment). Theory of simple bending. Shear Stress, torsion, shear centre, Influence lines for determinate structures, Deflection of cantilever, simply supported fixed and continuous beams. Analysis of Determinate and Indeterminate structures for axially loaded members, beams, frames pin jointed- Plane and space frames.

E. STEEL STRUCTURES

Provisions of latest versions of IS : 800 and 875, Limit State Design, Design of bolted connections, welded connections, Design of axially and eccentrically loaded tension members, Design of axially and eccentrically loaded compression members, Design of beams, Design of column bases (slab base and gusseted base), Design of plate girder, gantry girder, Design of roof trusses, Concepts of Plastic theory.

F. REINFORCED CONCRETE STRUCTURES

Provisions of latest IS: 456, design of beams singly and doubly reinforced, design of flexure and shear reinforcement. Serviceability criteria, Design for bond, anchorage and development length, Design of slabs spanning in two directions and T-beam slabs. Design of column axially and uniaxially eccentrically loaded. Design of isolated and combined column footings: Design of simple RCC cantilever and counterfort retaining walls. Provisions of latest IS: 3370, Reinforcement in overhead, ground supported and underground water tanks.

G. FLUID MECHANICS INCLUDING HYDROLOGY AND IRRIGATION

Properties of fluids, Hydraulic pressure at a point and its measurement. total pressure and centre of pressure on plane and curved immersed surfaces, fluid flow conditions, Bernoulli's, Navier-Stokes, Reynold's equations, flow through orifices venturimeter, notches and wires, flow through pipes and open channels, Gradually and rapidly varied flow, Momentum and angular momentum principles as applied to fluid in a control volume, applications of jets, Viscous flow, concept of drag, flow through pipes. Dimensional analysis, Model similitude, Model scales, Physical modeling, Computational hydraulics- theory and applications, Momentum and energy equations. Engineering hydrology; Hydrology of floods and drought reservoirs and dams; spillways, ground water hydrology. Irrigation: canals, silt theories, Khosla's theories for design of hydraulic structures. Ground water and well irrigation, water logging.

H. PUBLIC HEALTH ENGINEERING

Water demand for urban and rural areas, Forecast of population. Sources. Water supply standards of purity of public water supplies with various methods of purification; House drainage system Distribution network with all the ancillaries: system of drainage. Characteristics of waste water- BOD, COD, DO and TOC, Layout of sewerage systems. Primary, secondary treatments, sequencing batch reactor, trickling filters, lagoons and other treatment units and their design criteria. Flushing of sewers; sewage treatment; rural water supply and sanitation, classification of solid waste.

I. HIGHWAY AND BRIDGES

Principles of highway planning; classification of road land width, building line, center line, formation width, terrain classification. Geometric Design: pavement width, Camber, longitudinal gradient, sight distance, horizontal curve, super elevation, vertical curve, lateral and vertical clearances. Flexible pavements. Sub-base, base course and shoulder stone / Kankar brick soling, WBM courses, shoulders. Granular sub-base, stabilized soil roads cement / lime stabilized sub base, sand bitumen base course, crushed cement concrete base/sub-base course. Rigid pavements: Application of tie and dowel bars Traffic Engineering: traffic characteristics, road user characteristics, vehicular characteristics, volume, speed and delay studies origin and destination study, traffic flow characteristics, traffic capacity and parking studies, traffic regulation, traffic control devices, Intersection control. Alignment Highway construction and maintenance of different types of roads. Need for highway drainage and arboriculture. Highway bridges: Provisions of latest versions of IRC:5, IRC:6, IRC:21.

Rajasthan State Pollution Control Board
Junior Scientific Officer (JSO)
Exam - 2024
Solved paper with explanation

[Exam. Date : 09/01/2024]

1. In which year the Water Pollution Control Act was enacted in India?

(a) 1968 (b) 1982
(c) 1974 (d) 1976

Ans. (c) : The water (Prevention and control of Pollution) Act 1974 provides of the prevention and control of water pollution and the maintaining or re-storing of whole sameness of water.

Acts	Year
Indian Forest Act	1927
Wildlife Conservation Act	1972
Water (Prevention and Control of Pollution) Act	1974
Forest Conservation Act	1980
Air (Prevention and Control of Pollution) Act	1981
Environment (Protection) Act	1986
Noise Pollution (Regulation &Control) Rules	2000
Biological Diversity Act	2002

2. Noise pollution is measured in :-

(a) Fathoms (b) Decibel
(c) Ton (d) Kilogram

Ans. (b) : Noise Pollution:– Noise can be defined as that unwanted sound pollutant which produces undesirable physiological and psychological effects in an individual, by interfering with one's social activities like work rest, sleep etc.
Noise is measured in decibel (dB)

Area Code	Category of Area/Zone	Limits in dB(A) Leq*	
		Day Time	Night Time
(A)	Industrial area	75	70
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	Silence Zone	50	40

3. PAN is…..

(a) Peroxyacetyl nitrate
(b) Polyacrylonitrile
(c) Personal Area Network
(d) Polyacrylonitrate

Ans. (a): Peroxy acutely nitrate (PAN):–

- It is pollutant pound in photochemical smog as secondary pollutant.
- PAN is itself is an extremely harmful gas it may enter deeper into the lungs (lower lobes) than even the oxides of sulphur.
- At concentration of about 0.3 PPM cough and chest discomfort is increased.

4. AQI BETWEEN 101-199 is in which category it's falls?

(a) GOOD (b) MODERATE
(c) POOR (d) SEVER

Ans. (b) :

AQI	Remark	Color code	Possible Health impacts
0.50	Good	Green	Minimal impact
51-100	Satisfactory	Light Green	Minor breathing discomfort to sensitive people
101-200	Moderate	Yellow	Breathing discomfort to the people with lungs, asthma and heart diseases
201-300	Poor	Orange	Breathing discomfort to most people on prolonged exposure
301-400	Very Poor	Red	Respiratory illness on prolonged exposure
401-500	Severe	Dark Red	Affects healthy people and seriously impacts those with existing diseases

5. Which among the following pollutants is a secondary pollutant?

(a) Ozone (b) Nitrogen Oxide
(c) Sulphur Dioxide (d) Carbon Monoxide

Ans. (a) : Secondary Pollutant:– Primary pollinates often react with one another or with water vapour, aided and abetted by the sunlight to form entirely a new set of pollutants called the secondary pollution . These secondary pollutants are the chemical substances, which are produced from the chemical reactions of natural or anthropogenic pollutants or due to their oxidation etc. caused by the energy of the sun.

Example:– Sulphuric acid (H_2SO_4) Ozone (O_3), Formaldehydes Perory-acyl nitrate (PAN). smog, Acid rain.

6. The self purification factor (of natural streams), which occurs due to hydrolysis of organic matter settled at the bottom either chemically or biologically, is known as:

(a) Dispersion (b) Oxidation
(c) Sedimentation (d) Reduction

Ans. (d) : Self purification of stream: When the sewage disposed in stream it undergoes self purification by following natural mechanism:

1. Sedimentation:– When the sewage is disposed in river stream according to the turbulence available in it, the organic suspended particle get settled at the bottom of river bed, thereby helps the river to get self purified.

2. Sunlight:– In the presence of sunlight photosynthesis reaction takes in the river which release oxygen, which is used by microorganism for decomposition of organic matter there by helping the river to get self purified.

3. Oxidation:– The oxidation of organic matter present in the sewage effluent, will start soon as the sewage outfalls into the river water containing dissolved oxygen.

4. Reduction:– Reduction of organic matter occurs due to hydrolysis of organic matter settled at the bottom either chemically or biologically.

5. Dilution and Dispersion:– When the perishable organic matter is discharged into river stream, it gets rapidly dispersed and diluted.

This results in lowering of waste concentration and thus reduce potential nuisance of sewage.

7. Symbiotic association of algae with fungi is

(a) Cyanobacteria (b) Mycorrhizza
(c) Lichen (d) Mycoplasma

Ans. (c) : Lichen:– The symbiotic association of alges with fungi is called lichen. the cells from the alga bacterium line inside the fungus.

• Algae prepare food for fungi as it is photosynthetic whereas fungi provide shelter and absorb minerals and water for algae.

Type	Description
Mutualism	Both partner benefit
Commensalism	Only one species benefits while the other is neither helped nor harmed.
Parasitism	One organism (the parasite) gains, while the other (the host) suffers.

8. The depletion in the ozone layer is caused by

(a) Sodium
(b) Chlorofluorocarbons
(c) Oxygen
(d) Hydrogen

Ans. (b) : Ozone depletion:– Ozone depletion is the most dreaded aspect of air pollution, having wide spread implications, extending over the entire atmosphere.

• Chlorofluorocarbons (CFCs) are responsible for ozone layer depletion.

9. The safe permissible limit of nitrates in domestic water supplies is

(a) 15 ppm (b) 25 ppm
(c) 45 ppm (d) 100 ppm

Ans. (c) : As per IS 10500:2012

Characteristic	Permissible limit (mg/ℓ)	Rejection Limit (mg/ℓ)
Ammonia	0.5	No relaxation
Chloride	250	1000
Fluoride	1.0	1.5
Free residual chlorine	0.2	1
iron	0.3	No relaxation
Nitrate	45	No. relaxation
Sulphide	0.05	–

10. Which is used to remove grit, sand and such other inorganic matter from sewage?

(a) Screen chamber
(b) Grit chamber
(c) Primary settling tank
(d) Sludge digester

Ans. (b) : Grit chamber: A grit chamber is a long narrow or circular tank in the primary sewage treatment plant that is designed to reduce the velocity of the flow of sewage to eliminate the girt materials such as sand, ash and clinkers, eggshells, bone chips, and many inert materials inorganic in nature.

It is based on transition law.

The grit chamber should not allow the settlement of organic materials.

11. The National Green Tribunal, set up to deal with the expeditious disposal of cases relating to environmental protection, was set up under the

(a) 12^{th} Five-Year Plan
(b) 11^{th} Five-Year Plan
(c) 10^{th} Five-Year Plan
(d) 9^{th} Five-Year Plan

Ans. (b): The National green Tribunal (NGT) is a specialized body set up under the Nation Green tribunal Act (2010) for effective and expeditions disposal of cases relating to environmental protection and conservation of forests and other Natural resources.

- NGT was set up under the 11th five year plan in 18 Oct . 2010

The NGT has five places of sittings. New Delhi is principal place of sitting and Bhopal, Pune, Kolkata and Chennai are the other four.

12. As per CPCB, how much solid waste is generated per capita per day in small, medium and large cities respectively?

(a) 0.1 kg, 0.5 kg, 2.8 kg
(b) 0.5 kg, 0.6 kg, 0.8 kg
(c) 0.1 kg, 0.3 kg - 0.4 kg, 0.5 kg
(d) 2.8 kg, 3kg, 5kg

Ans. (c) : As per CPCB (Central pollution control Board)

Solid waste generated in small cities = 0.1 kg per capital per day

Solid waste generated in medium cities = 0.3-0.4 kg per capita per day

Solid waste generated in large cities = 0.5 kg per capita per day

13. Day time noise standard prescribed for residential areas in India is

(a) 75 dB (b) 65 dB
(c) 55 dB (d) 50 dB

Ans. (c) :

Area Code	Category of Area/Zone	Limits in dB(A) Leq*	
		Day Time	Night Time
(A)	Industrial area	75	70
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	Silence Zone	50	40

14. As per the Solid Waste Management Rules, 2016, the landfill site shall be _____ meter away from river?

(a) 100 meter (b) 50 meter
(c) 200 meter (d) 200 meter

Ans. (a) :

- As per the Solid Waste Management Rules, 2016 new rules, the landfill site shall be;
- 100 metres away from a river,
- 200 metres from a pond,
- 200 metres away from highways, habitations, public parks and water supply wells
- 20 km away from airports/airbase.

15. Green muffler is a measure adopted to control Which pollution?

(a) Soil pollution (b) Air pollution
(c) Noise pollution (d) Water pollutions

Ans. (c) : Green muffler:– It is a technique of reducing noise pollution by planting 4 to 6 rows around the populated area or noisy places like along roadsides industrial area, societies near highways etc. It is a control measure for noise pollution by planting green plants.

16. Which method is used to determine the dissolved oxygen (DO) content of wastewater?

(a) Winkler's method
(b) Clark's method
(c) Lon-exchange method
(d) EDTA method

Ans. (a) : Winkler's method is the methods or dissolved oxygen (D.O.) measurement in laboratory. Dissolved oxygen is used as an indicator of the health of a water body, Where higher dissolved oxygen concentrations are correlated with high productivity and little pollution.

17. The odour of water can be determined by

(a) Thermometer
(b) Osmoscope
(c) Jackson's turbid meter
(d) None of the above

Ans. (b) : Odours in water are caused by the presence of algae, leaves, decaying vegetables or contamination from sewage and industrial waste. The odour in a given water is determined at a temperature of 24° to 25°C

- The instrument used for measuring odour is known as osmoscope

Instrument	Use of measuring
Tintometer	Colour of water
Osmoscope	Taste and odour of water
Nephelometer, jacksons	Turbidity of water
Aquascope	pH of water

18. The permissible limit for Arsenic in drinking water, as per Indian standards [IS:10500] is

(a) 0.05 mg/L (b) 0.5 mg/L
(c) 1.0 mg/L (d) 2.0 mg/L

Ans. (a) : As per IS 10500-2012

Parameter	Permissible Limit	Cause for Rejection
Total suspended solids (mg/L)	500	2000
Turbidity (NTU)	1	10
Colour (TCU)	5	25

Taste & Odour (TON)	1	3
Total dissolved (mg/L)	500	2000
Alkalinity (mg/L as $CaCO_3$)	200	600
pH	7-8.5	< 6.5 & > 9.2
Hardness (mg/L as $CaCO_3$)	200	600
Chloride content (mg/L)	250	1000
Free ammonia (mg/L)	0.15	0.15
Nitrite (mg/L)	0	0
Nitrate (mg/L)	45	45
Fluoride content (mg/L)	1	1.5
Iron as Fe (mg/L)	1(Old = 0.3)	No Relaxation
Sulphate (mg/L)	200	400
Calcium (mg/L)	75	200
Free residual Chlorine (mg/L)	0.2	1
Total Arsenic as As (mg/L)	0.01	NO Relaxation (Old = 0.05)
Uranium, mg/L	0.03	Nor Relaxation

19. The major source of the pollutant gas, carbon mono-oxide (CO), in urban areas is

(a) Industries (b) Burning of wood
(c) Vehicles (d) None of these

Ans. (c) : Carbon monoxide (CO) is a toxic gas formed in combustion chambers that results from an insufficient supply of oxygen. The major source of the pollutant gas carbon mono oxide (CO) urban area is transport sector.

20. In WHICH YEAR Recycled Plastics Manufacture and Usage Rules Acted?

(a) 1999 (b) 1991
(c) 1986 (d) 2022

Ans. (a) : The Recycled plastic manufacture are usage rules were introduced by the government of India in 1999.

This regulation was to control the packaging of food products in recycled plastics and to manage the severe littering problem.

There were three main specifications in the rule.

(i) The use of recycled and virgin coloured polybags for Non-flood applications was allowed but discouraged for packaging food items.

(ii) all carry bags of size less than 20μ were banned

(iii) The guidelines for the recycling of plastics were made mandatory

21. The main reason of the sick building syndrome focusing the Indoor Air Quality in buildings is-

(a) Inadequate ventilation
(b) Contamination from inside the buildings
(c) Contamination from outside buildings
(d) Microbial contamination

Ans. (a) : Sick building syndrome:– The term sick building is used to describe building in which a significant number (more than 20%) of building occupants report illness perceived as being building related. This phenomenon know as sick building syndrome. The main reason of the sick building syndrome is inadequate ventilation.

22. The coagulant 'alum' used for treatment of water is also known as:

(a) Sodium aluminate
(b) Aluminium sulphate
(c) Ferric chloride
(d) Ferric sulphate

Ans. (b) : Coagulation: Coagulation is a process used to neutralize charges and form a gelatinous mass to trap or bridge particles thus forming a mass large enough to settle or be trapped in the filter.

Alum or Aluminium sulphate-

(i) Alum or Aluminium sulphate is most commonly used as coagulants in water treatment.

(ii) Coagulants are used to enlarge the size of the impurities so that they settle down in the sedimentation tanks.

(iii) Alum is also effective in killing pathogens present in the water. This process is known as Disinfection.

23. According to the National Ambient Air Quality Standards (NAAQS), the permissible limit (daily average) for RSPM in Residential areas is

(a) 40 $\mu g/m^3$ (b) 60 $\mu g/m^3$
(c) 100 $\mu g/m^3$ (d) 120 $\mu g/m^3$

Ans. (b) : According to the National Ambient Air Quality Standards (NAAQS).

Pollutant	**Averaging Time**	**Recommended Concentration as per NAAQS 2009**
$PM_{2.5}$ μ/m^3	Annual	40
	24-hour	60
PM_{10} μ/m^3	Annual	60
	24-hour	100
O_3 $\mu g/m^3$	8-hour	100

NO_2 μg/m^3	Annual	40
	24-hour	80
SO_2 μg/m^3	Annul	50
	24-hour	80
CO μg/m^3	8-hour	2

24. In which layer of the earth's atmosphere is the ozone layer found?

(a) Troposphere (b) Mesosphere
(c) Exosphere (d) Stratosphere

Ans. (d) : Ozone Layer lies in the stratosphere which is 15 to 30 km above the Earth's surface.

- Ozone(O_3) is blue in color and has a strong odor while Oxygen(O_2) is colorless and odorless.
- The ozone layer acts as a shield for the earth that absorbs Sun's ultraviolet radiation.
- It is mainly found in the lower portion of the stratosphere and its thickness varies from one place to another.
- It absorbs 97 to 99% of the Sun's ultraviolet light of medium frequency.
- Ozone Layer is getting depleted due to the use of chemicals by the industries mainly chlorofluorocarbons (CFCs).
- This depletion has threatened life on earth like increased skin cancer in humans and other environmental problems.

25. The solubility of oxygen in sewage when compared to its solubility in distilled water is

(a) 90% (b) 95%
(c) 99% (d) 80%

Ans. (b) : The solubility of oxygen in sewage is approximately 95% of its solubility in distilled water. Dissolved oxygen is an important factor to assess the quality of water. The presence of pollutants, minerals salts etc. causes variation in the amount of oxygen that is dissolved.

Distilled water does not contain any of these. The solubility of oxygen in distilled water is 9.1 mg/L. The ability of oxygen to dissolve in distilled water decreases when the temperature is increased.

Amount of oxygen is taken as 4 ppm for aquatic life.

$$\text{Dissolved Oxygen} \propto \frac{1}{\text{Temp.}}$$

Oxygen deficit = Saturation D.O. - Actual D.O.

Temperature (°C)	Saturation Dissolved Oxygen (mg/L)
0	14.6
20	9.2
30	7.6

26. Which of the following is not an example of a bio-mass energy source?

(a) Wood (b) Gobar-gas
(c) Nuclear energy (d) Agricultural wastes

Ans. (c) : Bio mass is renewable organic material that comes from plants and animals

• Bio mass energy sources –

(i) Wood and wood processing waste
(ii) Agricultural crops and waste materials
(iii) Biogenic materials in municipal solid waste
(iv) Animal manure and human sewage for producing.

27. Which of the following wastes is Not the Municipal Solid Waste (MSW)?

(a) Food waster (b) Glassware
(c) Paper (d) Asbestos

Ans. (d) : Food wastes, glassware, and paper are all commonly found in household waste, which is a major component of Municipal Solid Waste (MSW).

Asbestos, on the other hand, is a hazardous material not typically included in MSW due to its potential health risks. It requires specialized handling and disposal procedures.

28. The term smog was first coined in 1905 in a paper by_____

(a) Henry Antoine Des Voeux
(b) Hult
(c) Canon
(d) Le Chatelier

Ans. (a) : Smog: It is used to describe a mixture of smoke and fog. The term smog was first coined during the 1905, experienced in London.

Dr. Henry Antoine Des Voeux first used the term smog in a paper in 1905 to describe the combination of smoke and fog that had been plaguing London at the time. Since then, London has enacted strict air pollution regulations, which have drastically reduced smog incidents in the region.

29. Leachates are high-strength wastewaters formed as a result of percolation of rainwater and moisture through waste in ___

(a) Aerated lagoons (b) Septic tanks
(c) Compost plants (d) Landfills

Ans. (d) : Leaching – In this process the land is flooded with adequate depth of water. The alkali salts present in the soil, get dissolved in this water, which percolate down to join the water table or drained away by surface and sub-surface drains.

Leachate- As rainwater infiltrates through sanitary landfill waste, it becomes contaminated with dissolved and suspended matter originating from the decomposing waste.

30. Respiratory Suspended Particulate Matter (RSPM) are the particles having diameter:

(a) Less than 2.5 μm
(b) Less than 10 μm
(c) Less than 20 μm
(d) Less than 100 μm

Ans. (b) : Respirable suspended particulate matter (RSPM) or PM^{10}:– The smaller sized respirable particles present in the total suspended particulate matter are extremely harmful to human health. Accordingly smaller sized particles up 10 micron is size, known as Respirable suspended particulate matter (RSPM) or PM_{10}.

31. Which one of the following statements regarding photochemical smog is not correct ?

(a) Photochemical smog is formed through photochemical reaction involving solar energy
(b) Carbon monoxide does not play any role in photochemical smog fraction
(c) Photochemical smog is an oxidizing agent in character
(d) Photochemical smog does not cause irritation in eyes, throat and not reduce visibility

Ans. (d) : Photochemical smog:– Smog is a mixture of smoke and fog. The atmospheric conditions favourable for formation of photochemical smog are the present of high concentrations of hydro carbons and nitrogen oxides in the atmosphere, air stagnation as not to cause dispersal of air pollutants and abundant sunlight.

- In photochemical smog fraction carbon monoxide does not play any role.
- Photochemical smog is an oxidizing agent in nature.

32. Excess of fluoride in drinking water causes _

(a) lung disease (b) intestinal infection
(c) risk of tooth decay (d) Blue babies

Ans. (c) : Excess of fluoride in drinking water causes mottling of teeth, also referred as Dental Fluorosis.
Dental fluorosis is caused by a higher than normal amount of fluoride ingestion whilst teeth are forming.
Fluorosis - It is the disease caused by consumption of excess of fluorides.
It affects the bones and teeth.
Excess of fluorides in drinking water causes dental fluorosis by yellowing of teeth and weakening of the enamel.

33. Surgical dressing, bandage, gauze, and cotton contaminated with blood or body fluids are__

(a) Biomedical waste
(b) Hazardous Waste
(c) Municipal Solid Waste
(d) None of these

Ans. (a): Bio medical waste:– It means any waste which is generated during the diagnosis, treatment or immunization of human beings or animals or testing of biological or in heath camps.
Example:- Surgical dressing, cotton bandage, needle, syringes, etc.

34. Which effluents are of large-scale environmental concern because they color and diminish the quality of water bodies into which they are released?

(a) Tannery effluents
(b) Textile industry effluents
(c) Pulp and paper mill effluents
(d) Food processing industry effluents

Ans. (a) : Tannery effluents: Contain dyes, pigments, and other chemicals used in leather processing, which can impart intense colors to receiving water bodies.
This reduces light penetration, hindering photosynthesis for aquatic plants and affecting the entire aquatic ecosystem.
Textile industry effluents: Similar to tannery effluents, they contain dyes and other chemicals that can color water bodies, impacting aesthetics and ecological functions.
Pulp and paper mill effluents: May contain lignin and other organic compounds that can discolor water, reducing light penetration and affecting aquatic life.
Food processing industry effluents: May contain pigments, coloring agents, and other organic matter that can impart colors to water.

35. One joule of absorbed energy per kilogram are units of radiation dose is (used to measure different aspects of radiation)

(a) gray (Gy), and sievert (Sv)
(b) Radura
(c) Percentage
(d) MeV

Ans. (a) : Radiation dose:– It is defined as the quantity of radiation energy absorbed by food when it passes through the radiation field during processing unit of Radiation dosage is rad.
1 megarad (m_{rad}) = 1 million rad
1 Gray (G_y) = 100 radi.

- The IS unit of absorbed dose is the gray (G_y) which is defined as the absorption of one Joule of radiation energy per kilogram of matter.

$$\boxed{1G_y = 1Joule/kg}$$

36. Acid rain is caused when compounds like _____and _____ are released into the air.

(a) Sulfur dioxide, Hydrogen oxides
(b) Nitrogen oxides, Water vapour
(c) Hydrogen oxides, Nitrogen oxides
(d) Sulfur dioxide, Nitrogen oxides

Ans. (d): Acid Rain:– Normal clean rainfall through unpolluted environment is very slightly acidic with its pH value just less than 7. The environment is polluted with primary pollutants like SO_2 and NO_x gases, the resultant rainfall tends to become more and more acidic.
Acid rain is caused by a chemical reaction that begins when compounds like Sulfur dioxide and Nitrogen oxides are discharged into the air.
These substances can rise very high into the atmosphere, where they mix and react with water, oxygen, and other chemicals to form more acidic pollutants, known as acid rain.

37. The protocol that reduces greenhouse gas emission is:
(a) Kyoto protocol (b) Vienna protocol
(c) Montreal protocol (d) Cartagena protocol

Ans. (a) : Kyoto Protocol:– It is an international treaty to reduce green-house gas emissions.
The Kyoto protocol was adopted in Kyoto Japan on 11 December 1997 and entered into force on 16 February 2005.
The country meet to reduce greenhouse gas emissions, based on the scientific consensus that global warming is occurring and it is extremely likely that human-made CO_2 emissions have predominantly caused it.
Its goal is to fight global warming by reducing greenhouse gas concentrations in the atmosphere to "a level that would prevent dangerous anthropogenic interference with the climate system".

38. Average Biomedical waste produced per bed per day in India –
(a) 5-10 kg (b) 0.5–1 kg
(c) 3–4 kg (d) 1 to 2 kg

Ans. (d) : Central Pollution Control Board (CPCB) guidelines: Suggest a limit of 1-2 kg per bed per day as a reference standard.

39. Which of the following is not an E-waste?
(a) microwave (b) computer
(c) Bottle (d) Keyboard

Ans. (c) : Discarded electrical or electronic devices comes under the category of E-waste. Examples: Broken laptop, keyboard, calculator, television etc.

40. Autecology means the study of
(a) Effect of soil on plant
(b) Effect of temperature on plant
(c) Effect of transpiration on plant
(d) Relationship of species with their environment

Ans. (d) : Autecology means the study of the Relationship of species with their environment.
Autecology is also the study of individual organisms.

Study	Topic
The Study of Soil	Pedology
The Study of Insects	Entomology
The Study of Blood	Hematology
The Study of Heart	Cardiology

41. Sludge digestion is
(a) disposal of sludge
(b) dilution of sludge
(c) stabilisation of sludge
(d) removal of waste products from sludge

Ans. (c) : Sludge Digestion -The sludge which is deposited sedimentation tank is called the sludge. To reduce the volume of thickness sludge and stabilized the sludge is called sludge digestion.

42. Which is Not a solid waste management method ?
(a) Incineration (b) Composting
(c) recycling (d) Thermal pyrolysis

Ans. (c) : Methods of solid waste management
(i) Solid wastes sanitary land fills
(ii) Incineration.
(iii) Composting process
(iv) Disposal by hog feeding
(v) Fermentation or biological digestion
(vi) Thermal pyrolysis.
(vii) Landfill

43. Incomplete combustion of fuels produces Which gas?
(a) Carbon dioxide (b) Carbon monoxide
(c) Nitrogen oxide (d) Sulphur dioxide

Ans. (b) : Carbon monoxide (CO) is produced due to incomplete combustion of fossil fuels, metallurgical operations, automobile emission, cigarette smoking.
It easily combines with haemoglobin, produces carboxyhaemoglobin which impairs oxygen transport resulting in headache, decreased vision, cardiovascular disease, asphyxia.
It is only slightly soluble in water, blood serum and plasma. It is colourless and odourless gas.

44. Fine solid particles or liquid droplets suspended in air are called _____.
(a) Aerosol (b) Emulsion
(c) Foam (d) Gel

Ans. (a) : Aerosol:– Aerosols refer to fine solid or liquid particles suspended in the atmosphere Aerosol plays a major and vital role in the climate change and it also affects the human life. It is found that the tiny particles of dust, smoke and the various gases emitted by industrial activities goes into the atmosphere and they cause the asthmatic problems for the human life.

45. The anaerobic digestion process produces gas composed of ____known as biogas

(a) methane (CH_4) and carbon dioxide (CO_2)
(b) Oxygen & Nitrogen
(c) Oxygen & CO_2
(d) Nitrogen & methane

Ans. (a) : Bio-gas – Biogas is a mixture of gases, primarily consisting of methane and carbon dioxide, produced from raw materials such as agricultural waste, manure, municipal waste, plant material, sewage, green waste and food waste. It is a renewable energy source.
Biogas is produced by anaerobic digestion with anaerobic organisms or methanogen inside an anaerobic digester, biodigester or bioreactor.

46. Geometrical shape or form of the smoke coming out of a chimney

(a) Plume (b) Fume
(c) Fog (d) Smog

Ans. (a) : Plume- The geometrical shape of the smoke emanating from a chimney is typically referred to as a plume. A plume represents the visible column of smoke rising into the air. It often takes on a distinctive shape, resembling a vertical or slightly curved column, especially when observed from a distance

47. In Mohr's method, what is the titrant (precipitating agent) typically used to determine chloride ions?

(a) Silver nitrate ($AgNO_3$)
(b) Sodium chloride (NaCl)
(c) Potassium dichromate ($K_2Cr_2O_7$)
(d) Barium sulfate ($BaSO_4$)

Ans. (a) : Mohr's method uses $AgNO_3$ as the titrant (burette) and a small quantity of potassium chromate (K_2CrO_4) as the indicator to determine the concentration of chloride in a given sample.
However, Mohr's method uses a small quantity of $K_2Cr_2O_4$ such that the chloride concentration is much higher than that of chromate.

48. A liquid with a flash point at or below 60 degrees Celsius is a __

(a) Class 3 flammable liquid
(b) Corrosive
(c) Infectious substance
(d) Radioactive

Ans. (a) : According to the UN Classification of Dangerous Goods, Class 3 indicates flammable liquids.
Flammable liquids are substances that have a flashpoint below 60°C and can easily catch fire when exposed to an ignition source. They can pose a significant risk of fire and can spread quickly, causing damage to property and endangering lives.
Therefore, Class 3 is used to categorize and identify substances that fall under this classification.

49. Which one among the following is the correct order of steps taken during the process of Environmental Impact Assessment (EIA)?

(a) Scoping, Screening, Public Hearing, Appraisal
(b) Screening, Scoping, Public Hearing, Appraisal
(c) Public Hearing ,Scoping, Screening, Appraisal
(d) Scoping, Public Hearing, Appraisal, Screening

Ans. (b) : The order of steps taken during the process of Environmental Impact Assessment (EIA) are:
1. Screening
2. Scoping
3. Collection of baseline data
4. Impact analysis
5. Impact mitigation and management
6. Public hearing
7. EIA report
8. Review
9. Decision making
10. Issue of environmental clearance

50. Average hospital waste produced per bed per day in Government hospital –

(a) 1–5-2.0 kg (b) 0.5–4 kg
(c) 0.5–1 kg (d) 0.5–2 kg

Ans. (d) : Central Pollution Control Board (CPCB) guidelines: These guidelines recommend a range of 0.5 – 2 kg/bed/day for healthcare waste generation in India, including government hospitals.

51. As per the Solid Waste Management Rules, 2016, the landfill site shall be ___ meter away from river.

(a) 100 meter (b) 200 meter
(c) 300 meter (d) 400 meter

Ans. (a) : Revision of parameters and existing standards:
(i) As per the new rules, the landfill site shall be;
100 metres away from a river,
200 metres from a pond,
200 metres away from highways, habitations, public parks and water supply wells
20 km away from airports/airbase.
(ii) Emission standards are completely amended and include parameters for dioxins, furans, reduced limits for particulate matters from 150 to 100 and now 50.
Also, the compost standards have been amended to align with the Fertilizer Control Order.

Rajasthan State Pollution Control Board
Junior Environmental Engineer (JEE)
Exam - 2024
Solved paper with explanation

[Exam. Date : 09/01/2024]

1. Septic tank is an?

(a) aerobic attached growth treatment system
(b) aerobic suspended growth biological treatment system
(c) anaerobic attached growth biological treatment system
(d) anaerobic suspended growth treatment system

RSPCB JEE 09/01/2024

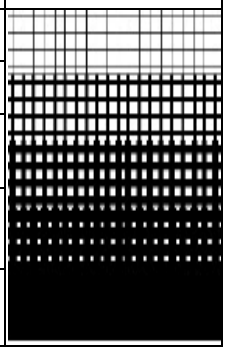
Ans. (d): anaerobic suspended growth treatment system

Method	Contact	Decomposition
Trickling filter	Attached growth	Aerobic
Rotating biological contactor	Attached growth	Aerobic
Activated sludge process	Suspended growth	Aerobic
Oxidation pond	Suspended growth	Aerobic
Septic tank	Suspended growth	Anaerobic
Imhoff tank	Suspended growth	Anaerobic

2. Ringelmann's scale is used to?

(a) Measure CO
(b) measure Sulphur Dioxide
(c) grade automobile exhaust gas
(d) grade density of smoke

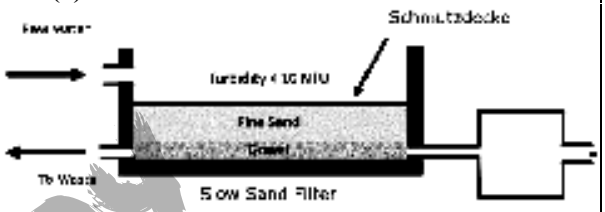
Ans. (d) : The Ringelmann scale is a scale for measuring the apparent density or opacity of Smoke. It was developed by a French professor of agricultural engineering Maximilien Ringelmann in Paris in 1888.

RINGE,MANN 0	0% OPACITY - CLEAR	
RINGELMANN 1	20%OPACITY-BARELY VISIBLE	
RINGELMANN 2	40% OPACITY – CLERLY VISIBLE	
RINGELMANN 3	60% OPACITY-SOMEWHAT TRANSPARENT	
RINGELMANN 4	80%OPACITY-BARELY TRANSPARENT	
RINGELMANN 5	100% OPACITY-BLACK	

3. Schmutzdecke layer is found in?

(a) Slow sand filter (b) Rapid sand filter
(c) pressure filter (d) Coagulation tank

Ans. (a) : Slow sand filter



In case of slow sand filter, after continuously using for some time impurities are started to accumulate within the filter and filtering quality deceases. So, they must be cleaned periodically to maintain the quality of filtration. The micro-organisms present in slow sand filters utilise organic impurities as food and convert them into harmless compounds known as schmutzdecke by the process of biological metabolism. This schmutzdecke layer helps in absorbing and straining out the impurities and increases the quality of filtration.

While cleaning the filter the schmutzdecke layer is also scraped of and it takes 24 to 36 hours (or 1 day to 1.5 days) to form again. Thus the filtered water obtained before this period will not be properly filtered and will contain impurities.

∴ That's why after cleaning a slow sand filter, raw water admitted into filter but filtered water is not used for 24 hr to 36 hr.

4. total organic and ammonia nitrogen known as

(a) kjeldhal ammonia
(b) Albuminoid nitrogen
(c) Nitrites
(d) Nitrates

Ans. (a) : kjeldhal ammonia

Kjeldahl Nitrogen = Organic nitrogen + free ammonia

Nitrogen in water:- The nitrogen in water indicates organic contamination of water i.e when water is contaminated by sewage then nitrogen compounds are traced in water. We can trace the following compounds,

1) Ammonia nitrogen
2) Organic nitrogen or Albuminoid nitrogen
3) Nitrites
4) Nitrates

Nitrogen compound are measured by colorometry

Total Kjeldahl nitrogen (TKN):- It is the sum of organic nitrogen, ammonia (NH_3), and ammonium (NH_4^+) in the chemical analysis of soil, water and wastewater. To calculate Total Nitrogen (TN), the concentrations of nitrate-N and nitrite-N are determined and added to the total Kjeldahl nitrogen.

5. Pneumoconiosis is caused due to inhalation of which one of the following?

(a) Pb (b) Silica
(c) Arsenic (d) Cadmium

Ans. (b) : SILICA – Pneumoconiosis is a general term for a group of lung diseases caused by inhaling fine dust particles over a long period. These particles irritate and damage the lungs, leading to scarring and fibrosis. Silica is the most common cause of pneumoconiosis worldwide. It's naturally found in many environments, like sand, rock, and soil, and can become airborne during activities like mining, quarrying, sandblasting, and construction. Lead (Pb) can cause other health problems like lead poisoning, but it's not typically associated with pneumoconiosis.

- Arsenic can also cause lung damage, but it's usually through chronic exposure in the workplace or by drinking contaminated water. Cadmium is another environmental toxin with various health effects, but it's not a primary cause of pneumoconiosis. Therefore, while other options may have harmful health effects, silica dust inhalation is the most common trigger for pneumoconiosis, particularly in occupational settings.
- There are different types of pneumoconiosis depending on the specific dust inhaled, e.g., silicosis from silica, coal worker's pneumoconiosis from coal dust, etc.
- The severity of pneumoconiosis depends on the type and amount of dust inhaled, the duration of exposure, and individual susceptibility.
- Symptoms include coughing, shortness of breath, chest pain, and fatigue.
- It's important to remember that all these elements may contribute to lung health risks, and proper safety measures should be taken when working with potentially harmful dusts.

6. During the EIA process under India's EIA notification 2006, public consultation is a must for?

(a) All 'A' category projects
(b) All 'A' category projects except for a few exceptional ones
(c) All 'B1' category projects
(d) All 'A' and B1 Category projects except for few exceptional ones

Ans. (d) : Public Consultation –

➢ Process by which the concerns of local affected persons and others who have plausible stake in the environmental impacts of the project or activity are ascertained

➢ All Category 'A' and Category B1 projects or activities shall undertake Public Consultation

➢ A big list of exceptions

7. Which of the following acts related cases's disposal does not come under jurisdiction of NGT?

(a) Air act
(b) Water act
(c) FOREST RIGHT Act
(d) Forest conservation act

Ans. (c) : Acts Falling Under NGT Jurisdiction:- The NGT has jurisdiction over cases arising from the implementation of the following enactments (as specified in Schedule I of the NGT Act):

- The Water (Prevention and Control of Pollution) Act, 1974
- The Water (Prevention and Control of Pollution) Cess Act, 1977
- The Forest (Conservation) Act, 1980
- The Air (Prevention and Control of Pollution) Act, 1981
- The Environment (Protection) Act, 1986
- The Public Liability Insurance Act, 1991
- The Biological Diversity Act, 2002

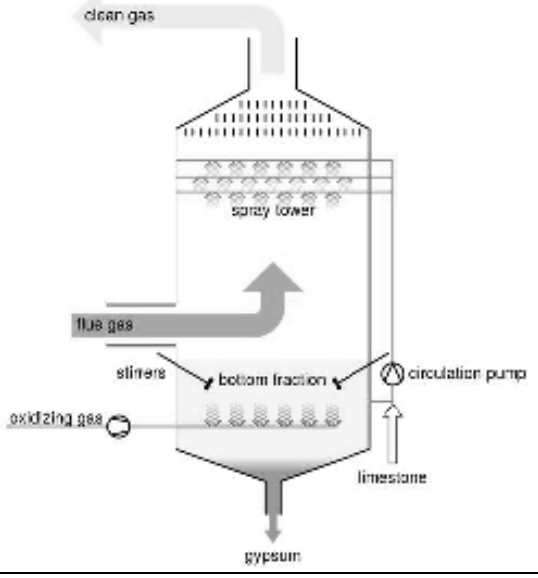
Acts Not Under NGT Jurisdiction:-

- Forest Rights Act (also known as the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006) is not specifically listed in Schedule I of the NGT Act.
- Therefore, cases related to the Forest Rights Act do not fall directly under the jurisdiction of the NGT.

8. which of the following is used to remove particulate as well se gaseous pollutants ?

(a) wet scrubber (b) ESP
(c) BAG FILTER
(d) GRAVITY SETTLING

Ans. (a) : WET SCRUBBER:- A wet scrubber is an air pollution control device that uses a liquid (usually water) to capture and remove pollutants from gas streams.



Wet Scrubbers are air pollution control devices for removing particles and gases from industrial exhaust stream.

It is operated by introducing the dirty gas stream with a scrubbing liquid as water. Then gases are collected in the scrubbing liquid. Wet scrubbers are usually the most appropriate air pollution- control device for collecting both, particulate and gas in a single system alone.

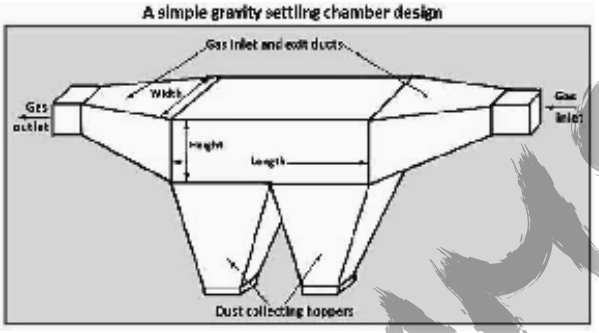
9. The minimum particle size removes by the gravitational chamber is?

(a) >50 μm (b) >10 μm

(c) >25 μm (d) 0.5 μm

Ans. (a) : Gravitational channel- Used to remove particles with size greater than 50 μm.

- Velocity of flue gas reduced in large chamber.
- Particles settle under gravitational force.
- The particulate matter is settled by its own weight by lowering the flue gas velocity.



Gravitational settling chambers rely on gravity to remove heavier particles from a fluid stream. Their effectiveness depends on the balance between the Civil Junction settling velocity of the particles and the flow velocity of the fluid.

10. Windrow composting is used in:-

(a) Indore method

(b) Bangalore method

(c) Bhopal Method

(d) Maharashtra method

Ans. (a) : Indore method:- Windrow composting is a method of composting where organic matter is piled in long, narrow rows called windrows and turned periodically to aerate the mixture. This method is suitable for large-scale composting and is commonly used in agriculture and waste management facilities.

- The Bangalore method is another Indian composting method, but it utilizes trenches instead of windrows.

The Bhopal Method and the Maharashtra method are not well-established composting methods.

Method	Description
Windrow composting	Piling organic matter in long rows and turning them periodically
Indore method	A type of windrow composting sing alternating layers of green and brown materials
Bangalore method	Composting in trenches instead of windrows
Bhopal Method	Not a well-established composting method
Maharashtra method	Not a well-established composting method

11. Which one among the following is the correct order of steps taken during the process of Environmental Impact Assessment (EIA)?

(a) Scoping, Screening, Public Hearing, Appraisal

(b) Screening, Scoping, Public Hearing, Appraisal

(c) Public Hearing, Scoping, Screening, Appraisal

(d) Scoping, Public Hearing, Appraisal, Screening

Ans. (b) : Appraisal The order of steps taken during the process of environmental Impact Assessment (EIA) are:

1. Screening
2. Scoping
3. Collection of baseline data
4. Impact analysis
5. Impact mitigation and management
6. Public hearing
7. EIA report
8. Review
9. Decision making
10. Issue of environmental clearance

12. Air prevention and control of pollution act comes in which year?

(a) 1981 (b) 1974

(c) 1986 (d) 1987

Ans. (a) : The Air (Prevention and Control of Pollution) Act, 1981, is the primary legislation in India aimed at preventing, controlling, and abating air pollution. It was enacted on 29th March 1981 by the Parliament of India.

13. Which of the following is not a secondary treatment unit

(a) Grit chamber (b) ASP

(c) Trickling filter (d) UASB reactor

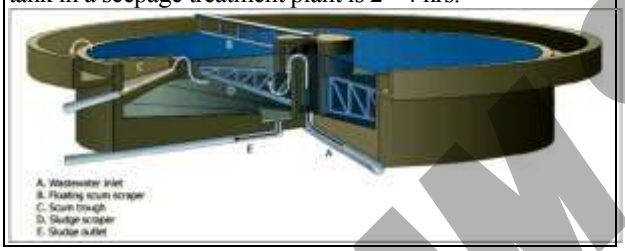
Ans. (a) : Grit chamber:- Grit chamber: grit chambers belong to the primary treatment stage. Their primary function is to remove heavy inorganic materials like sand, gravel, and cinders from the wastewater through sedimentation. These materials can damage pumps and other equipment in the later stages of treatment

Treatment Stage	Unit	Function
Primary	Grit	Removes heavy inorganic materials
Secondary	chamber	Removes dissolved and organic matter through aerobic biological processes
Secondary	ASP	Removes dissolved and organic matter through aerobic biological processes using fixed-film media
Secondary	Trickling	Removes dissolved and organic matter through anaerobic biological processes

14. The detention period in primary sedimentation tank in a sewage treatment plant is ?

(a) 2 - 4 hrs (b) 4 to 8 hrs
(c) 8 to 12 hrs (d) 12 to 18 hrs

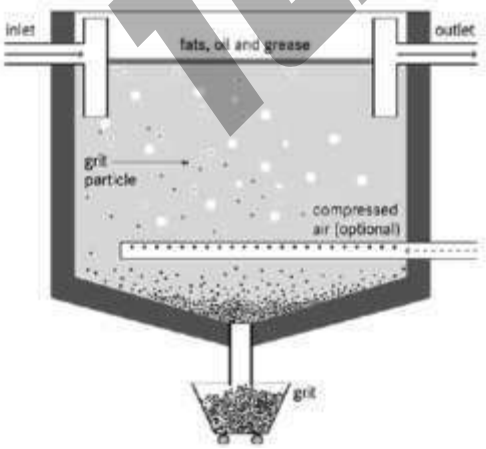
Ans. (a) : The detention period in primary sedimentation tank in a seepage treatment plant is 2 - 4 hrs.



15. What is the detention time of grit chamber when the depth is 1-1.8m?

(a) 10 minutes (b) 30 minutes
(c) 40-60 sec (d) 60-90 sec

Ans. (c) :



Grit removal basin, such as grit chambers or grit channels or Detritus tanks are the sedimentation basins placed in front of the waste water treatment plant to remove the inorganic particles such as sand, gravel grit, egg shells, etc. A detention time of about 40 to 60 seconds is generally sufficient for a water depth of about 1 to 1.8 m

16. From ecological consideration, the minimum level of Dissolved Oxygen (DO) necessary in the rivers and streams for fish is :-

(a) 1 mg/L (b) 2 mg/L
(c) 4 mg/L (d) 8 mg/L

Ans. (c) : For ecological concern, the minimum of 4 ppm of dissolve oxygen (DO) should be available so that fish can survive.

17. which of the following prevents the flow of oxygen to the blood?

(a) CO (b) ozone
(c) nitrogen monoxide (d) sulphur dioxide

Ans. (a) : Carbon monoxide:- Carbon monoxide (CO) binds to hemoglobin in the blood with much greater affinity than oxygen. This prevents oxygen from binding to hemoglobin, effectively blocking its transport to the body's tissues. As a result, the tissues become deprived of oxygen, leading to tissue hypoxia and potentially death.

18. the following is abiotic:-

(a) Microorganisms (b) Animal
(c) plant (d) Land

Ans. (d) : Land:- Abiotic factors refer to the non-living components of an ecosystem. They include physical and chemical elements like temperature, sunlight, humidity, soil composition, pH, etc.
Microorganisms, animals, and plants are all classified as biotic factors. These are living organisms that can reproduce, grow, and interact with their environment.
Land itself is not a living entity. It's a vast geological formation composed of non-living components like rocks, minerals, and organic matter. While it plays a crucial role in supporting life, land itself is not considered biotic.

19. What is the noise pollution limit in silence zone at day and night time respectively in dB(A) ?

(a) 50 &40 (b) 75 & 70
(c) 60& 80 (d) 55& 45

Ans. (a) :

Area Code	Category of Area/Zone	Limits in dB(A) leg*	
		Day Time	Night Time
(A)	Industrial area	75	70
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	Silence Zone	50	40

Note-
1. Day time shall mean from 6.00 a.m. to 10.00 p.m.
2. Night time shall mean from 10.00 p.m. to 6.00 a.m.
3 . Silence zone is defined as an area comprising not less than 100 metres around hospitals, educational institutions, courts and religious places or any other place which is declared as such by the competent authority.

20. Air Quality Index 210 mean?

(a) severe (b) moderate
(c) good (d) poor

Ans. (d) :

AQI	Remark	Code	Possible Health Impacts
0-50	Good	Green	Minimal impact
51-100	Satisfactory	Light	Minor breathing discomfort to sensitive people
101-200	Moderate	Green	Breathing discomfort to the people withlungs, asthma and heart diseases
201-300	Poor	Yellow	Breathing discomfort to most people on prolonged exposure
301-400	Very Poor	Orange	Respiratory illness on prolonged exposure
401-500	Severe	Red	Affects healthy people and seriously impacts those with existing diseases

21. In which pollution zone of the river, the dissolved oxygen reduced to 0?

(a) Zone of degradation
(b) Zone of recovery
(c) Zone of clean water
(d) Zone of active decomposition

Ans. (d) : The dissolved oxygen, reduced to 0 in the zone of active decomposition. The water is highly polluted in this zone.

ZONES OF ACTIVE DECOMPOSITION:-

(i) This is marked by heavy pollution. It is characterized by the absence of dissolved oxygen; water is grayish and darker with active anaerobic organic decomposition accompanying and with the evolution of methane (CH_4), Hydrogen sulphide (H_2S), Carbon dioxide (CO_2), and Nitrogen (N_2), bubbling to the surface with masses of sludge forming black scum.

(ii) Fish life is practically absent, fungi and bacteria disappear. As the organic decomposition slackens, reaction sets in, and D.O. again rises to its original level (i.e. 40%).

22. Air binding in rapid sand filter occurs due to?

(a) Cracking of filter sand
(b) Low temperature
(c) Mud ball formation
(d) Excessive negative head

Ans. (d) : Air Binding:- The clogging of a filter due to resistance offered by the medium particle along with the impurities exceeds the static head of water.

- Due to the above resistance negative head or vacuum pressure is developed at the bottom layer of the filter medium.
- The negative head created in the bottom releases dissolve gases that rises to the surface and leads to binding of the voids of the filter medium from the bottom.
- The above process of operational trouble caused in rapid sand filter is called as Air Binding.

To avoid Air Binding:- Proper cleaning of filter should be done when head loss becomes 2.5 to 3.5 m or Negative head becomes 1.2 m.

23. The process of reverse osmosis is also known as?

(a) Hyper-filtration (b) Double-filtration
(c) Double-osmosis (d) Hyper-osmosis

Ans. (a) : The process of reverse osmosis is also known as super- or hyper-filtration. It is a process by which a solvent passes through a porous membrane in the direction opposite to that for natural osmosis when subjected to a hydrostatic pressure greater than the osmotic pressure.

24. The rate of filtration of a slow sand filter ranges from?

(a) 10 to 100 L/h/m^2
(b) 100 to 200 L/h/m^2
(c) 200 to 400 L/h/m^2
(d) 400 to 1000 L/h/m^2

Ans. (b) :

	Slow sand filter	Rapid sand filter
Pre treatment	Effluents from plain sedimentation coagulation, not reg.	Coagulation, flocculation, and sedimentation is the must.
Filter sand	D_{10} b/w 0.2 and 0.4 mm $C_u \Rightarrow$ 1.8 to 3. Gravel-30-75 cm thick	D_{10}=0.35 mm - 0.55 mm C_u = 1.2 to 1.8 Gravel – 60-90 cm thick
Size of each unit	Large such as 30m × 60m An area from 100-2000 m^2. Less flexible on shock loading	Small 5m × 8m Area < 100m^2 More flexible on shock loading
Rate of filtration	100 to 200 litres/hr/m^2	3000 to 6000 L/hr/m^2
Efficiency	Very efficient in removing bacteria but less efficient in removing colour.	less efficient in bacteria (80-90%), very efficient in colour removal.
Post-treatment	Disinfection is not must. Almost pure water obtained	Disinfection is the must. Turbidity up to 35 ppm.

Method of cleaning	Scrapping and removing the top 1.5 to 3 cm thick layer and washing down by hoses.	Backwashing with of without compressed air.
Qty of wash water reg.	0.2 to 0.6% of total filtered water is reg. in every 1 to 3 months	A large amount total filtered water is reg. in every 1 to days. (1-5%)

25. The efficiency of biochemical oxygen demand (BOD) removal in trickling filter is?

(a) 98% (b) 75%

(c) 56% (d) 65%

Ans. (b) : Trickling Filter:- A trickling filter is an aerobic attached growth system. This filter consists of a 2 m to 3 m deep circular bed of packed granular stone or gravel about 50 to 70 mm in size. Over this trickling filter, the rotary distributors spray the incoming sewage continuously over the filter bed under the action of gravity.

Advantages of Trickling filters-

- Rate of filter loading is high as such requiring lesser land areas and smaller quantities of filter media for their installations.
- Effluent obtained from the trickling filter is sufficiently nitrified and stabilized, They can remove about 75% of BOD and about 80 % of suspended solids.
- Moisture content of sludge, obtained from trickling filter is as high as 99% or so.

BOD removal for various units is given below:

Treatment Method	BOD Removal Efficiency
Oxidation Ditch	98%
Oxidation Pond	90%
Aerated Lagoons	65-90%

26. The Dissolved oxygen level in natural unpolluted water at normal temperature is found to be?

(a) 1 mg/litre (b) 10 mg/litre

(c) 100 mg/litre (d) 1000 mg/litre

Ans. (b) : Dissolve oxygen (D.O.) is the amount of oxygen present in water naturally.

- DO sustains the aquatic life in water bodies and its content in water depends on the temperature.
- Dissolved oxygen present in sewage is very important for respiration of aerobic microorganism as well as for all other aerobic life forms.
- If the temperature of sewage is more, then DO content is less and vice versa.
- Saturated dissolved oxygen: It is the maximum quantity of DO that can remain in water at a particular temperature.

Typical values of dissolved oxygen of fresh water are:-
Dissolved Oxygen (mg/L) at Saturation in freshwater

Temp. (°C)	Temp.(°F)	Dissolved Oxygen at saturation (mg/L)
0	32	14.6
5	41	12.8
10	50	11.3
15	59	10.1
20	68	9.1
25	77	8.3
30	86	7.6

27. Which one of the following statements is not true in the case of point source gaussian plume model?

(a) Wind speeds are constant in time

(b) Pollutants are conservative

(c) Rate of emission of pollutants from the stack is constant

(d) The ground level concentration is inversely proportional to effective stack height

Ans. (d) : The ground-level concentration of pollutants decreases as the effective stack height increases. A taller stack results in better dispersion and dilution of pollutants.

Ground-level concentration:- The concentration at ground level depends on the effective stack height (the actual stack height plus the plume rise due to buoyancy effects).

28. What is the Annual Average concentration of NO_2 in ecological sensitive area?

(a) 50 $\mu g/m^3$ (b) 40 $\mu g/m^3$

(c) 30 $\mu g/m^3$ (d) 60 $\mu g/m^3$

Ans. (c) : Modified Jacob and Hochheiser (Sodium-Arsenite) method and chemiluminescence method are used to determine atmospheric NO_2 concentration.

As per National Ambient Air Quality Standards (NAAQS) - 2009. In ecological sensitive area, the concentration of NO_2 is 30 $\mu g/m^2$ for annual time weighted average, where as for 24 hours time weighted average is 80 $\mu g/m^2$.

29. As Per Indian National Ambient Air Quality standards The permissible concentration of PM2.5 in the air is (24 hour average)

(a) 60$\mu g/m^3$ (b) 40$\mu g/m^3$

(c) 50$\mu g/m^3$ (d) 20$\mu g/m^3$

Ans. (a) : The permissible concentration of PM2.5 (particulate matter with a diameter less than 2.5 micrometers) in the air for a 24-hour period is as follows:

National Ambient Air Quality Standards (India):-

Annual average: 40 $\mu g/m^3$

24-hour average: 60 $\mu g/m^3$

World Health Organization (WHO) Guidelines:-

Annual average: Should not exceed 5 $\mu g/m^3$.

24-hour average: Should not exceed 15 $\mu g/m^3$ more than 3-4 days per year

Pollutant	Averaging Time	Recommended Concentration as per NAAQS 2009
$PM_{2.5}$ μg/m³	Annual	40
	24-hour	60
PM_{10} μg/m³	Annual	60
	24-hour	100
O_3 μg/m³	8-hour	100
NO_2 μg/m³	Annual	40
	24-hour	80
SO_2 μg/m³	Annual	50
	24-hour	80
CO μg/m³	8-hour	2

30. What is Phytoremediation?

(a) eradicating the sever species
(b) protecting the health of plant
(c) removal of toxiz elements from water
(d) removal of dissolved oxygen

Ans. (c) : Phytoremediation is the process of using plants to clean up, degrade, or contain contaminants in the environment. It is an environmentally friendly and cost-effective approach to remediate polluted soil, water, and air. Phytoremediation is an environmentally friendly approach that utilizes living plants to clean up contaminated soil, air, and water.

Phytoremediation involves the use of certain plants, known as hyperaccumulators, which have the ability to absorb, accumulate, and sometimes transform pollutants from the soil, water, or air. These plants act as natural "clean-up" agents, helping to mitigate the impact of pollutants on the environment. The process can be applied in various settings, including industrial sites, brownfields, and areas contaminated by heavy metals, organic compounds, or other pollutants.

31. Area required for UASB reactor per MLD of water

(a) 1 acre (b) 0.1 acre
(c) 10 acre (d) 0.5 Acre

Ans. (d) : The area requirements for a UASB (Upflow Anaerobic Sludge Blanket) reactor per MLD (Million Liters per Day) of water treatment.

1. UASB Reactor Overview:-

• The UASB reactor is an anaerobic treatment system used for sewage and wastewater treatment.

• It offers several advantages, including compactness, low energy consumption, and potential for energy recovery.

2. Space Requirement:-

• The space required for a UASB system is quite comparable to that of an Activated Sludge system.

• Specifically, it requires approximately 0.5 acres per MLD (Million Liters per Day) of treated water.

• To put this in perspective:

■ An Activated Sludge system typically needs more space (around 2.5 acres per MLD) for the same treatment capacity.

■ Oxidation ponds require even more space (about 2.5 acres per MLD).

■ Aerated lagoons occupy approximately 1.5 acres per MLD.

3. Comparison:-

• UASB-based STPs (Sewage Treatment Plants) have gained popularity, especially in sub-tropical countries like Brazil and India.

• The benefits of UASB systems include reduced energy consumption and the potential for energy self-sufficiency. • Constraints include potential odor issues and challenges related to nutrient removal.

32. According to for propagation of wildlife and fisheries rule, water for forest and biodiversity comes in what category?

(a) A (b) B
(c) D (d) E

Ans. (c) : Propagation of Wild life and Fisheries (D CATEGORY) Criteria:-

Designated Best Use Water Quality Criteria

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	Total Coliforms Organism MPN/100ml shall be 50 or less pH between 6.5 and 8.5
Outdoor bathing (Organized)	B	Total Coliforms Organism MPN/l00ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20C 3mg/l for less
Drinking water source after conventional treatment and disinfection	C	Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20C mg/l or less
Propagation of Wild life and Fisheries	D	pH between 6.5 to 8.5 Dissolved oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling Controlled Waste disposal	E	pH between 6.0 to 8.5 Electrical Conductivity at 25C micro micro mhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l

33. What is the common method employed for the removal of flue particle from the chimney?

(a) Isothermal process (b) differential process
(c) Isokinetic process (d) Adiabatic process

Ans. (c) : Exhaust Gas generated through the combustion process is called flue gas or stack gas.

Isokinetic Process:- Isokinetic sampling is an equal or uniform sampling of particles and gases in motion within the stack. Isokinetic source sampling is achieved when the velocity of gas entering the sampling nozzle is exactly equal to the velocity of the approaching gas stream.

The term "isokinetic" refers to a condition in which the velocity of the flue gas entering the sampling probe is equal to the velocity of the gas inside the sampling probe. In the context of flue gas sampling from chimneys, isokinetic sampling is crucial for accurate measurement of the concentration of particulate matter.

34. What is the method for effective removal of ammonia.

(a) UV PHOTOMETRIC
(b) EDX AND teflon filter
(c) indo phenol blue method
(d) AAS/ TCP METHOD

Ans. (c) : Indophenol Blue Method:- The indophenol blue method is commonly used for the determination of ammonia in water samples. It is a colorimetric method that relies on the reaction between ammonia and a reagent, forming a blue-colored complex. The intensity of the blue color is proportional to the concentration of ammonia in the sample.

35. In which year did the Brundtland Commission cite the definition of sustainable development?

(a) 1982 (b) 1988
(c) 1987 (d) 1989

Ans. (c) : The Brundtland Commission cited the definition of Sustainable development in 1987, defining it as the development that meets the needs of the present, without compromising the needs of the future generations to meet their own needs. The Brundtland Commission, also known as the World Commission on Environment and Development (WCED), released the influential Brundtland Report in 1987. This report introduced the concept of sustainable development

36. surface overflow rate of UASB reactor when settling chamber is provided along with it?

(a) 0.1m/ hr (b) 1m/ hr
(c) 3m/ hr (d) 2m/hr

Ans. (b) : The UASB reactor is an anaerobic treatment system where no special medium (such as stones) are needed. Instead, the sludge granules themselves act as the "media" and remain in suspension. In the UASB process, wastewater flows through the reactor in an upflow mode, with a hydraulic retention time (HRT) of approximately 8-10 hours at average flow.

Surface Overflow Rate:- The surface overflow rate is maintained at 20 to 28 m^3/m^2-day (equivalent to 1 to 1.2 m/h) during peak flow. Flow Velocity: The flow velocity through the aperture connecting the reaction zone with the settling compartment should not exceed 5 m/h during peak flow.

37. The BOD removal efficiency, during primary treatment, under normal conditions are?

(a) 65% (b) 55%
(c) 85% (d) 30%

Ans. (d) : The main function of Primary treatment is to carry out the removal of suspended solids present in the sewage.

Heavy suspended solids are removed by screens and fine suspended solids are removed in the grit chamber and in the primary sedimentation tank Primary treatment removes 60 - 70% suspended solids present in the sewage and satisfied 30 - 40%

BOD associated with it.

Grit chamber is provided for the removal of inorganic suspended solid and Primary sedimentation tank is provided for the removal of organic suspended solid.

38. The safe permissible limit of nitrates in domestic water supplies is?

(a) 15 ppm (b) 25 ppm
(c) 45 ppm (d) 100 ppm

Ans. (c) :

Parameter	Permissible Limit	Cause for Rejection
Total suspended solids (mg/L)	500	2000
Turbidity (NTU)	1	10
Colour (TCU)	5	25
Taste & Odour (TON)	1	3
Total dissolved solids (mg/L)	500	2000
Alkalinity (mg/L as CaCO3)	200	600
pH	7-8.5	< 6.5 & > 9.2
Hardness (mg/L as CaCo3)	200	600
Chloride content (mg/L)	250	1000
Free ammonia (mg/L)	0.15	0.15
Nitrite (mg/L)	0	0
Nitrate	45	45
Fluoride content (mg/L)	1	1.5
Iron as Fe (mg/L)	1	No Relaxation
Sulphate (mg/L)	200	400
Calcium (mg/L)	75	200

39. What is the zone through which sunlight can pass.

(a) euphotic zone (b) littoral
(c) benthic (d) eutrophication

Ans. (a) : Euphotic zone:- This zone, also known as the photic zone or sunlight zone, is the upper layer of a body of water where sufficient sunlight penetrates to support photosynthesis by phytoplankton and other aquatic plants. The depth of the euphotic zone varies depending on water clarity, turbidity, and other factors, but can typically range from several meters to around 200 meters.

Littoral Zone:- The littoral zone refers to the shallow area near the shore of a water body where sunlight can penetrate to the bottom. It is an important zone for the growth of rooted plants and supports diverse aquatic life.

Benthic Zone:- The benthic zone is the bottom layer of a water body, where sediment and organic matter accumulate. It is typically characterized by reduced light penetration, and sunlight does not reach the seafloor in deeper parts of the ocean.

Eutrophication:- Eutrophication is a process where excessive nutrients, often from human activities, lead to an overgrowth of algae and other aquatic plants. This process can result in decreased light penetration and oxygen depletion in the water.

40. What is the range of Mesophilic and Thermophilic range of decomposition ?

(a) 20 -35 and 55-60 (b) 15-20 and 40 -50
(c) 30-40 and 50-60 (d) 40-50 and 60-70

Ans. (c) : Mesophilic Degestion System:- Mesophilic bacteria have as option temperature for growth between 30-40^{o}C and consequently mesospheric digesters are usually operated at temperatures around 35^{o}C.

- It is essential for efficient operation to control temperature since reaction rates drop of considerably as temperature falls bellow 35°C and there is also a sharp drop off in activity at temperature above 45^{o}C, as mesophilic bacteria become inhibited by the head.
- Mesophilic digestion system are generally more stable than thermophilic system due to the fact a wider diversity of bacteria grow at mesophilic temperatures and these bacteria are generally more robust and adaptable to changing environmental conditions.

41. What is the oxidising agent used for the determination of COD?

(a) sulfuric acid
(b) potassium dichromate
(c) silver Sulphate
(d) FAS

Ans. (b) : Potassium dichromate ($K_2Cr_2O_7$) is the primary oxidizing agent in the standard COD test. It oxidizes organic matter present in the sample, consuming itself in the process. The remaining amount of dichromate is then measured to determine the amount of organic matter oxidized, which reflects the COD value.

Chemical Oxygen Demand (COD) test is used to measure the content of organic matter of waste water, both biodegradable and non-biodegradable. The oxygen equivalent of organic matter that can be oxidised is measured by using a strong chemical ($K_2Cr_2O_7$) oxidising agent in an acidic medium. The excess potassium dichromate is titrated with ferrous ammonium sulphate (FAS) until all of the excess oxidizing agent has been reduced to Cr_3^+ .

The oxidation-reduction indicator ferroin is also added during this titration as it changes its color from red topale blue when oxidized.

COD test is also called dichromate-oxygen demand test. Chemical Oxygen Demand is the total measurement of all chemicals (organics & in-organics) in the water/waste water.

Non-technical

42. Tropic of cancer passes through which state of rajasthan?

(a) Banswara (b) CHURHU
(c) JAISALMER (d) JAIPUR

Ans. (a) :

43. which airport of India got UNESCO recognition as most beautiful airport terminal 2?

(a) Kempegowda International Airport Terminal 2 Bangalore
(b) chennai airport
(c) DELHI AIRPORT
(d) MUMBAI AIRPORT

Ans. (a) :

44. Which of the following river passes through darra wildlife century.

(a) chambal (b) gagghar
(c) banas (d) mahi

Ans. (a):

45. For ekal naari samman pension yojna women is eligible when her age is more than

(a) 20 (b) 22
(c) 25 (d) 18

Ans. (d):

46. What will the subsidy provided for LPG Cylinder from 1 jan 2024 in Rajasthan?

(a) 500 (b) 450
(c) 600 (d) 800

Ans. (b):

Rajasthan Public Service Commission
Assistant Engineer (DLB)
Exam-2023
Solved paper with explanation

[Exam. Date : 21/05/2023]

Technical (Civil)

1. Select the correct order of performing engineering survey for roads, railways and irrigation works.

(a) Preliminary Survey, Reconnaissance Survey, Location Survey
(b) Preliminary Survey, Location Survey, Reconnaissance Survey
(c) Location Survey, Reconnaissance Survey, Preliminary Survey
(d) Reconnaissance Survey, Preliminary Survey, Location Survey

Ans. (d) : The sequence of four stages of survey in a highway alignment is–

1. Map study–Topographic map is used to suggest likely routes of the road.

2. Reconnaissance–It is rapid and rough survey. During survey, physical characteristics of the areal are inspected and the proposed route is thoroughly examined.

3. Preliminary survey–It consists of detailed survey of alternative routes selected using chain compass, tape, level and theodolite.

4. Detailed Survey and Final location–The alignment finalized is to be first located on the field.

2. Read the following statements carefully :
A. Length of Gunter's Chain is 66 ft.
B . Gunter's Chain is divided in 66 links.
C. Gunter's Chain is also known as Surveyor's Chain.
Which of the following statements is/are correct?

(a) Only statement A is correct
(b) Only statement B is correct
(c) Statement A and C are correct
(d) All statements are correct

Ans. (c) : Gunter's chain or Surveyor's chain–A Gunter's chain or Surveyor's chain is 66 ft. long and consists of 100 links, each link being 0.66 ft or 7.92 inches long The length of 66 ft. was originally adopted for convenience in land measurement since 10 square chain are equal to 1 acre. Also, when linear measurements are required in four longs and miles, it is more convenient since
10 Gunter's chains = 1 furlong
80 Gunter's chains = 1 mile.

3. Which of the following triangulation would have longest base line?

(a) First order (b) Second order
(c) Third order (d) Fourth order

Ans. (a) : First order or Primary triangulation–The first order triangulation is of the highest order and is employed either to determine the earth's figure or to furnish the most precise control points to which secondary triangulation may be connected. The primary triangulation system embraces the vast area (usually the whole of the country). Every precaution is taken in making linear and angular measurements and in performing the reductions.

• **Primary triangulation–**Length of base line 5 to 15 km
• **Secondary triangulation–**Length of base line 1.5 to 5 km
• **Tertiary triangulation–**Length of base line 0.5 to 3 km

4. Select the correct advantage of tacheometric surveying.

(a) Speed of surveying is low but result is highly precise
(b) Survey can be performed in poor visibility.
(c) Chain can be used to measure the distance between two points.
(d) Cost of surveying is less.

Ans. (d) : Advantages of tachemometric surveying–The advantages of tacheometric surveying are as follows–

• It is a very quick method
• No chain or tapes are required to measure the horizontal distance.
• It is an economical method.
• It can be used for any terrain, including hilly areas, rough grounds, marshy and swampy lands as well as stretches of rivers.

5. _____ is the horizontal distance between two points on any two consecutive contours and _____ is the vertical distance between two consecutive contour lines.

(a) Contour intervals, Contour slope
(b) Horizontal equivalent, Contour intervals
(c) Contour gap, Contour slope
(d) Contour gap, Horizontal equivalent

Ans. (b): Horizontal equivalent–The horizontal distance between two points on two consecutive contours is known as horizontal equivalent.

Contour interval–The vertical distance between any two consecutive contour lines is known as contour interval.

6. An area of a plan is to be determined by using an Amsler polar planimeter. What does 'N' mean in equation of area = M (FR – IR ± 10N + C) of this planimeter?

(a) Number of sides of the traverse
(b) Number of cellular units of plan
(c) Number of completer revolutions of the disc
(d) Number of stations in the plan

Ans. (c) : The formula for calculating areas of the map by using planimeter.

$$\text{Area (A)} = M (FR - IR \pm 10N) + C$$

where,

C = Constant marked above scale division on tracing arm

M = Multiplying constant

FR = Final reading of planimeter

IR = Initial reading

N = Number of times zero of dial pass is index mark.

7. Select the first step to be performed in the procedure for setting the curve.

(a) Swing the arc of chord length C_1 from point A_1 (A_1 lies on the line T_1V, where V is the vertex of the curve)
(b) Locate the tangents point T_1 and T_2 and determine the length of first and last sub-chord
(c) Check whether the last point coincides with tangent point T_2
(d) The closing error is distributed.

Ans. (b) : Setting out simple circular curve–

Before a curve is set out, it is essential to locate the tangents, PI, PC and PT. The surveyor is always supplied with a working plan upon which the general alignment of tangent is known. The tangents can be staked on the ground by the tape and theodolite measurement. The total deflection angle (Δ) can be measured. After having located the PI and measured Δ, the tangent length can be calculated and knowing the chainage of PI, the chainage of point T_1 can be known by subtracting the tangent length from it. The length of curve is than added to T_1 to get the chainage of T_2.

8. If the natural state of cohesionless soil is in it's densest state then the degree of density becomes.

(a) Zero (b) Unit
(c) Negative (d) Not defined

Ans. (b): Relative density or Density index (I_D)–The degree of denseness or looseness of natural deposits of coarse-grained soil can be measured in terms of their relative density.

$$I_D = \frac{e_{max} - e_N}{e_{max} - e_{min}} \times 100$$

where,

I_D = Relative density or density index

e_{max} = Void ratio in the loosest state

e_{min} = Void ratio in the densest state

e_N = Void ratio in the natural state

• In the looset state, I_D is equal to 0% in the densest state I_D is equal to 100%.

9. An oven-dried soil having a mass of 200 g is placed in a pyconometer which is completely filled with water. The mass of empty pycnometer is 125 g. The specific gravity of soil mass shall be calculated as.

(a) 2.67 (b) 1.67
(c) 2.65 (d) 1.65

Ans. (*) : Data insufficient.

10. Which of the following option is correct if the clay sample has activity 1.49 ?

(a) Illite clay mineral
(b) Kaolinite clay mineral
(c) Montmorillonite clay mineral
(d) No comments

Ans. (c) : Activity number (A_c)–More activity means more changes in volume.

$$A_c = \frac{I_P}{\%\text{ of clay size particle (size} < 2\mu)}$$

< 0.75	Inactive
0.75-1.25	Normal
> 1.25	Active

11. A horizontal stratified soil deposits consists of three uniform layers of thickness 4, 1 and 2 units respectively. The permeabilities of these three layers are 2, 1 and 4 units. Which relation is correct for effective average permeability of the soil deposits in horizontal and vertical direction?

(a) $k_x < k_z$ (b) $k_x = k_z$
(c) $k_x \cdot k_z = 1$ (d) $k_x > k_z$

Ans. (d) : Given,

Three uniform thickness

$H_1 = 4, H_2 = 1, H_3 = 2$

Permeabilities of three layers–

$k_1 = 2, k_2 = 1, k_3 = 4$

Permeability of soil deposits in horizontal and vertical direction = ?

Permeability of horizontal direction–

$$k_x = \frac{k_1H_1 + k_2H_2 + k_3H_3}{H_1 + H_2 + H_3}$$

$$k_x = \frac{4\times2 + 1\times1 + 2\times4}{4+1+2} = \frac{8+1+8}{7}$$

$$k_x = \frac{17}{7} = 2.42 \text{ units}$$

Permeability of vertical direction–

$$k_z = \frac{H_1 + H_2 + H_3}{\frac{H_1}{k_1} + \frac{H_2}{k_2} + \frac{H_3}{k_3}}$$

$$k_z = \frac{4+1+2}{\frac{4}{2} + \frac{1}{1} + \frac{2}{4}} = \frac{7}{3.5} = 2 \text{ units}$$

$\because$ $k_x > k_z$

12. Complex potential is defined as

(a) $\phi + i\psi$ (b) $\phi - i\psi$

(c) $\psi + i\phi$ (d) $\psi - i\phi$

Ans. (a) : Complex potential function–Complex potential function (w) is a complex valued function with its both domain and co-domain being complex number. It is defined as

$w = f(z)$

where, $z = x + i \times y$

In Complex potential theory, it is represented by–

$w(x, y) = \phi(x, y) + i \times \psi(x,y)$

$w = \phi + i\psi$

where, ϕ is velocity potential and ψ is stream function.

13. Match list-I with list-II and select the correct answer by the codes given below :

List-I	List-II
A. Boussinesq influence factor under concentrated load	**1.** $\frac{1}{P\left[1+2\left(\frac{r}{z}\right)^2\right]^{3/2}}$
B. Boussinesq influence factor under uniformly distributed circular load	**2.** $1-\left[\frac{1}{1+\left(\frac{a}{z}\right)^2}\right]^{3/2}$
C. Westergaard influence factor under point load	**3.** $1-\left[\frac{1}{1+\left(\frac{a}{\eta z}\right)^2}\right]^{1/2}$
D. Westergaard influence factor under uniformly distributed circular load	**4.** $\frac{3}{2p}\left[\frac{1}{1+\left(\frac{r}{z}\right)^2}\right]^{5/2}$

	A	B	C	D
(a)	1	3	4	2
(b)	4	2	1	3
(c)	2	1	3	4
(d)	3	4	2	1

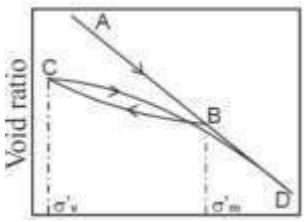
Ans. (b): Boussinesq influence factor under concentrated load - $\frac{3}{2p}\left[\frac{1}{1+\left(\frac{r}{z}\right)^2}\right]^{5/2}$

Boussinesq influence factor under uniformly distributed circular load - $1-\left[\frac{1}{1+\left(\frac{a}{z}\right)^2}\right]^{3/2}$

Westergaard influence factor under point load - $\frac{1}{P\left[1+2\left(\frac{r}{z}\right)^2\right]^{3/2}}$

Westergaard influence factor under uniformly distributed circular load - $1-\left[\frac{1}{1+\left(\frac{a}{\eta z}\right)^2}\right]^{1/2}$

14. The segment BC shown in pressure void ratio curve for remoulded soil sample represents



(a) Recompression

(b) Virgin compression curve

(c) Expansion

(d) Decompression

Ans. (c) :

15. The radius of Mohr circle drawn for unconfined compression test on saturated clay is equal to

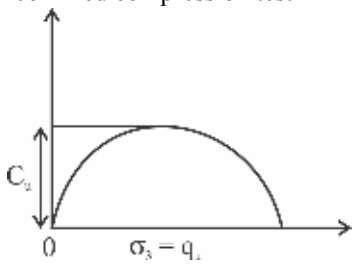
(a) The apparent cohesion

(b) The unconfined compressive strength

(c) $\sqrt{\left\{\frac{1}{2}(s_y - s_x)\right\}^2 t_{xy^2}}$

(d) $\frac{s_1 + s_3}{2}$

Ans. (a): Unconfined compression test–



$C_u = \frac{\sigma}{2} = \frac{q_u}{2}$

Radius of Mohr circle, $C_u = \frac{2C}{2} = C$

• The test is simple, quick and normally employed for measuring in-situ strength of fully saturated or nearly saturate clays.

• The Mohr circle can be draw for stress conditions at failure. As the minor principal stress is zero, the Mohr circle passes through the origin. The failure envelope is horizontal. The cohesion intercept is equal to the radius of the circle.

16. The ratio of horizontal to vertical stress for elastic equilibrium of soil considering the angle of shearing resistance of 30º shall be

(a) 1 (b) 3
(c) 0.33 (d) 0.5

Ans. (d) : Given,
Angle of shearing resistance (ϕ) = 30º
The ratio of horizontal to vertical stress for equilibrium = ?
We know that,
The ratio of lateral to vertical earth pressure use termed as coefficient earth pressure.

$$\frac{\sigma_h}{\sigma_v} = k$$

For elastic equilibrium at rest,

$k_0 = 1 - \sin\phi$
$k_0 = 1 - \sin 30º$
$k_0 = 1 - 0.5$
$k_0 = 0.5$

17. The allowable bearing pressure on spread footing constructed on sand should be such that the differential settlement does not exceed

(a) $\frac{1}{450}$ (b) $\frac{1}{300}$
(c) $\frac{1}{500}$ (d) $\frac{1}{750}$

Ans. (b) : According to National Building Code of India (SP: 7-1983)

• Simple spread footing on sand, the allowable bearing pressure should be such that the differential settlement does not exceed 1/300; the condition is generally satisfied if the total settlement is limited to 50 mm.

• Simple spread footings on clayey soils, the allowable bearing pressure should be such that the differential settlement does not exceed 1/300; this condition is generally satisfied if the total settlement is limited to 75 mm.

18. A homogeneous and isotropic material has density 2.5 kN/m^3. The modulus of rigidity and bulk modulus for the material is 100 MPa and 50 MPa respectively. What is the modulus of elasticity for given material ?

(a) 1.8 N/mm^2 (b) 180 N/mm^2
(c) 1800 N/mm^2 (d) 180000 N/mm^2

Ans. (b) : Given,
Density = 2.5 kN/m^3
Modulus of rigidity (G) = 100 MPa
Bulk modulus (k) = 50 MPa
Modulus of elasticity (E) = ?
We know that,

$$E = \frac{9kG}{3k + G}$$

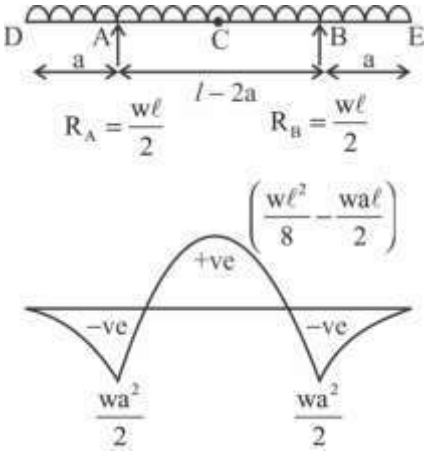
$$E = \frac{9 \times 100 \times 50}{3 \times 50 + 100}$$

$E = 9 \times 20 = 180$ N/mm^2

19. An overhanging beam of total length l m, having equal overhangs on both sides carriers U.D.L. of w kN/m on the entire span. A beam with given loading condition has _____ number of point/s of contraflexure.

(a) 0 (b) 3
(c) 2 (d) 1

Ans. (c) : Given beam

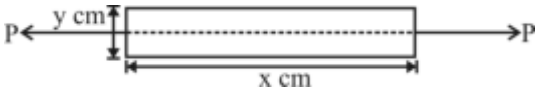


• A beam with give loading condition has 2 number of points of contraflexure.

20. A rectangular mild steel specimen of width X cm and depth Y cm is loaded with force P perpendicular to the cross-section, at centroids of specimen. If both width and depth of original specimen is doubled then, determine the ratio of stress in original specimen to modified specimen with same amount of force P.

(a) 1 : 2 (b) 4 : 1
(c) 8 : 1 (d) 2 : 1

Ans. (b) : Given,



Force (F) = P

Area = x.y

Stress $(\sigma)_o = \frac{F}{A} = \frac{P}{xy}$ ...(i)

If both width and depth of original specimen is double then,

Force (F) = P

Area = 2x × 2y

Area = 4xy

Stress $(\sigma)_m = \frac{F}{A} = \frac{P}{xy}$ ...(ii)

From equation (1) and (2)

$$\frac{\sigma_o}{\sigma_m} = \frac{\frac{P}{xy}}{\frac{P}{4xy}} = \frac{4}{1}$$

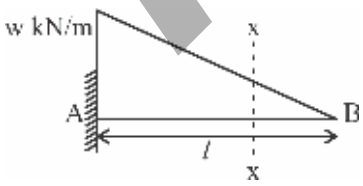
21. A cantilever beam of effective span l, carrying a triangular load of zero per unit length at free support increasing uniformly to per unit length at fixed support. Read the below statements carefully about the given beam :

A. S.F. diagram has a straight inclined line.

B . B.M diagram has a cubical curve.

(a) Both statements are correct
(b) Only first statement is correct
(c) Only second statement is correct
(d) Both statements are incorrect

Ans. (c) :



$R_A = \frac{1}{2} w.\ell$

Shear force at x distance from B

$(SF)_x = \frac{1}{2} \times \frac{w}{\ell} \times x^2$

$= \frac{wx^2}{2\ell}$ (Parabola)

Bending moment at x distance from B

$(BM)xx = \frac{1}{2} \times \frac{w}{\ell} \times \frac{x^3}{3}$

$(BM)\ xx = \frac{wx^3}{6\ell}$

So, bending moment equation is cubical parabola curve.

Note–

• SF diagram has a triangle shape

• BM diagram has a cubical curve.

22. A determinate structure had total cost about 2 lakhs rupees. If the same structure would have made with indeterminate structure, then what amount of total saving in cost may be obtained with indeterminate structure?

(a) Around 35000 to 45000 rupees
(b) Around 10000 to 16000 rupees
(c) Around 20000 to 25000 rupees
(d) Around 20000 to 30000 rupees

Ans. (d) : Indeterminate structures are often more economical than determinate structures because they can–

Reduce material usage– Indeterminate structures can optimize material distribution leading to reduced quantities and costs.

Improve structural efficiency– Indeterminate structures can better resist loads and stresses, allowing for more efficient use of materials.

The estimated cost saving of ₹ 20,000 to ₹ 30,000 (approximate 2% to 3% of total cost) is a reasonable range for many projects.

23. What is the ratio of maximum slope to maximum deflection in a cantilever beam of span *l* m subjected to U.D.L. of w kN/m on the entire span?

(a) $\frac{2}{3 \times l}$ (b) $\frac{2}{4 \times l}$
(c) $\frac{4}{3 \times l}$ (d) $\frac{4 \times l}{3}$

Ans. (c) : For cantilever beam

Maximum slope $(\theta) = \frac{w\ell^3}{6EI}$

Maximum deflection $(\Delta) = \frac{w\ell^4}{8EI}$

Ratio of maximum slope and maximum deflection–

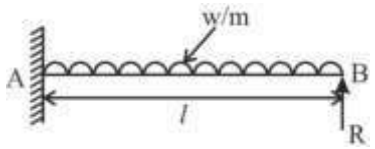
$$\frac{\text{Maximum slope } (\theta)}{\text{Maximum deflection } (\Delta)} = \frac{\frac{w\ell^3}{6EI}}{\frac{w\ell^4}{8EI}} = \frac{8}{6 \times \ell} = \frac{4}{3\ell}$$

24. A Propped cantilever beam is loaded with uniformly distributed load on whole span, such that deflection at prop end of the beam is zero. The reaction of the prop end of the beam is calculated by (Take usual notations for all quantities).

(a) $\frac{3wl}{8}$ (b) $\frac{7wl}{8}$

(c) $\frac{5wl}{8}$ (d) $\frac{5wl}{7}$

Ans. (a) :



Reaction R at propped end

Deflection at B due to udl (in downward direction)

$$\delta_B = \frac{w\ell^4}{8EI}$$

Deflection at B due to propped (in upward direction)

$$\delta_B = \frac{R\ell^3}{3EI}$$

Net deflection is zero.

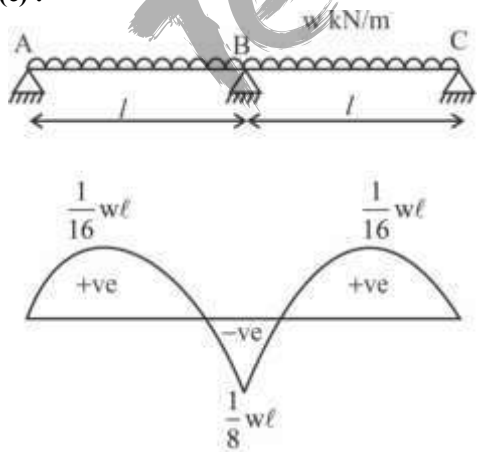
So, $\frac{R\ell^3}{3EI} = \frac{w\ell^4}{8EI}$

$$R = \frac{3w\ell}{8}$$

25. A two spans continuous beam is simply supported by three supports A, B and C from left to right end respectively and subjected to U.D.L. of w kN/m throughout the span. Then negative bending moment will be generated at

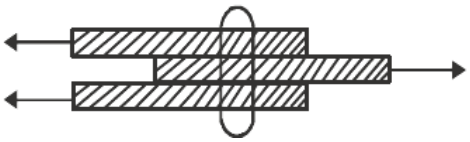
(a) Support A
(b) Support C
(c) Support B
(d) Both supports A and C

Ans. (c) :



• The negative bending moment will be generated at support B.

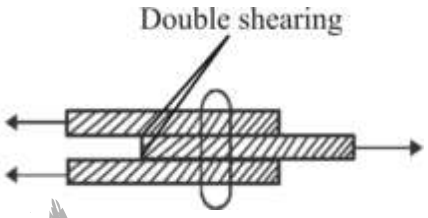
26. Three steel plates are held together by 14 mm diameter rivet. If the load transmitted is 88 kN through this arrangement, estimate the shearing stress in the rivet.



(a) $\frac{4\times10^3}{7}$ (b) $\frac{2\times10^3}{7}$

(c) $\frac{3\times10^3}{7}$ (d) $\frac{7\times10^3}{2}$

Ans. (*) :



Rivet diameter = 14 mm

Load (P) = 88 kN

Shearing stress (σ_s) = ?

We know that,

$$P = \frac{\pi}{4}d^2\sigma_s$$

Double shearing

$$P = 2\frac{\pi}{4}d^2\sigma_s$$

$$\sigma_s = \frac{P}{2.\frac{\pi}{4}\times d^2}$$

$$\sigma_s = \frac{88\times10^3}{2\times\frac{22}{7}\times\frac{1}{4}\times14\times14} = \frac{2\times10^3}{7}$$

27. The displacement of joints is selected as redundant in which method of structural analysis ?

(a) Force method
(b) Stiffness method
(c) Flexibility method
(d) Compatibility method

Ans. (b) : Displacement or stiffness method–In this method of analysis, the displacement of joints (may be rotation or transition) are selected as redundant and similar equation as in force method are written.

• The displacement method of analysis, also called the stiffness or equilibrium method.

28. What is the maximum length of open gantries beyond which expansion joint shall be provided ?

(a) 120 m (b) 150 m

(c) 180 m (d) 230 m

Ans. (b) : Expansion joint–

• The maximum width of the covered building section should preferably be restricted to 150 m beyond which suitable provisions for the expansion joint may be made.

• The length of the building section may be restricted to 180 m in case of covered building and 120 m in case of open gantries.

29. If M25 grade concrete is used as a bedding material for a steel column, then the maximum bearing pressure shall be limited to

(a) 15 MPa (b) 13.5 MPa

(c) 21.75 MPa (d) 17.5 MPa

Ans. (a) : As per IS 800:2007

• The maximum bearing pressure should not exceed the bearing strength equal to 0.6 f_{ck}.

where f_{ck} is the smaller of characteristic cube strength of concrete or bedding material.

Given,

Grade of concrete = M25

Maximum bearing pressure = 0.6 f_{ck}

$= 0.6 \times 25$

Maximum bearing pressure = 15 MPa

30. What is the ratio of most unfavourable slenderness of each member between the intermediate weld connection back to back if the most unfavourable ratio of slenderness of the member as a whole is 90 ?

(a) 40 (b) 54

(c) 63 (d) 45

Ans. (a) : The ratio of the most unfavourable slenderness of each member between the intermediate weld connection back to back is given by-

$$\lambda_1 = \frac{90}{2.25} = 40$$

- Overall slenderness ratio = 90
- Reduction factor for back-to-back connection = 2.25

$\therefore$ Slenderness ratio of each member = 40

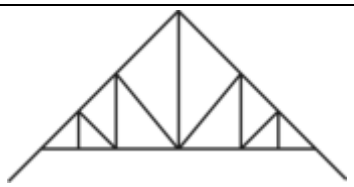
31. In which type of roof truss the diagonals are in tension under gravity loading?

(a) Howe truss (b) King post truss

(c) Pratt truss (d) Warren truss

Ans. (c) : Pratt trusses are commonly used in long span buildings ranging from 20 to 100 m in span.

- In a conventional Pratt truss, diagonal members are in tension for gravity loads.
- This type of truss is used where gravity loads are predominant.
- Pratt trusses were inverted in 1844 by Thomas and Caleb Pratt.



Pratt truss

32. When transverse stiffeners are not provided in plate girder and the web of plate girder is connected to flange along one longitudinal edge only, then the minimum thickness of web shall be taken as

(a) $\frac{d}{200\varepsilon_w}$ (b) $\frac{d}{340\varepsilon_w}$

(c) $\frac{d}{90\varepsilon_w}$ (d) $\frac{d}{400\varepsilon_w}$

Ans. (c) : As per clause (8.6.1.1) of IS 800-2007– The thickness of the web in a section shall satisfy the following requirement :

1. When transverse stiffeners are not provided and web connected to flanges along both longitudinal edges

$$\frac{d}{t_w} \le 90\varepsilon_w$$

2. When transverse stiffeners are not provided and web connected to flanges along one longitudinal edge only

$$\frac{d}{t_w} \le 200\varepsilon_w$$

Web thickness-

- Initially the web thickness can be assumed as 6 mm (if painted) or 80 mm (if unpainted).

33. What is the minimum vertical distance between the rows of bars if the beam is constructed with 20 mm size aggregate and reinforced with 12 mm diameter bars ?

(a) 12 mm (b) 14 mm

(c) 15 mm (d) 20 mm

Ans. (c) : As per IS 456 : 2000–

The minimum vertical distance between two main bars shall be–

• 15 mm

• Two-third of the nominal size of coarse aggregate, or

• Maximum size of the bar, whichever is greater.

Given,

Size of bar =12 mm

Size of coarse aggregate = 20 mm

Vertical distance = 15 mm

= Maximum dia of bar = 12 mm

$= \frac{2}{3} \times 20 = 13.33\,\text{mm}$

Which is maximum

So, minimum vertical distance = 15 mm

Reinforcement spacing for beam–

- Max. horizontal spacing $\not>$ 300 mm for Fe250, 180 mm for Fe415
- Min. horizontal spacing, maximum of :

(a) Equal to dia. of bar if the dia. is equal
(b) Dia. of larger bar if the dia. are unequal
(c) 5 mm more than nominal maximum size of coarse aggregate.

34. If 300 mm × 600 mm rectangular beam case with M25 grade concrete subjected to flexure, then the cracking moment of the beam is

(a) 63 kN.m (b) 48.3 kN.m
(c) 31.5 kN.m (d) 36 kN.m

Ans. (a) : Given,
Size of beam = 300 mm × 600 mm
Grade of concrete = M25
Cracking moment (M) = ?
Flexural tensile strength/stress at cracking (f_{ck})

$$= 0.7\sqrt{f_{ck}}$$

$$= 0.7 \times \sqrt{25} = 3.5 N/mm^2$$

$$\frac{M}{I} = \frac{\sigma}{y}$$

$$M_{cr} = f_{ck} \times \frac{I}{y}$$

$$M_{cr} = f_{ck} \times z$$

$$M_{cr} = f_{ck} \times \frac{bd^2}{6}$$

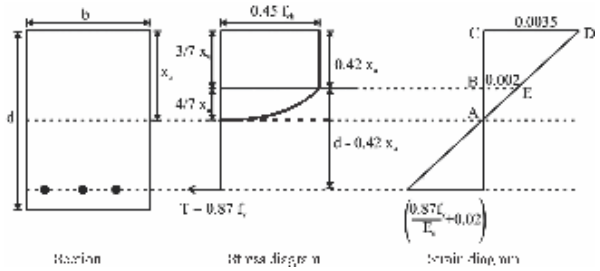
$$M_{cr} = 3.5 \times \frac{300 \times 600^2}{6}$$

$M_{cr} = 63 \times 10^3$ N-m
$M_{cr} = 63$ kN-m

35. What is the depth of rectangular portion in stress block diagram of concrete ?

(a) 4/7 X_u (b) 3/7 X_u
(c) 2/7 X_u (d) 5/7 X_u

Ans. (b) : Stress block diagram of concrete–



From similar triangle, ΔACD & ΔABE

$$\frac{0.0035}{AC} = \frac{0.002}{AB}$$

$$AB = \frac{2}{3.5} AC$$

$$AC = \frac{2}{3.5} x_u$$

$$AB = \frac{4}{7} x_u$$

Depth of rectangular portion = $x_u - \frac{4}{7}x_u = \frac{3}{7}x_u$

The depth of rectangular portion in stress block diagram of concrete $= \frac{3}{7}x_u$.

36. The nominal shear stress should not exceed _____ for solid slab constructed with M40 grade concrete.

(a) 4 N/mm^2 (b) 3.1 N/mm^2
(c) 2 N/mm^2 (d) 2.8 N/mm^2

Ans. (a) : Maximum shear stress with shear reinforcement ($\tau_{c\,max}$)
Given, $f_{ck} = 40$ N/mm^2

$$\tau_{max} = 0.631\sqrt{f_{ck}}$$

$$\tau_{max} = 0.631\sqrt{40}$$

$$= 3.99 \simeq 4 N/mm^2$$

Grade	M 15	M 20	M25	M30	M35	M40 and above
LSM	2.5	2.8	3.1	3.5	3.7	4.0
WSM	1.6	1.8	1.9	2.2	2.3	2.5

37. The maximum spacing of shear reinforcement for 230 mm wide and 350 mm deep (effective) beam shall not exceed _____ when inclined stirrups is provided at 45º.

(a) 350 mm (b) 225 mm
(c) 230 mm (d) 300 mm

Ans. (d) : For vertical stirrups (90°) : The maximum spacing is –

- 0.75 * d or 300 mm, whichever is less.

For inclined stirrups (45°) : The maximum spacing is–

- 0.75 * d or 300 mm, whichever is less.

Given,
Width of the beam (b) = 230 mm
Effective depth (d) = 350 mm
Stirrups are inclined at 45°
0.75 * d = 0.75 × 350 = 262.5 mm ≃ 300 mm

38. The strength of compression members subjected to helical reinforcement is about _____ percent more than the strength of similar member with lateral ties.

(a) 1.05 (b) 10
(c) 5 (d) 1.10

Ans. (c) :

- Due to helical reinforcement its strength increased by 5%.
- Helical reinforcement provided only circular reinforcement.

• The strength of a column with helical reinforcement is typically 1.05 times the strength of a similar column with lateral ties.

39. Which of the following criteria is considered while proportioning the size of footing ?

(a) $\frac{P}{A}+\frac{M}{Z} < \text{A.B.P. and } \frac{P}{A}-\frac{M}{Z} \geq 0$

(b) $\frac{P}{A}-\frac{M}{Z} < \text{A.B.P. and } \frac{P}{A}+\frac{M}{Z} \geq 0$

(c) $\frac{P}{A}+\frac{M}{Z} > \text{A.B.P. and } \frac{P}{A}-\frac{M}{Z} \leq 0$

(d) $\frac{P}{A}-\frac{M}{Z} > \text{A.B.P. and } \frac{P}{A}+\frac{M}{Z} \leq 0$

Ans. (a) : The criteria is considered while proportion the size of footing $= \frac{P}{A}+\frac{M}{Z} < \text{ABP and } \frac{P}{A}-\frac{M}{Z} \geq 0$.

40. The thickness of base slab for a cantilever retaining wall of 6 m overall height may be considered as

(a) 300 mm (b) 450 mm
(c) 350 mm (d) 380 mm

Ans. (b) : Thickness of base slab– For the preliminary analysis, thickness of the base slab can be taken H/10 to H/15. H is the total height of the retaining wall. Min thickness not less than 300 mm.

• Base width varies from 0.4H to 0.6H.

Thickness of base slab = $\frac{h}{12}$ or 0.08 h

$= \frac{6000}{12}$ or 0.08×6000

= 500 mm or 480 mm

Base slab thickness range– For this height the base slab thickness generally falls between 300 mm to 450 mm.

Conservative choice– A thickness of 450 mm is a safe, conservative option for structural stability.

41. The development length of each bar of bundled bars shall be taken as _____ times more than that of individual bar when four bars in contact.

(a) 1.10 (b) 1.20
(c) 1.30 (d) 1.33

Ans. (d) : Bar bundled in contact–

The respective development lengths of each of the bars for two, three or four bars in contact are determined following the same principle. The development length of each base of bundled bars shall be that for individual bar, increased by 10 percent for two bar in contact, 20 percent for three bars in contact and 33 percent for four bars in contact.

42. The nominal cover to meet the requirements of durability for M45 grade concrete under various exposure condition is given below:

	Exposure	Minimum nominal cover (mm)
A.	Mild	1. 40
B.	Severe	2. 45
C.	Very severe	3. 50
		4. 20

	A	B	C
(a)	1	2	3
(b)	4	2	3
(c)	1	1	3
(d)	4	1	2

Ans. (b) : Cover–The protect against corrosion

Environmental condition	Minimum grade of concrete	Nominal cover
Mild	M20	20 mm
Moderate	M25	30 mm
Severe	M30	45 mm
Very severe	M35	50 mm
Extreme	M40	75 mm

43. What is the value of coefficient of discharge when the area of jet of liquid at outlet is equal to the area of mouthpiece ?

(a) 0.530 (b) 0.602
(c) 0.608 (d) 0.858

Ans. (d) :

Mouthpiece type	C_v	C_d	C_c
1. External mouthpiece			
Cylindrical mouthpiece	0.855	0.855	1.0
Convergent mouthpiece	0.98	0.98	1.0
Convergent-divergent mouthpiece	0.99	0.99	1.0
2. Internal mouthpiece			
Running full	0.707	0.707	1.0
Running free	1.0	0.50	0.50

44. The atmospheric pressure at sea level at 15° is

(a) 10.13 N/cm^2 (b) 14.17 N/cm^2
(c) 19.75 N/cm^2 (d) 22.83 N/cm^2

Ans. (a) : An atmosphere (atm) is a unit of measurement equal to the average air pressure at sea level at a temperature of 15 degrees celsius (59 degree Fahrenheit). One atmosphere is 1013 millibars or 10.13 N/cm^2.

45. Euler's number has the dimensions as

(a) $ML^{-2}T^2$ (b) $ML^{-1}T^2$
(c) MLT^{-1} (d) $M^0L^0T^0$

Ans. (d): Euler's number–It is defined as the ratio of the square root of the inertia force to the pressure force.

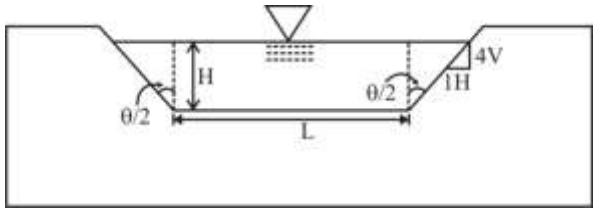
$$E_u = \sqrt{\frac{\text{Inertia force}}{\text{Pressure force}}} = \frac{V}{\sqrt{\frac{P}{\rho}}}$$

The Euler number (EU) is a dimensionless $[M^0L^0T^0]$.

46. A cipolletti weir is constructed for the side slope of _____

(a) 1 Horizontal to 4 vertical
(b) 1 horizontal to 2 vertical
(c) 2 horizontal to 1 vertical
(d) 1 Horizontal to 2½ vertical

Ans. (a) : Cipolletti weir–



$$\tan\frac{\theta}{2} = \frac{1}{4}, \quad \theta = 28^\circ$$

$$Q = \frac{2}{3}C_d \cdot \sqrt{2g}LH^{3/2}$$

$C_d = 0.63$

• A cipolletti weir is constructed for the side slope of 1 horizontal to 4 vertical.

47. Identify the incorrect statement in terms of gradually varied flow.

(a) The energy correction factor is zero
(b) The flow is steady
(c) The roughness coefficient is constant for the length of channel
(d) The channel is prismatic

Ans. (a) : Gradually varied flow (GVF)– The gradually varied flow is a steady non-uniform flow in which the depth of flow varies gradually.

Assumption of gradually varied flow :

1. The bottom slope of the channel is very small
2. The channel is prismatic
3. The energy correction factor ^oC is unit
4. The pressure distribution in any vertical is hydrostatic
5. The roughness coefficient is independent of the depth of flow and it is constant throughout the channel reach considered.

48. Which of the following is not come under self-recording type rain gauge ?

(a) Tipping bucket rain gauge
(b) Symon's rain gauge
(c) Float type rain gauge
(d) Weighing type rain gauge

Ans. (b): The following are the main types of rain gauges used for measurement of rainfall–

1. Non-automatic rain gauge–This is also known as non-recording rain gauge. Symon's rain gauge is the instrument prescribed by use at all government rain gauge stations throughout India.

2. Automatic rain gauge–These are integrating type recording rain gauges and are of three types–

(i) Weighing bucket rain gauge
(ii) Tipping bucket rain gauge
(iii) Float type rain gauge

49. The reservoir for irrigation may be planned with the value of design yield of about _____ times higher than the firm yield.

(a) 1.10 (b) 1.30
(c) 1.05 (d) 1.20

Ans. (d) : For domestic water supply the design yield corresponds to firm yield while for a reservoir meant for irrigation, the design yield may be 20% higher than the firm yield. The value of the design yield depends on the urgency of water requirement and the amount of risk involved if the actual yield is less than the design yield.

50. Kennedy gives silt theory for the design of unlined alluvial channels by considering B/D ratio ranging from

(a) 0.8 to 1.2 (b) 1.5 to 3
(c) 3.5 to 12 (d) 1.5 to 2.5

Ans. (c) : Unlined canal design on alluvial soil by Kennedy's theory–

• Critical velocity $V_o = 0.546\ mD^{0.64}$
• B/D ratio is assumed between 3.5 to 12
• Mean viscosity $V = C \times (RS)^{1/2}$
• Discharge Q = A.V

51. In Khosla's theory, if no cutoff is provided at the downstream end of the floor, then the exit gradient becomes

(a) Infinite (b) Zero
(c) Unity (d) Negative

Ans. (a) : Exit gradient (E) according to this theory based on mathematical solutions adopted by Khosla is given as–

$$\text{Exit gradient } (G_e) = \frac{h_L}{L}$$

In Khosla theory no. cut off is provided so L = 0

$$\text{Exit gradient } (G_e) = \frac{h_L}{0} = \infty$$

As per Khosla theory, the exit gradient in the absence of downstream cut-off is infinite.

52. _____ is the rate of flow of water through a vertical strip of aquifer of unit width and extending for the full saturated height under unit hydraulic gradient.

(a) Coefficient of transmissibility
(b) Coefficient of permeability
(c) Coefficient of discharge
(d) Storativity

Ans. (a) : Coefficient of transmissibility is defined as the rate of flow of water through a vertical strip of aquifer of unit width and extending the full height of saturation under unit hydraulic gradient. This is obtained by multiplying the field coefficient of permeability by the thickness of the aquifer.

Coefficient of permeability–It is defined as the velocity of flow which will occur through the total cross-section area of the soil under unit hydraulic gradient.

53. Total quantity of 730 m litre water is required by a town per year having population of 10000. The per capita demand for the town will be of

(a) 0.73 m^3/day (b) 200 m^3/day
(c) 0.2 m^3/day (d) 0.2 litres/day

Ans. (d) : Given,
Total quantity of water required = 730M liter
Population (P) = 10000
Per capita demand = ?
We know that

$$\text{Per capita demand (q)} = \frac{Q}{P \times 365}\ell/\text{day}$$

$$= \frac{730 \times 10^6}{10000 \times 365} = 200\ell/\text{day}$$

Per capita demand (q) = 0.2 m^3/day

54. Which of the following method is suitable for forecasting the population of those towns and cities whose development is likely to place according to the national growth of country ?

(a) The Master Plan Method
(b) The Apportionment Method
(c) The Comparative Graphical Method
(d) The Logistic Curve Method

Ans. (b) : Apportionment Method–This is also as the ratio method of forecasting future population. In this method, the census population record is expressed as the percentage of the population of the whole country. The population of the city under consideration and the country's population for the last four to five decades are collected from the census department.

55. Ultra - violet rays are highly disinfectants and kill the disease bacteria, in this disinfection method water is allowed to pass in thickness not exceeding _____ before the ultraviolet rays.

(a) 8 cm (b) 15 cm
(c) 12 cm (d) 10 cm

Ans. (d): Disinfection by ultra-violet ray–Ultra-violet rays are invisible light rays having wavelengths of 1000 to 4000 m. Sun rays also have ultra violet rays which can also be utilized in the disinfection.
• Ultra-violet rays are highly disinfection and kill the disease bacteria. After removing the turbidity and the color of water, its disinfection by ultra-violet rays can be done. The water is allowed to pass in thickness not exceeding 10 cm before the ultraviolet rays.

56. The trickling filters are always provided between _____ to remove organic solids produced in filtration.

(a) Intermittent filters and contact beds
(b) Intermittent filters and final settling tank
(c) Primary sedimentation tank and final settling tank
(d) Screening and primary sedimentation tank

Ans. (c) : Trickling filter–Trickling filters are used to remove organic matter from wastewater. The TF is an aerobic treatment system that utilizes microorganisms attach to a medium to remove organic matter from wastewater. This type of system is common to a number of technologies such as rotating biological contactors and packed bed reactors (bio towers). These system are known as attached growth processes.

57. Read the below given statements carefully and identify the correct statements :

A. Generally grit particles lie between 0.1 to 1 mm in size.
B . Stokes law holds good for settling of particles of diameters less than 1 mm.
C. Usually the detention period of grit chambers is 60 min.
D. The loss of head in a grit chamber varies from 0.06 to 0.6 m.

(a) A and D (b) B and C
(c) A and C (d) B and D

Ans. (a) : • The grit particles lie between 0.1 mm and 1.0 mm.
• The settling velocity is given by Stoke's law, applicable for particles of diameter less than 0.1 mm.
• Usually the detention period of grit chambers is 30-60 sec and depth is 1-1.5 m.
• Loss of head in a grit chamber varies from 6 to 60 cm depending on the device adopted for velocity control.

58. The sludge index is the ratio of the volume of activated sludge varies from

(a) 0 to 100 (b) 150 to 300
(c) 350 to 500 (d) 400 to 550

Ans. (*) : Sludge Volume Index (SVI)–
• It indicate physical state of sludge in the Biological Aeration system.
• Generating SVI value should be (80-150) ml/gm.
• Sludge volume index with ml/gm.
• SVI represent the degree of concentration of sludge in the system.

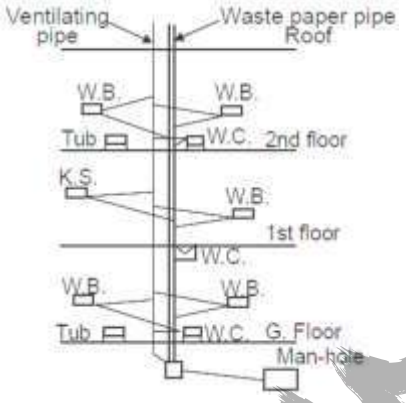
59. The gas vent area for Imhoff tank is provided as

(a) 5 to 8% of the plan area
(b) 30 to 35% of the plan area
(c) 10 to 15% of the plan area
(d) 20 to 25% of the plan area

Ans. (d) : Imhoff tank–An Imhoff tank is an improvement over septic tank, in which the coming sewage is not allowed to get mixed up with the sludge produced and the outgoing effluent is not allowed to carry with it large amount of organic load as in the case of septic tank. They are sometimes also known as Two-storey digestion tanks.

• It removes 60 to 65% solids and 30 to 40% BOD.
• Detention period = 2 to 4 hours (usually 2 hours).

60. Identify the figure :



(a) Single Stack System
(b) One - Pipe System
(c) Two - Pipe System
(d) Single Stack Partially Ventilated System

Ans. (b) : One - Pipe System–In this system of plumbing, the waste connections from sinks, baths, washbasins and the soil pipe which is connected directly to the drainage system.

Gully traps and waste pipes are completely dispensed with. But all the traps of WC, basins etc. are completely ventilated to preserve the water seal by separate vent pipe.

61. How many litres of water is required in steel industry for the production of 1 tonne steel?

(a) 1,75,000 (b) 60,000
(c) 4,500 (d) None of these

Ans. (d) : This is only a small fraction of the total water requirement about 350000 liters of water are required to produce one tonne of steel. The steel-making sector is a very large consumer of energy and therefore a major contributor to greenhouse gas emission.

62. The depth of tank for a high rate trickling filter may vary from

(a) 1.0 to 1.8 m (b) 2.0 to 2.7 m
(c) 3.0 to 1.8 m (d) 4.0 to 5.3 m

Ans. (a) : Design data for trickling filters

	Standard	High rate	Super high rate
Hydraulic loading (in $m^3/m^2/day$)	1-4	10-40 (including recirculation)	40-200 (including recirculation)
Organic loading (in kg $BOD_5/m^3/day$)	0.08-0.32	0.32-10 (excluding recirculation)	0.6-0.8 (excluding recirculation)
Depth (m)	1.8-3.0	0.9-2.5 m	4.5 - 12 m
Recirculation ratio (θ_R/θ_o)	0	0.5-3.0	1-4

63. In Geometrical design of highways, mechanical widening and psychological widening are provided on

(a) The vertical curves of highways
(b) The horizontal curves of highways
(c) The straight path of highways
(d) The overtaking zones of highways

Ans. (b) : Horizontal curves–A horizontal highway curve is a curve in plan to provide change in direction to the central line of a road. When a vehicle traverses a horizontal curve, the centrifugal force acts horizontally outwards through the center of gravity of the vehicle.

• On horizontal curve, it is sufficient to provide mechanical and psychological widening.

64. Match the following list of tests of bituminous materials with its testing apparatus :

Bituminous materials tests	Testing Apparatus
A. Ductility test	P. Ring and Ball test
B. Flash and Fire point test	Q. Penetrometer
C. Softening test	R. Standard briquette mould
D. Penetration test	S. Pensky-Martens closed tester

(a) D → R, C → S, A → Q, B → P
(b) D → Q, C → R, A → S, B → P
(c) D → Q, C → P, A → R, B → S
(d) D → Q, C → R, A → P, B → S

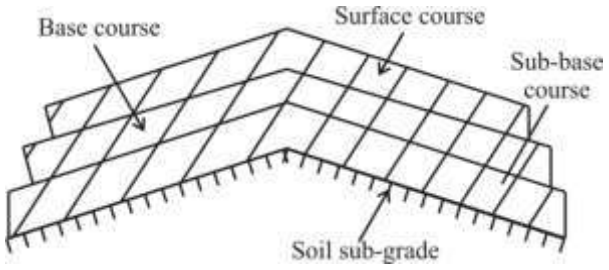
Ans. (c) :

Bituminous materials tests	Testing Apparatus
Ductility test	Standard briquette mould
Flash and Fire point test	Pensky-Martens closed tester
Softening test	Ring and Ball test
Penetration test	Penetrometer

65. Select the correct sequence of component parts of road structure from top to bottom.

(a) Wearing layer, subgrade, foundation, subsoil
(b) Wearing layer, foundation, subsoil, subgrade
(c) Wearing layer, foundation, subgrade, sub soil
(d) Subsoil, wearing layer, foundation, subgrade

Ans. (c) : Following are the different component of road structure–
1. Subgrade
2. Sub-base
3. Base course
4. Surface course or wearing course.



Components of Road Pavement Structure

66. Which of the following is a characteristic of rigid pavements ?

(a) In design of rigid pavements, the strength of sub grade is most important
(b) Its failure is usually due to movement of subgrade
(c) It produces heavy temperature stresses
(d) It cannot resist tensile stresses

Ans. (c) : Rigid pavements–Rigid pavements have sufficient flexural strength to transmit the wheel load stress to a wider area below. Compared to flexible pavement, rigid pavements are placed either directly on the prepared sub-grade or on a single layer of granular or stabilized material.

67. The minimum radii of curve recommended for vehicle moving in a hill road which is not snowbound at a speed of 10 m/s is

(a) 41 m (b) 3.15 m
(c) 46 m (d) 3.5 m

Ans. (a) : For hilly terrain e = 10%
$g = 9.81\ m/sec^2$
v = 10 m/sec
f = 0.15

$$\text{Minimum radii of curve } (R) = \frac{v^2}{g(e+f)}$$

$$= \frac{10\times10}{9.81(0.1+0.15)} = 40.77 m \simeq 41\ m$$

68. The width of entry and the width of non - weaving section for a 4-lane road is 10 m and 7.5 m respectively. The width of wearing section for rotary carriageway should be provided as

(a) 8.75 m (b) 12.25 m
(c) 17.5 m (d) 16 m

Ans. (b) : As per IRC 65 - 1976 the width of weaving section of the rotary should be one traffic lane (3.5 m) wider than the mean entry width.

$$\text{Width of weaving section (w)} = \frac{e_1+e_2}{2} + 3.5$$

$$= \frac{10+7.5}{2} + 3.5 = 12.25\ m$$

69. Choose the correct option in terms of vehicle registration with its colour of letter and the background of number plate.

A. In case of transport vehicle	**1. In black on a yellow background**
B. In case of temporary	**2. In black on a white background**
C. In case of taxies	**3. In white on a red background**
D. In case of registration marks allotted to dealers	**4. In red on a yellow background**

	A	B	C	D
(a)	3	2	1	4
(b)	4	3	1	2
(c)	2	4	1	3
(d)	2	3	1	4

Ans. (c) : • In case of transport vehicle - In black on a white background
• In case of temporary - In red on a yellow background
• In case of taxies - In black on a yellow background
• In case of registration marks allotted to dealers - In white on a red background

70. The size of letter for advance direction signs on urban areas may range from

(a) 20-25 cm (b) 25-30 cm
(c) 8-15 cm (d) 8-10 cm

Ans. (d) : For advance direction signs on rural roads, the letter size ('x' height) should be minimum of 15 cm for National and State highways and 10 cm for other roads. In urban areas letter size shall be 10 cm on all directional signs for easy and better comprehension the word message shall be written in initial upper case letter followed by lower case letters.

71. Where the needle scaffolding will be most suitable to use ?

(a) To do painting and repair work inside the rooms
(b) When ground is strong to support standard
(c) When it is required to keep the ground near to the wall, free for traffic
(d) When construction work in the basement of the building is to be carried out

Ans. (c) : Needle scaffolding–It is used when obstacles are preventing a scaffolding tower being erected such as the ground can't support standards, the ground near the wall needs to be free from traffic or the upper part of the wall is under construction.

72. A dog legged stair is to be planned in a stair hall of 2.5 m × 5 m size, having vertical distance between the floors 3.6 m. The height of each flight is half of vertical distance between the floors. Find out number of risers and treads in each flight. Take height of single riser be 15 cm and width of tread 25 cm.

(a) 11, 12 (b) 12, 11
(c) 12, 13 (d) 12, 12

Ans. (b) : Dog legged staircase
Floor to floor height = 3.6 m

Height of flight $= \frac{3.6}{2} = 1.8 \text{ m} = 1800 \text{ mm}$

Height of single riser = 15 cm = 150 mm
Width of tread = 25 cm = 250 mm

No. of riser in single flight $= \frac{180}{150} = 12$

No. of tread in single flight = Riser – 1
12 – 1 = 11

73. Which of the following is a correct general arbitrary volumetric proportion for a high strength concrete ?

(a) 1 : 1.3 : 2.8 (b) 1 : 1.2 : 2.4
(c) 1 : 1.2 : 2.6 (d) 1 : 1.1 : 2.6

Ans. (b) : Arbitrary method–In arbitrary method, the proportion of cement sand and coarse aggregates are arbitrary chosen. The quantity of water in the cement paste is adjusted per the desired workability. For foundations and mass concrete work, the preferred concrete mix ratio is 1:4:8 while normal construction work can work with ratio 1:1.5:3 and 1:2:4 construction work that requires a high strength concrete subsequently requires higher grade concrete ratio 1:1:2 and 1 : 1.2 : 2.4

74. What is the aggregate crushing value for a sample having total dry weight of 2.1 kg and weight of material passing through 2.36 mm I.S. sieve is about 0.84 kg after the crushing of aggregates ?

(a) 40% (b) 45%
(c) 38% (d) 42%

Ans. (a) : Total dry weight of sample = 2.1 kg
Sample weight after crushing = 0.84 kg

Crushing of aggregate $= \frac{0.84}{2.1} \times 100 = 40\%$

75. Arrange the constituents of a good brick earth in descending order of them contained in brick earth.

(a) Silica, Alumina, Lime
(b) Alumina, Lime, Silica
(c) Lime, Silica, Alumina
(d) Silica, Lime, Alumina

Ans. (a) : Constituent of good brick earth–
- Silica (50-60%)
- Alumina (20-30%)
- Lime (5-10%)
- Iron oxide (5-7%)
- Magnesia (near about 1%)

76. The few chips or pieces of stones are taken and they are placed in a glass tube to find out the presence of soluble matter in a sample of stone. This is the process of

(a) Water absorption test
(b) Smith's test
(c) Acid test
(d) Attrition test

Ans. (b) : Smith's test–This test is performed to find out the presence of soluble matter in a sample of stone. Few chips or pieces of stone are taken and they are placed in a glass tube. The tube is then filled with clear water. After about an hour, the tube is shaken.
Presence of earthy matter will convert the clear water into dirty water, if water remains clear, stone will be durable and free from dry soluble matter.

77. The fire load of Domestic buildings should not exceed by an average of _____ of the net floor area of any compartment, nor an average of _____ on limited isolated areas.

(a) 550000 k cal/m^2, 11000000 k cal/m^2
(b) 275000 k cal/m^2, 22000000 k cal/m^2
(c) 550000 k cal/m^2, 22000000 k cal/m^2
(d) 550000 k cal/m^2, 22000000 k cal/m^2

Ans. (b) : Occupancies of low fire load–Under this fall those occupancies whose the fire load does not exceed an average of 275000 kcal/m^2 of net floor area of any compartment, nor an average of 55000 kcal/m^2 on limited isolated areas. Domestic buildings, hotels, boarding houses, restaurants, schools, hospitals, temples, mosques, commercial offices come under this category.

78. For providing fire resistance to timber by Sir Abel's process, the timber surface should be cleaned and coated with a dilute solution of

(a) Boric acid
(b) Calcium silicate
(c) Sodium dichromate
(d) Sodium silicate

Ans. (d): Sir Abel's process–In this process, the timber surface is cleaned and it is coated with a dilute solution of sodium silicate. A cream like paste of slaked fat lime is then applied and finally a concentrated solution of silicate of soda is applied on the timber surface. The process is quite satisfactory in making the timber fire resistant.

79. Which of the following statement is incorrect regarding to pit sand ?

(a) When it is rub between fingers, fine pit sand should not leave any stain on the fingers
(b) It consists of fine rounded grains
(c) It is excavated from a depth of about 1 to 2 m from ground level
(d) It is obtained by forming pits into soils

Ans. (b) : Pit sand–

Obtained by forming pits into the soil

• It is sharp, angular, porous and free from harmful salts.

• Clay and other impurities should be washed and screened before using engineering purposes.

• Fine pit sand, when rubbed between fingers should not leave any stain on it. It indicates the presence of day.

80. Which type of bricks are commonly used at places where brickwork is to be provided with a coat of plaster ?

(a) Second class bricks (b) First class bricks
(c) Third class bricks (d) Fourth class bricks

Ans. (a) : Classification of bricks as per common bricks–

1. First class
2. Second class
3. Third class
4. Fourth class brick

Second class brick–These bricks are ground moulded and they are burnt in kilns. The surface of these bricks is somewhat rough and shape is also slightly irregular. These bricks may have hair cracks and their edges may not be sharp and uniform. These bricks are commonly used at places where brick work is to be provided with a coat of plaster.

Non-technical

81. A few days before independence, the Maharaja of Manipur, ..., signed the Instrument of Accession with the Indian government on the assurance that the internal autonomy of Manipur would be maintained.

(a) Nara Singh
(b) Gambhir Singh
(c) Bodhachandra Singh
(d) Surachandra Singh

Ans. (c)

82. ..... is famous for its black - red prints in which flowers, leaves, animals and birds are made in red and black on the base is matia (earthen) color.

(a) Sanganeri (b) Kaithoon
(c) Bagru (d) Akola

Ans. (c)

83. Which of the following dance performed by men and women is a famous dance of Garasiya tribe of the Sirohi region?

(a) Terah Taali Dance (b) Agni Dance
(c) Walar Dance (d) Bum Dance

Ans. (c)

84. The works which throw light on the achievements and incidents of a particular individual and dynasty are called .....

(a) Vigat (b) Prakas
(c) Veli (d) Saakhi

Ans. (b)

85. Which of the following became the first All India Struggle Movement against British government in 1919?

(a) Dandi March
(b) Rowlatt Satyagraha
(c) Non-Cooperation Movement
(d) Khilafat Agitation

Ans. (b)

86. What is the main function of a capacitor in an electronic circuit?

(a) To store electric charge
(b) To amplify current
(c) To convert AC to DC
(d) To regulate voltage

Ans. (a)

87. Which of the following elements is used as a semiconductor in electronic devices?

(a) Gold (b) Silver
(c) Platinum (d) Silicon

Ans. (d)

88. Which of the following is the primary function of a modem in a telecommunication system?

(a) To convert digital signals to analog signals for transmission over telephone lines
(b) To convert analog signals to digital signals for transmission over the internet
(c) To amplify signals for longer distance transmission
(d) To filter out noise and interference from the signal

Ans. (a)

89. Which of the following is the effect of the presence of suspended particulate matter on the Air Quality Index (AQI) and human health?

(a) Increases AQI and has no significant health impact
(b) Decreases AQI and has no significant health impact
(c) Increases AQI and can cause respiratory problems
(d) Decreases AQI and can cause respiratory problems

Ans. (c)

90. Which of the following is a type of non-volatile memory that is commonly used for storing firmware and operating systems in computer systems?
(a) RAM (b) ROM
(c) Virtual memory (d) Cache memory

Ans. (b)

91. Which of the following is a type of orbit used by communication satellites that allows them to remain in a fixed position relative to the Earth's surface?
(a) Low Earth Orbit
(b) Geostationary Orbit
(c) Polar Orbit
(d) Sun Synchronous Orbit

Ans. (b)

92. Which of the following software tools is commonly used for version control in software development?
(a) AutoCAD (b) Adobe Photoshop
(c) Ruby (d) Git

Ans. (d)

93. What is the total length of Indira Gandhi Canal Project approximately?
(a) 150 km (b) 350 km
(c) 650 km (d) 850 km

Ans. (c)

94. Which of the following five year plans, had objective defined as "Growth with Stability"?
(a) Fourth Five-year plan
(b) Tenth Five-year plan
(c) Twelfth Five-year plan
(d) Fourteenth Five-year plan

Ans. (a)

95. According to recent report, Rajasthan holds what rank in production of Pearl-millet crop in India?
(a) First (b) Second
(c) Third (d) Seventh

Ans. (a)

96. How many priorities were adopted in the Union Budget for F.Y. 2023-24 to guide the country towards 'Amrit Kaal'?
(a) Five Priorities (b) Six Priorities
(c) Seven Priorities (d) Eight Priorities

Ans. (c)

97. Which economic reform in India has introduced a new credit guarantee scheme for Micro, Small and Medium Enterprises (MSMEs) benefitting many states including Rajasthan?
(a) PM-KISAN Scheme (b) PLI Scheme
(c) ECLG Scheme (d) ABR Yojana

Ans. (c)

98. Which of the following is designated as town of export excellence for Handicrafts in Rajasthan?
(a) Pali (b) Bikaner
(c) Jaipur (d) Udaipur

Ans. (c)

99. The first factory to manufacture white cement in Rajasthan started in 1984 was established in which of the following place?
(a) Kekri (Ajmer) (b) Beawar (Ajmer)
(c) Ringus (Jaipur) (d) Gotan (Nagaur)

Ans. (d)

100. Which of the following rivers in Rajasthan is not a tributary of Chambal river?
(a) Kali Sindh (b) Banas
(c) Parbati (d) Luni

Ans. (d)

101. Which of the following is situated in Kota, is famous for Tiger reserve?
(a) Nahargarh Biological Park
(b) Machhiya Safari Park
(c) Keoladeo National Park
(d) Mukundara Reserve Park

Ans. (d)

102. Which of the following geological events was one of the reasons for the formation of the Grand Canyon in the United States?
(a) Volcanic eruption (b) Glaciers
(c) Meteor strike (d) River erosion

Ans. (d)

103. Which of the following PSUs, has recently approached Rajasthan Government to set up 1 GW Solar plant in Rajasthan?
(a) HPCL (b) ONGC
(c) IOC (d) NTPC

Ans. (d)

104. Alluvial soil is found in which of the following districts of Rajasthan?
(a) Kota (b) Bundi
(c) Baran (d) Dausa

Ans. (d)

105. Which of the following is world's longest mountain range?
(a) Rocky Mountains (b) Andes
(c) The Himalayas (d) Ural Mountains

Ans. (b)

106. Which of the following districts, has the highest (Million Tonnes) copper deposits in Rajasthan?
(a) Alwar (b) Chittorgarh
(c) Pali (d) Jhunjhunu

Ans. (d)

107. Under the Pradhan Mantri Awaas Yojana – Urban (PMAY-U), what is the tenure of the credit linked subsidy provided to eligible beneficiaries?
(a) 10 Years or Tenure
(b) 15 Years or Tenure
(c) 20 Years or Tenure
(d) 25 Years or Tenure

Ans. (c)

108. Which of the following is not a focus area of the AMRUT scheme?
(a) Water Supply
(b) Water Waste Management and Sanitation
(c) Green Space/Parks
(d) Affordable Housing

Ans. (d)

109. Which of the following cities have not been selected for the implementation of the HRIDAY scheme in 2015?
(a) Ajmer (b) Badami
(c) Chandigarh (d) Dwarka

Ans. (c)

110. Under the National Urban Livelihood Mission (NULM), what is the maximum amount of loan that can be availed by an individual under the Self-Employment Programme (SEP)?
(a) ₹ 50,000 (b) ₹ 1,00,000
(c) ₹ 2,00,000 (d) ₹ 5,00,000

Ans. (c)

111. Under Indira Gandhi Urban Employment Guarantee Scheme, how many days of employment is guaranteed in a year to the families living in Urban areas of Rajasthan?
(a) 50 days (b) 125 days
(c) 150 days (d) None of these

Ans. (b)

112. Which of the following scheme was launched in Rajasthan to provide upto days ₹ 50,000 interest free loan to street vendors and unemployed youth of urban areas?
(a) Indira Rasoi Yojana
(b) Indira Gandhi Credit Card Yojana
(c) Indira Gandhi Rojgar Guarantee Yojana
(d) Indira Gandhi Urban Livelihood Mission

Ans. (b)

113. Indira Rasoi Yojana, aims to benefit approximately how many people per day?
(a) 50,000 (b) 1 lakhs
(c) 2.3 lakhs (d) 5 lakhs

Ans. (c)

114. Which of the following fairs is also known as Kaila Devi Chaitra Mela, recently celebrated in Karauli district in March 2023?
(a) Karni Mata Mela
(b) Lakkhi Mela
(c) Channi Cheri Mela
(d) Chandra Bhaga Mela

Ans. (b)

115. In which district of Rajasthan, 'Pipalkhunt High Level Canal' will provide irrigation facility?
(a) Tonk (b) Barmer
(c) Pratapgarh (d) Bhilwara

Ans. (c)

116. Rajasthan's first Vande Bharat Express was flagged off by Prime Minister, that runs between which of the following stations?
(a) Udaipur - Ahmedabad
(b) Kota - Mumbai CSMT
(c) Jaipur - Chandigarh
(d) Ajmer - Delhi Cantt

Ans. (d)

117. In which of the following countries was the "Buzi Bridge" made by India and recently was inaugurated by External affairs minister Dr. S. Jaishankar?
(a) Sudan (b) Mozambique
(c) Uruguay (d) Chile

Ans. (b)

118. 1st International Quantum Communication Conclave was organized in which country in March 2023?
(a) India (b) China
(c) USA (d) Switzerland

Ans. (a)

119. Who built the Aanasagar Lake and the Varaha Temple at Pushkar?
(a) Ajayraj (b) Arnoraj
(c) Vigrahraj IV (d) Prithviraj III

Ans. (b)

120. Kamadia Panth was founded by .....
(a) Tejaji (b) Pabuji
(c) Ramdevji (d) Harbhuji

Ans. (c)

Rajasthan Assistant Town Planner Exam-2023 Solved paper with Explanation

Exam Date : 16/06/2023

Technical

1. As evolved from the Tourism 2020 Vision, UNWTO 2002, cities or places of high population density where trips are taken by travelers for leisure and recreation can be referred as .....

(a) Recreation cities (b) Tourism cities
(c) Leisure cities (d) Repose cities

Ans. (b) : Tourism cities–Tourism is a social cultural and economic phenomenon which entails the movement of people to countries or places outside their usual environment for personal or business/ professional purposes.

2. As per URDPFI guidelines, Sector Plan shall be reviewed at least once in year ..... years.

(a) 3 (b) 10
(c) 7 (d) 5

Ans. (d) : Urban Development Plan and Rural or sector plan shall be reviewed at least once in every 5 years.
• Regional development plan shall be reviewed at least once in every 10 years.

3. Which of the following are the powers not given to local authorities, to enforce zonal plans?

(a) Acquisition of privately owned lands
(b) Prohibiting the undesirable use of land
(c) Approval of plans of the proposed structures
(d) Approval of designs of building by private owners

Ans. (*) : The following powers are given by local authorities, to enforce zonal plans :
(i) Acquisition of privately owned lands
(ii) Prohibiting the undesirable use of land
(iii) Approval of plans of the proposed structures
(iv) Approved of designs of building by private owners, etc.

4. Which of the following is not an advantage of vertical growth of a city?

(a) Considerable saving of land
(b) Reduction in economy of construction cost
(c) High population density
(d) Upper floors can enjoy views of natural sceneries

Ans. (c) : The advantage of vertical growth of a city–
• Considerable saving of land.
• Reduction in economy of construction cost.
• Upper floors can enjoy views of natural sceneries.
• Vertical urbanization allows for more efficient energy usage and conservation, at least when it comes to heating because the area is more localized. There are also economical and social benefits.

5. The land contained in the set-back belongs to .....

(a) Local Governing Body
(b) Central Government
(c) State Government
(d) Owner of the property

Ans. (d) : The land contained in the set-back belongs to owner of the property.
• A set back is the minimum distance from the property line (or a major roadway, hazard or an environmentally sensitive area) to where a building or amenity may be located.

6. Government has introduced ....., which mainly aims at securing excess urban vacant lands in private hands for the development of houses of acceptable standards for the weaker sections of the society.

(a) The Urban Land Ceiling and Regulation Act
(b) Sustainable Development Goals Act
(c) Affordable Housing Act
(d) Neighbourhood Development Act

Ans. (a) : Government has introduced the Urban Land Ceiling and Regulation Act, 1976 which mainly aims at securing excess urban vacant lands in private hands for the development of houses of acceptable standards for the weaker sections of the society.
• The ceiling limit varies from 500-2000 sqm.

7. NHP stands for

(a) Native Housing Policy
(b) National Housing Policy
(c) National Housing for Poor
(d) Native Housing for Poor

Ans. (b) : NHP stands for–National Housing Policy.
• The National Housing Policy 1994 recognizes the importance of both rural and urban housing in the overall development of rural people and urban poor.
• The existing central sector housing schemes aimed at benefitting the urban poor are proposed to be continued.

8. 'Dharavi', the largest slum area of Asia, is situated in

(a) Kolkata (b) Mumbai
(c) Chennai (d) Hyderabad

Ans. (b) : Dharavi is a residential area in Mumbai, Maharashtra, India.
• It has often been considered to be one of the world's largest slum.
• Dharavi has an area of just over 2.39 square kilometers and a population of about 10,00,000.

9. Which of the following is not a characteristic of a slum?

(a) Over-crowding
(b) Fire hazards
(c) Good sanitation management
(d) Social isolation

Ans. (c) : The characteristic of a slum–
• Overcrowding and high density
• Fire hazards
• Poverty and isolation.
→ Good sanitation and waste management both refer to the appropriate management of waste to protect people and the environment.

10. Which of the following is not a cause of slum?

(a) Improper use of land
(b) Lack of Zoning
(c) Industrialization
(d) Hygiene Maintenance

Ans. (d) : Common causes of slums–
1. Lack of zoning
2. Improper use of land
3. Industrialization
4. Unplanned urban growth
5. Transport.
• Hygiene management for manufacturers, kitchens and catering.

11. Which of the following is not a measure to prevent slum for formation?

(a) Availability of sufficient number of subsidized cheap housing
(b) Carry out effective social education
(c) Formation of strict rules and regulations
(d) Deprived of social education

Ans. (d) : The following is measure to prevent slum formation–
• Availability of sufficient number of subsidized cheap housing.
• Carry out effective social education
• Formation of strict rules and regulations.
• Deprived of social education is not a measure to prevent slum formation.

12. Which of the following is not a metropolis as per Lewis Mumford categories?

(a) London (b) Jaisalmer
(c) Bombay (d) Calcutta

Ans. (b) : The following is metropolis as per Lewis Mumford categories–
• London
• Bombay
• Calcutta.
→ Kolkata (Calcutta) capital of West Bengal is located on the east bank of the Hooghly river. It is the oldest metropolis of India having acquired the status in 1901.

13. When the town develops away from the heart of the parent city, the town is called:

(a) Ribbon town (b) Satellite town
(c) Scattered town (d) Combined town

Ans. (b) : A satellite town also known as a satellite city is a self-sufficient smaller town located on the periphery of a larger metropolitan city, with its economic and social life often intertwined with the bigger city.

14. ..... is the first private planned hill city of India.

(a) Chandigarh (b) Lavasa
(c) Gandhinagar (d) Jaipur

Ans. (b) : Lavasa is the first planned hill city.
• Government of Maharashtra created special regulations for hill station development in 1996. In response to this, Lavasa corporation limited embarked on this pioneering initiative of creating a new hill city, the first such endeavour of private sector in India.

15. Which of the following is not a requirement of a new town?

(a) Effective Road Network
(b) Parks and Playgrounds
(c) Recreation Centers
(d) Climatic Conditions

Ans. (d) : The following requirement of a new town–
• Effective road network
• Parks and playgrounds
• Recreation centers.
The concept of a new town–New town a form of urban planning designed to relocate populations away from large cities by grouping homes, hospitals, industry and cultural, recreational and shopping centers to form entirely new relatively autonomous communities.

16. An open, strip of land provided in the periphery of a town for the special purpose of limiting the growth of a town is known as .....

(a) Focal point (b) Green belt
(c) Cul-De-Sac street (d) Conurbation

Ans. (b) : An open, strip of land provided in the periphery of a town for the special purpose of limiting the growth of a town is known as green belt.

17. Wild Life Protection Act, 1972 gave provision for the creation of National Parks, Sanctuaries and Closed Area. Further, for the purpose of buffers around these protected areas as shock absorber, ... were declared.

(a) Ecological Zones
(b) Eco-sensitive Zones
(c) Eco-friendly Zones
(d) Eco-submissive Zones

Ans. (b) : Wild Life Protection Act, 1972–
• This act provide for the protection of the country's wild animals, birds and plant species, in order to ensure environmental and ecological security. Among other things, the act lays down restrictions on hunting many animal species.
• The act was last amended in the year 2006. An amendment bill was introduced in the Rajya Sabha in 2013 and referred to a standing committee, but it was withdrawn in 2015.

18. In which of the following, property tax rebate is not offered for implementing certain desirable projects as an incentive?

(a) Green building
(b) Rain water harvesting
(c) Solar power installation in building
(d) Hydraulic Parking Facilities

Ans. (d) : The following property are included in tax rebate is offered for implementing certain desirable projects as an incentive :
(i) Green building
(ii) Rain water harvesting
(iii) Solar power installation in building, etc.

19. ..... refers to a network that provides the "ingredients" for solving urban and climatic challenges by a combination of infrastructure, ecological restoration and urban design to connect people with nature.

(a) Red-Yellow Infrastructure
(b) Blue-Green Infrastructure
(c) Blue-Red Infrastructure
(d) Blue-Yellow Infrastructure

Ans. (b) : Blue-Green Infrastructure refers to a network that provides the "ingredients" for solving urban and climatic challenges by a combination of infrastructure, ecological restoration and urban design to connect people with nature.
• Blue indicates water bodies such as rivers and tanks.
• Green indicates trees, parks and gardens.

20. Western Ghats Ecology Expert Panel was constituted by government of India for which among the following?

(a) Eco-sensitive areas
(b) Eco-sanitary areas
(c) Eco-friendly areas
(d) Eco-submissive areas

Ans. (a): Eco-sensitive areas–Eco-sensitive areas is a designation provided to area which has very diverse yet fragile ecosystem.
• Western ghats is one of the ecologically sensitive area is the country.
• For this GOI constituted Western Ghats Ecology Expert panel which submitted its report in year 2011.

21. In town planning, the new areas to be opened up for development are clearly marked and divided into smaller areas of about 100-200 hectares. Each such area is called .....

(a) Town Planning Method
(b) Town Planning Demand
(c) Town Planning Scheme
(d) Town Planning Proposal

Ans. (c) : Town Planning Scheme–The DP is a broad-brush development vision for the city a dynamic document which than is detailed gradually. Most importantly, the new areas for growth to be opened up for development are clearly marked and divided into smaller area of about 100 to 200 hectares.

22. Which of the following mechanisms is not used to assemble land and/or develop land?

(a) TP Scheme (b) Land Acquisition
(c) Land Reservation (d) Urban Governance

Ans. (d) : The following mechanisms used to assemble land and/or develop land–
1. TP Scheme
2. Land Acquisition
3. Land Reservation
• Urban governance is defined as "the sum of the many ways individual and institutions, public and private, plan and manage the common affairs of the city.

23. Which of the following is the rating system for green buildings in India?

(a) PCC (b) LEED
(c) JNNURM (d) PMAY

Ans. (b) : The Leadership in Energy and Environmental Design (LEED) is the rating system developed for certifying green buildings.

24. In rating systems of green building in India, GRIHA stands for,

(a) Green Rating for Interior Habitat Assessment
(b) Green Rating for Integrated Habitat Assessment
(c) Green Rating for Interior Housing Assessment
(d) Green Rating for Integrated Holistic Assessment

Ans. (b) : GRIHA is an acronym for Green Rating for Integrated Habitat Assessment.
• GRIHA is a sanskrit word meaning–'Abode' Human Habitats (buildings) interact with the environment in various ways.

25. Which of the following is not a policy to protect environment in India?

(a) National Conservation Strategy and Policy Statement on Environment and Development, 1992
(b) Environment Protection Act, 1986
(c) National Environment Policy, 2006
(d) National Housing Scheme, 2015

Ans. (d) : The following policy to protect environment in India–

1. National conservation strategy and policy statement or environment and developments 1992.
2. The Environment Protection Act, 1986 authorizes the Central government to protect and improve environmental quality, control and reduce pollution from all sources and prohibit or restrict the setting and/or operation of any industrial facility on environmental grounds.
3. The National Environment Policy of India, formulated in 2006, acts as a comprehensive guideline for sustainable development and environmental governance in the country.

• National housing scheme 2015 is not a policy to protect environment in India.

26. Which type of natural hazards is not covered under National Disaster Management Guidelines?

(a) Flood Management
(b) Earthquake Management
(c) Tsunami Management
(d) Riot Management

Ans. (d): The following types of natural hazards is covered under National Disaster Management Guidelines–

1. Flood Management
2. Earthquake Management
3. Tsunami Management
4. Hydrological Management
5. Meteorological (e.g. cyclones and storms/wave surges).

27. Which of the following is a feature on Mitigation of Flood Management?

(a) Implementation of activities, which include construction of dams and Catchment Area Treatment (CAT) works
(b) Sensitive earthquake seismic zones should be identified at city or region or district level
(c) Measures for integration of soil, water and forest management and form part of soil conservation, watershed development and forestry programs
(d) By not diverting flood waters

Ans. (*) : Methods of flood management :

- Construction of dams and reservoirs.
- Redirecting the excess water to canals and floodways.
- Excess water can be used for ground water replenishment.
- Self-closing flood barrier is a flood defense system designed to protect people and property from inland waterway floods caused by heavy rainfall, rapid melting snow.
- Having a planned disaster preparedness plan and an integrated solution and approach.
- Planting vegetation to retain excess water.

28. The concept of ..... to manage the disaster is practiced.

(a) Incentive Response System
(b) Incident Response System
(c) Incident Resonating System
(d) Indirect Response System

Ans. (b) : The Incident Response System (IRS) provides a systematic proactive approach guiding the concerned departments and agencies at all levels of government, the private sectors and non-governmental organizations to work flawlessly in disaster situation.

29. ..... thrive as centers of human habitation, production and cultural development, despite the challenges posed by climate change, population growth and globalization.

(a) Resonating cities (b) Resilient cities
(c) Restricting cities (d) Restructing cities

Ans. (b) : Resilient cities thrive as centers of human habitation, production and cultural development, despite the challenges posed by climate change, population growth and globalization.

30. ..... means measures aimed at reducing the risk, impact or effects of a disaster or threatening disaster situation.

(a) Migration (b) Mitigation
(c) Maximization (d) Modification

Ans. (b) : Mitigation means measures aimed at reducing the risk, impact or effects of a disaster or threatening disaster situation.

31. Bengal comes under which of the following climatic zone?

(a) Hot-arid zone (b) Hot-humid zone
(c) Hilly zone (d) Dry zone

Ans. (b) : Bengal hot humid zone falls under–
West Bengal is situated on the eastern part of India. Its neither in North India nor in South India, geographically.

32. The magnitude of the heat island effect does not depend on the .....

(a) time of the day (b) wind condition
(c) sky condition (d) soil condition

Ans. (d) : The magnitude of the heat island effect are not depends on the–

1. time of the day
2. wind condition
3. sky condition

• Heat islands form as a result of several factors: Reduced natural landscapes in urban area. Trees, vegetation and water bodies tend to cool the air by providing shade, transpiring water from plant leaves and evaporating surface water respectively.

33. A ..... is a building which seek to harness all the natural elements in its design and construction to an optimum level so as to have eco-friendly, low energy and low water consumption building and at the same time providing fresh and healthy environment to its occupants.

(a) Green building (b) Smart building
(c) Efficient building (d) Affordable building

Ans. (a) : A green building is a building which seek to harness all the natural elements in its design and construction to an optimum level so as to have eco-friendly, low energy and low water consumption building and at the same time providing fresh and healthy environment to its occupants.

34. Which of the following is not a benefit of Green Building?

(a) Economic benefit
(b) Environmental benefit
(c) Healthy & community benefit
(d) Social benefit

Ans. (d) : Advantages of green building–Following are the benefits of green building–

1. Economic benefit
2. Environmental benefit
3. Healthy and community benefit.
4. Reduction of natural resource consumption.
5. Reduction of operating costs.

35. ..... enable the traffic on roads to avoid the congested area of the town.

(a) Streets (b) Loop Roads
(c) Pathways (d) Footpaths

Ans. (b) : Loop Roads enable the traffic on roads to avoid the congested area of the town.

• Vehicle detection loops, called inductive loop traffic detectors, can detect vehicles passing or arriving at a certain point, for instance approaching a traffic light or in motorway traffic.

76. The space at a road junction over that traffic is not allowed to move, is known as which among the following?

(a) Kerb (b) Pedestrian Traffic
(c) Traffic Island (d) Boundabouts

Ans. (c) : Traffic island–

- A higher area in the middle of the road, where you can stand and wait for the traffic to pass when you want to cross.
- So, It is the space at a road junction over which traffic is not allowed to move.

37. Which of the following is not a requirement of ideal city road?

(a) Straight alignment
(b) Should have sharp turns and the junctions need not be designed
(c) Sufficient width to accommodate the traffic
(d) Have smooth wearing surface

Ans. (b) : Requirement of ideal city road–

1. Straight alignment
2. Sufficient width to accommodate the traffic
3. Have smooth wearing surface
4. It should be cheap and durable
5. It should be resting on unyielding soil.

38. T.O.D. in town planning stands for:

(a) Transportation as Object of Development
(b) Technology Oriented Development
(c) Transit Oriented Development
(d) Transportation and its Order of Development

Ans. (c) : Transit Oriented Development (TOD) means integrated urban places designed to bring people, activities, buildings and public space together with easy walking and cycling connection between them and near excellent transit service to the rest of the city.

39. The roads which connect the town to a state highway or a national highway are termed as:

(a) Streets (b) Local Roads
(c) Sub-Arterial Roads (d) Arterial Roads

Ans. (d) : Arterial Roads- The arterial roads provided the highest level of mobility and the highest speeds over the longest un-interrupted distance.

• State highways are the arterial roads of a state, connecting up with the national highways of adjacent states, district head quarters and important cities within the state. They also serve as main arteries to and from district roads.

• The NH and SH have the same design speed and geometric design specifications.

40. ..... study is to determine the travel pattern of an area/city.

(a) Destination - Focus
(b) Reach - Focus
(c) Origin - Destination
(d) Reach - Destination

Ans. (c) : Origin - Destination study is to determine the travel pattern of an area/city.

• An origin - destination study. It is used to determine travel patterns of traffic called desire lines.

41. Which of the following is a method for traffic volume survey?
(a) Biological Methods
(b) Photographic Methods
(c) Biometric Methods
(d) Sigma Methods

Ans. (b) : Traffic volume is the number of vehicles crossing a section of road per unit time at any selected period.

- **The available for traffic volume counts are :**

1. Manual count
2. Mechanical count
3. Combination of manual and mechanical methods
4. Automatic devices
5. Photographic methods.

42. Which of the following cities, has the largest metro system for public transport?
(a) Kolkata (b) Port Blair
(c) Delhi (d) Kanpur

Ans. (c) : The Delhi metro rail is the largest and busiest metro network in India.
•It is managed and executed by the Delhi Metro Rail Corporation (DRDO).

43. ..... are the main highways running through the length and breadth of the Indian Union, connecting ports, foreign highways and capitals of states and including roads of strategic and military value.
(a) National Highways (b) State Highways
(c) District Roads (d) Village Roads

Ans. (a) : National Highways are the main highways running through the length and breadth of the Indian Union, connecting ports, foreign highways and capitals of states and including roads of strategic and military value.

44. In India, ... provides the basis for regulating vehicles, drivers, other road users and traffic.
(a) The Vehicles Act, 1992
(b) The Traffic Act, 1981
(c) The Motor Vehicles Act, 1988
(d) The Road Safety Act, 1979

Ans. (c) : The Motor Vehicles Act, 1988 Sections 7-38 talks about penalizing the motorists exceeding speed limits and license regulation etc. indirectly protecting vulnerable road users.
Section 138 clause (h & i) empowers the state government to prevent motor vehicle from using the pavements for driving or parking.

45. Which of the following is not used for remote sensing?
(a) Multi-Spectral Scanner
(b) Radar
(c) Microwave Sensors
(d) Electromagnetic sensors

Ans. (d) : Remote sensing refers to the use of satellite or aircraft based sensor technologies to detect and classify objects on earth, including on the surface and in the atmosphere and oceans, based on propagates signals.
The following are used in remote sensing :
(i) Multi spectral scanner
(ii) Radar
(iii) Microwave seniors, etc.

46. The ..... system technology uses satellite ranging techniques to determine very precisely the three-dimensional co-ordinates of a point on the round in the form of latitude, longitude and height.
(a) Geo Polar System
(b) Global Positioning System
(c) Geographic Polar System
(d) Geo Positioning System

Ans. (b) : The Global Positioning System technology uses satellite ranging techniques to determine very precisely the three-dimensional co-ordinates of a point on the round in the form of latitude, longitude and height.

47. GPS is not applied to which of the following surveys?
(a) Topographic survey
(b) Hydrographic survey
(c) Seismic survey
(d) Site survey

Ans. (d) : GPS (Global Positioning System) is a satellite navigation system designed to provide accurate position, velocity and time information almost anywhere in the world.
GPS is used to in following survey method :
(a) Topographic survey
(b) Hydrographic survey
(c) Seismic survey, etc.

48. ..... is a computerized information storage processing and hardware and software especially designed to cope with geographically referenced spatial data and the corresponding attribute information.
(a) Geographical Information System
(b) Geological Information Statistics
(c) Geographical Information Statistics
(d) Geological Information System

Ans. (a) : Geographical Information System is a computerized information storage processing and hardware and software especially designed to cope with geographically referenced spatial data and the corresponding attribute information.

49. Ministry of Housing and Urban Affairs, Government of India has launched ..... on 25th June, 2015 to provide the national priority basic services for e.g. water supply, sewerage, urban transport to households and build amenities in cities which will improve the quality of life for all, especially the poor and the disadvantaged.

(a) Atal Mission for Rejuvenation and Urban Transformation
(b) Smart City Mission
(c) Sustainable Development Goals
(d) Town Planning Scheme

Ans. (a) : Ministry of Housing and Urban Affairs, Government of India has launched Atal Mission for Rejuvenation and Urban transformation on 25th June, 2015 to provide the national priority basic services for e.g. water supply, sewerage, urban transport to households and build amenities in cities which will improve the quality of life for all, especially the poor and the disadvantaged.

50. Which of the following is not a smart solution for urban mobility under Smart City Mission?

(a) Smart Parking
(b) Intelligent Traffic Management
(c) Waste to Compost
(d) Integrated Multi-modal Transport

Ans. (c) : The following smart solution for urban mobility under Smart City Mission–
1. Smart Parking
2. Intelligent Traffic Management
3. Integrated Multi-modal Transport.
• The smart city mission is all about improving the standard of living across the zero cities of India.

51. The main objective of which of the following government scheme is to preserve character of the soul of heritage city and facilitate inclusive heritage linked urban development by exploring various avenues including involving private sector?

(a) AMRUT : Atal Mission for Rejuvenation and Urban Transformation
(b) HDIDAY : Heritage City Development and Augmentation Yojana
(c) TPS : Town Planning Scheme
(d) SDG : Sustainable Development Goals

Ans. (b) : The HDIDAY scheme aims to revitalize heritage cities in India through development projects focusing on infrastructure.
• The scheme encourages inclusive urban development while preserving the unique character of heritage cities.

52. The Government of India (GOI) launched a flagship urban development program, which among the following names is given to it?

(a) Jawaharlal Nehru National Urban Renewal Mission (JNNURM)
(b) Urban Infrastructure and Governance (UIG)
(c) High Powered Expert Committee (HPEC)
(d) Sustainable Development Goals (SDG)

Ans. (a) : Jawaharlal Nehru National Urban Renewal Mission (JNNURM)–The JNNURM was launched in 2005 with the objective of fast track development of the cities across the country with focus on increased efficiencies in urban infrastructure, service delivery mechanisms, community participation and accountability of urban local bodies.

53. Which of the following is not an objective of Jawaharlal Nehru National Urban Renewal Mission (JNNURM)?

(a) Improve infrastructural facilities in towns and cities
(b) Urban sector reforms at state and ULB level
(c) Subdue public-private-partnership in infrastructural development
(d) Promote planned integrated development of towns/cities

Ans. (c) : The primary objective of JNNURM is to create economically productive, efficient, equitable and responsive cities.
• Integrated development of infrastructure services
• Security linkages between asset creation and maintenance for long run project sustainability
• Accelerating the flow of investment into urban infrastructure services.
• Planned development of cities including the peri-urban areas, outgrowths and urban corridors.
• Renewal and re-development of inner city areas and
• Universalization of urban services so as to ensure their availability to the urban poor.

54. Which of the following is not a difficulty suffered by Land Pooling Schemes?

(a) Issues related to cost recovery
(b) Delay in process of preparation approval, arbitration and implementation, mainly due to litigations
(c) Inadequate public participation
(d) Land-owner shares the project cost and benefits by increased property prices.

Ans. (d) : The Land Pooling Schemes in India faces several challenges and limitations including–
• Difficulty in implementing in congested areas
• Risk of land hoarding
• High profit margins for land-owners
• Significant human resource requirements
• Lack of convergence at the state level
• Challenge in public private co-operation
• Risk of unequal distribution of benefits.

55. The Constitutions 74th (seventy-fourth) Amendment 1992 provides for the setting up of a ..... once in five years, to review the financial position of the municipalities.

(a) State Fiscal Commission
(b) State Finance Commission
(c) State Finance Committee
(d) State Fiscal Committee

Ans. (b) : The Constitutions 74th (seventy-fourth) Amendment 1992 provides for the setting up of a State Finance Commission once in five years, to review the financial position of the municipalities.

The Constitution 74th Amendment Act, 1992– Addition of a new part relating to the urban local bodies in the constitution for–

(a) Constitution of three types of municipalities–
(i) Nagar Panchayats for areas in transition from a rural area to urban area.
(ii) Municipal councils for smaller urban areas.
(iii) Municipal corporations for larger urban areas.

56. The operational duration of the latest i.e. 15th Finance Commission, which was established in 2017, is .....

(a) 2017-2022 (b) 2020-2025
(c) 2015-2020 (d) 2018-2023

Ans. (b) : The 15th Finance Commission was constituted by President in 2017.
• The chairman of the 15th Finance Commission is N.K. Singh.
• It was constituted to provide recommendations for five years from 2021 to 2026.
• It recommended 41% devolution from center to states.

57. Which of the following content is not covered while preparing a DPR?

(a) Project Phasing
(b) Project Financial Structuring
(c) Project Cost
(d) Project Progress

Ans. (d) : DPR is a complete document for investment decision making, approval, planning.

DPR covered–
• Project concept and scope
• Project cost
• Project institution framework
• Project phasing
• Techniques to be used in project
• Project benefits assessment.

58. Which of the following is not an advantage of horizontal growth of a town?

(a) Density of population is low
(b) Maximum use of natural light and air
(c) Good number of parks and gardens could be developed
(d) Requires more land for the same space area

Ans. (d) : The advantages of horizontal growth are as follows :
(i) In general, there will be saving in cost as the buildings will usually consist of two or three stories.
(ii) The involvement of highly technical personnel is net necessary for its implementation.
(iii) It is possible to make the maximum possible use of natural light.
(iv) The density of the population can be restricted.
(v) There is the economy of floor space as the province on of columns, lifts, etc. will not be required.
(vi) The adjacent marginal space can be effectively utilized for the development of a garden.

59. Faridabad near Delhi is an example of ..... growth of town.

(a) Satellite (b) Scattered
(c) Ribbon (d) Concentric

Ans. (a) : Satellite city–Smaller municipalities that are next to a larger city that is the center of a metropolitan area are known as satellite cities or satellite towns.

Example–
Gurugram and Faridabad (for Delhi)
Navi Mumbai (Mumbai)
Rajarhat (for Kolkata)
Whitefield (for Bangalore)

60. In ..... type growth pattern, the city grows in shape of circular rings around the central area. E.g. Chennai.

(a) Satellite (b) Radio centric
(c) Linear (d) Sheet

Ans. (b) : The radiocentric city–
• Geographical possibilities of spreading in all directions.
• Radio centric radiate outward from a common center.
• Inner outer ring roads linked by radiating roads.
• Core has business area.
• Industrial area interspersed within the residential.
• Periphery has green belts.

61. When the town develops along sides of the main roads, then the development is known as:

(a) Ribbon development
(b) Satellite development
(c) Concentric development
(d) Scattered development

Ans. (a) : Ribbon development–A system of building built side by side along a highway.

Effect of Ribbon development–
• Town and cities causing traffic and other issues.
• The loss of foot producing land
• Parking vehicles along roadsides.
• Roadside encroachment.
• Large number of advertisement cause driver distraction.

62. HUDCO stands for:

(a) Housing and Urban Development Corporation
(b) Housing and Urban Department of Calcutta
(c) Health and Urban Development Corporation
(d) Health and Urban Development Costing

Ans. (a) : Housing and Urban Development Corporation Ltd. (HUDCO) was incorporated as a fully owned Government company under the Companies Act, 1956 with the main objective of financing housing and urban development projects in the country.

63. ..... is an approach under which services are delivered by the private sector providing the service rests with the government.

(a) Paid-Public Partnership
(b) Paid-Private Partnership
(c) Public-Private Partnership
(d) Public-Paid Partnership

Ans. (c) : Public-Private Partnership (PPP) is an approach under which services are delivered by the private sector, both non-profit and for profit organizations while the responsibility for providing the resources rests with the government. This kind of a partnership refers to the sharing of resources needed to work together towards a common goal while respecting one another's entity negotiations among all the partners would give rise to a dear understanding of each other's roles and responsibilities.

64. Government of Rajasthan has initiated a mega project for development of urban centers of the State in the year 2000 through .....

(a) Rajasthan Urban Infrastructure Development Project (RUIDP)
(b) Rural Urban Infrastructure Development Project (RUIDP)
(c) Rural Urban Information Development Project (RUIDP)
(d) Rajasthan Urban Information Development Project (RUIDP)

Ans. (a) : Rajasthan Urban Infrastructure Development Project (RUIDP)–RUIDP is an externally aided project, working under the Government of Rajasthan (GoR). The GoR, through its implementing agency the town planning department, implemented the technical assistance component of the RUIDP, ADB Loan No. 2373-IND. This projects covers RUIDP programs for six cities in Rajasthan–
1. Jaipur, 2. Ajmer, 3. Udaipur, 4. Kota, 5. Bikaner, 6. Jodhpur.

65. RERA stands for:

(a) Real Estate Regulation Authority
(b) Real Esteemed Regulatory Authority
(c) Real Estate Regulatory Authority
(d) Real Estate Regulatory Administration

Ans. (c) : RERA stands for Real Estate Regulatory Authority that came into existence as per the Real Estate (Regulation and Development) Act, 2016 with the purpose of protecting the home purchases and also boosting the real estate investments.

66. As per the 73rd Constitutional Amendment ..... means a body consisting of persons registered in the electoral rolls relating to a village comprised within the area of Panchayat at the village level.

(a) Gram Sabha (b) District
(c) Panchayat (d) Intermediate level

Ans. (a) : Gram Sabha means a body consisting of persons registered in the electoral rolls relating to a village comprised within the area of panchayat at the village level.
"Panchayat" means an institution of self-government for the rural areas.

67. Which of the following bills, provides for information of livelihood rights, social security of street vendors, regulation or urban street vending in the country and for matters connected therewith or incidental thereto?

(a) The Street Act, 2018
(b) The Street Vendors Act, 2014
(c) The Vendors Act, 2016
(d) The Urban Street Vending Act, 2001

Ans. (b) : Objectives of the act–In order to legitimize street seller's rights to sell goods the street sellers (Protection of Livelihood and Regulation of Street Vending) Act, 2014 was passed. This Act was introduced in accordance with Article 14 of the Constitution, which guaranteed by Article 19(1) of the constitution.

68. Which of the following authorizes the central government to protect and improve environmental quality, control and reduce pollution from all sources and prohibit or restrict the setting and/or operation of any industrial facility on environmental grounds.

(a) The Energy Act
(b) The Environment (Protection) Act
(c) The Ecology (Protection) Act
(d) The Green Building Act

Ans. (b) : The Environment (Protection) Act, 1986 which authorizes the central government to protect and improve environmental quality, control and reduce pollution from all sources and prohibit or restrict the setting and/or operation of any industrial facility on environmental grounds.

69. As per building bye-laws, ... means an act to enter into the possession or rights either of permanent or temporary nature on a land or build up property of local body or state/central government.

(a) Trespassing (b) Encroachment
(c) Set-back (d) Margin

Ans. (b) : Encroachment– As per building by-laws, encroachment means an act to enter into the possession or rights either of pavement or temporary nature on a land or build up property of local body or state/central government.

70. Which of the following is not an objective of affordable housing policy (for urban areas of Rajasthan)?
(a) To reduce the housing shortage in the State, especially in EWS/LIG categories
(b) To bring down the cost of EWS and LIG categories of houses to affordable limits
(c) To involve private developers in the construction of EWS/LIG categories of houses by offering various attractive incentives
(d) To increase the lifestyle of HIG categories

Ans. (d) : Rajasthan Government formulated its Affordable Housing Policy in 2009 and updated in 2015 it has been framed with the following objectives–
• To reduce the housing shortage in the state, especially in EWS/LIG categories.
• To take up large scale construction of Affordable Housing (with focus on EWS and LIG housing with super built up area of 325 and 300 sq.ft. respectively)
• To bring down the cost of EWS and LIG houses to affordable limits.
• To promote investments in housing on PPP model.
• To involve private developers in the construction of EWS/LIG houses by offering various incentives.

71. The objective of which of the following policies, is to ensure safe, affordable, quick, comfortable, reliable and sustainable access for the growing number of city residents to jobs, education, recreation and such other needs within our cities?
(a) National Urban Transport Policy
(b) National Urban Transit Policy
(c) Natural Urban Transport Policy
(d) National Unified Transport Policy

Ans. (a) : National Urban Transport Policy–The National Urban Transport Policy was launched in 2006, by collaborating directly with the Indian Ministry of urban development and by bringing together experts and government officials from around the world. It envisages safe, affordable, quick comfortable, reliable and sustainable urban transport system.

72. In Rajasthan Tourism Policy 2020, for which of the following areas, government is not planning Experiential Tourism?
(a) Desert Tourism
(b) Wild life and Eco-Tourism
(c) Crafts and Cuisine Tourism
(d) Architectural Tourism

Ans. (d) : Rajasthan Tourism Policy 2020–To reposition Rajasthan as a preferred tourism destination for both domestic as well as international tourists by offering tourists a high quality experience and through responsible and sustainable policies ensuring conservation of natural, historical cultural heritage of the state while simultaneously accelerating socio-economic development by improving livelihood opportunities for the local population. As per Rajasthan Tourism Policy 2020 special heritage village/craft village and craft and cuisine tourism are under major objectives to implements.

73. Which of the following is not an objective of National Energy Policy?
(a) Access at affordable prices, improved security and independence
(b) Greater sustainability and economic growth
(c) Improved energy security
(d) Rebate in taxation

Ans. (d) : Energy Policy objective–Energy Policy objectives are the outcomes sought the use of energy policy instruments.
• Economic efficiency in the supply of energy
• Efficiency in energy use
• Diversity in the sources of supply of energy
• The cost and availability of energy resources to low income groups
• Conservation of energy resources
• Research in energy supply technologies
• The sustainability of energy supplies.

74. As per Rajasthan land utilization act, ... means any plot measuring 2500 sqm. or more being developed in ecological area/ rural belt/ periphery belt or any other zone of the master plan having built up area not more than 10% of the plot area or 500 sqm, whichever is less.
(a) Twin Bungalow (b) Apartment
(c) Farm House (d) Skyscraper

Ans. (c) : As per Rajasthan land utilization act, farm house means any plot measuring 2500 sqm. or more being developed in ecological area/ rural belt/ periphery belt or any other zone of the master plan having built up area not more than 10% of the plot area or 500 sqm, whichever is less.

75. The Municipal Corporation is headed by the .....
(a) Municipal Commissioner
(b) Chief Minister
(c) Mayor
(d) Town Planning Engineer

Ans. (c) : The Mayor is the head of municipal corporation, but in most states and territories of India the role is largely ceremonial as executive powers are vested in the Municipal Commissioner.