GATE CIVIL ENGINEERING

MULTUPLE SELECT QUESTIONS (MSQ's)

1. Which of the following conditions are recommended for using sulphate resisting cement:
(a) Concrete to be used in foundation and basement, where soil is not infested with sulphates.
(b) Concrete used for fabrication of pipes which are likely to be buried in marshy region or sulphate bearing soils.
(c) Concrete to be used in the construction of sewage treatment works.
(d) Concrete surfaces subjected to alternate wetting and drying such as bridge piers, concrete surface in tidal zone, apron etc.

2. The strength of a column depends on which of the following imperfections:
(a) The material being isotropic and homogeneous.
(b) Geometric variations of columns.
(c) Eccentricity of load.
(d) Axis of the shaft is perfectly straight when unloaded.

3. Which of the following types of failures occur in the beam-column connections:
(a) Failure by lateral-torsional buckling.
(b) Failure by combined instability in both the principal directions.
(c) Failure by combined twisting and bending on the torsionally weak sections.
(d) Failure by combined twisting and bending when plane of bending does not contain the shear centre.

4. As per IS-456:2000, cracking of concrete in tension zone cannot be avoided but can be limited by:
(a) Adhering to the codal requirements of minimum steel area.
(b) Proper and prolonged curing of concrete.
(c) Increasing water cement ratio to increase workability.
(d) limiting the width in crack width.

5. Which of the following assumptions are made with respect to Euler's theory applied to columns:
(a) The section of the column is uniform.
(d) The length of the column is very large compared to the lateral dimensions.
(c) The direct stress is large when compared with the bending stress.
(d) Column is initially straight, and the compressive load is applied axially.

6. Which of the following are the general design requirements of retaining wall:
(a) The factor of safety against sliding should be at least 1.5.
(b) The factor of safety against overturning should be at least 2.0.
(c) The bearing pressure at toe should be less than the bearing capacity of the soil.
(d) The length of retaining wall to be cast in one go should not exceed 10 m otherwise cracks may develop.

7. Which of the following are the desirable properties for efficient functioning in design for movement joint of water tank?
(a) The joint should accommodate repeated movement of the structure without loss of water-tightness.
(b) The design should provide for exclusion of grit and debris which would prevent the closing of the joint.
(c) The material used in the construction of movement joints should not slump unduly in hot weather or become brittle in cold weather.
(d) The joint should not accommodate repeated movement of the structure without loss of water-tightness.

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8. Which of the following are correct for cover to reinforcement:
(a) The reinforcement shall have a minimum clear cover of 20 mm or diameter of such bar whichever is more.
(b) At each end of reinforcing bar not less than 25 mm nor less than twice the diameter of such bar.
(c) Increased cover thickness may be provided when surface of concrete is exposed to the action of harmful chemicals.
(d) The reinforcement shall have a minimum clear cover of 15 mm or diameter of such bar whichever is less.

9. Which of the following assumptions are correct for the lateral torsional buckling of an I-section beam:
(a) The beam is initially distorted.
(b) Its behaviour is elastic.
(c) It is loaded by equal and opposite end moments in the plane of the web.
(d) The beam does not have residual stresses.

10. Which of the following statements are correct for Critical Path Network:
(a) The path of critical activities, which links the start and end events is critical path.
(b) It is the path of activities having zero float.
(c) It is the path of events having zero slack.
(d) The sum of the duration of the critical activities along a critical path gives the duration of the project.

11. Independent float is an amount of time by which the start of an activity may be delayed without affecting:
(a) the preceding or the following activity
(b) the start of a following activity
(c) the completion of the project
(d) the start of succeeding activities

12. By performing which of the following functions the construction manager can achieve the project goals:
(a) Envisioning the task ahead
(b) Setting targets and monitoring performance
(c) Motivating the work force
(d) Building the line supervisors team

13. Which of the following relations are correct for determining different components of a bid price:
(a) Bid price = Base cost + Mark up amount
(b) Direct cost = Project overheads + Common plant and equipment cost + Common work men cost
(c) Mark up amount = Profit + Contingency + Allowances for risks + General overheads
(d) Base cost = Direct cost + Indirect cost

14. When speed changes in case of centrifugal pump, which of the following points are correct:
(a) The shape of the velocity triangle will remain same
(b) Various angles will remain same
(c) Magnitude of velocity will change proportionately
(d) Various angles will change

15. Which of the following are the causes of failure of weirs:
(a) Rupture of floor due to uplift
(d) Rupture of floor due to suction caused by standing wave
(c) Scour on the upstream and downstream of the weir
(d) Deterioration of cut-off and subsequent loss of containment.

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16. Which of the following are the principal factors influencing the choice of a particular method of lining:
(a) Availability and cost of the material at the site or within easy reach
(b) Velocity of flow in the channel
(c) Cost of maintenance
(d) Position of water table and Climatic condition

17. Which of the following are the objectives for river training:
(a) High flood discharge may pass safely and quickly through the reach
(b) To make the river course stable and reduce bank erosion to minimum
(c) To check flow through canal
(d) To provide a sufficient draft for navigation as well as good course for it

18. Which of the following chemical parameters are associated with the organic content of water:
(a) Biological Oxygen Demand (BOD)
(b) Chemical Oxygen Demand (COD)
(c) Total Organic Carbon (TOC)
(d) Total Oxygen Demand (TOD)

19. The noise value of sound waves depends upon:
(a) The frequency of sound waves
(b) The intensity of sound waves
(c) The time of exposure of sound waves
(d) The time period of sound wave

20. Physiological responses to noise exposure include which of the following:
(a) A vascular response characteristic by peripheral vasoconstriction, changes in heart beat rate and blood pressure
(b) Various glandular charges such as increased output of adrenaline evidenced by chemical changes in blood
(c) Slow, deep breathing
(d) A change in the electrical resistance of skin with changes in activity of the sweat glands.

21. Electrostatic precipitators are *not* used for removal of:
(a) Gaseous contaminants
(b) Liquid contaminants
(c) Particulate contaminants
(d) Solid contaminants

22. Which of the following assumptions of the Rankine theory of lateral earth pressure are correct:
(a) The soil mass is semi-infinite, homogeneous, dry and cohesion-less.
(b) The ground surface is an inclined plane.
(c) The wall yields about the base and thus satisfies the deformation condition for plastic equilibrium.
(d) The ground surface is a horizontal plane.

23. Which of the following statements with reference to isogonic line are correct in magnetic declination:
(a) It is drawn through the points of same declination
(b) It does not form complete great circle
(c) It radiates from north and south magnetic regions and follow irregular paths
(d) It radiates from south and north magnetic regions and follow irregular paths

24. The sight distance available on a road to a driver at any instance depends on:

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(a) Features of the road ahead
(b) Height of the driver's eye above the road surface
(c) Height of the object above the road surface
(d) Camber provided in the road

25. Which of the following statements are correct regarding Westergaard's concept for temperature stresses:
(a) During the day, the top of the pavement slab gets heated under the sun light when the bottom of the slab becomes hot
(b) During summer season as the mean temperature of the slab increases, the concrete pavement expands towards the expansion joints
(c) Due to frictional force at the interface, compressive stress is developed at the bottom of the slab as it tends to expand
(d) During the day the top of the pavement slab gets heated under the sunlight when the bottom of slab still remains relatively colder.

26. Which of the following advantages are correct regarding Poly-centric shape tunnel:
(a) It can be conveniently used for road and railway traffic
(b) The number of centres and lengths of radii cannot be fixed
(c) It can resist external and internal pressure due to its arch action
(d) It has more than one centre and flat base

27. Which of the following statements are wholly correct regarding broken-brick aggregate useable in concretes:
(a) Broken-brick aggregate is obtained by crushing waste bricks; and it has a density varying between 1000 kg/m^3 – 1200 kg/m^3.
(b) Such aggregate is usable in concrete for foundation in light buildings, floorings and walkways.
(c) Such aggregate may also be used in light-weight reinforced concrete floors.
(d) Such aggregate may also be used in heavy-weight reinforced concrete floors.

28. In handling air-entraining admixtures the beneficial amount of entrained air depends upon certain factors like
(a) Type and quantity of air-entraining agent
(b) Water-cement ratio of the mix
(c) Strength of aggregates
(d) Extent of compaction of concrete

29. Which of the following methods will help in reducing segregation in concrete:
(a) Not using vibrator to spread the concrete
(b) Reducing the continued vibration
(c) Improving the cohesion of a lean dry mix through addition of a further small quantity of water
(d) preventing over-vibration

30. Permeability in concrete is studied towards providing for, or guarding against, which of the following features:
(a) The penetration by materials in solution may adversely affect the durability of concrete; moreover, aggressive liquids 'attack' the concrete.
(b) In case of reinforced concrete, ingress of moisture and air will result in corrosion of steel leading to an increase in volume of steel, resulting in cracking and spalling of the concrete cover.
(c) The moisture penetration depends on permeability and if the concrete can become saturated with water it is less vulnerable to frost action.
(d) The moisture penetration depends on permeability and if the concrete is completely saturated with water, frost action will lead to expansion.

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31. Which of the following statements are correct in respect of temperature effect on a load-carrying three-hinged arch:
(a) No stresses are produced in a three-hinged arch due to temperature change alone.
(b) There is a decrease in horizontal thrust due to rise in temperature.
(c) There is an increase in horizontal thrust due to rise in temperature.
(d) There is a decrease in horizontal thrust due to decrease in temperature.

32. Which of the following assumptions are correct for ideal beam behavior:
(a) The compression flange of the beam is restrained from moving laterally.
(b) The tension flange of the beam is restrained from moving laterally.
(c) Any form of local buckling is prevented.
(d) The tension in flexure of the beam to attain its full moment capacity and shear capacity is restrained from moving laterally.

33. Which of the following statements are correct with reference to ensuring minimum shrinkage of prestressed concrete:
(a) The water-cement ratio and proportion of cement paste should be kept minimum to reduce shrinkage.
(b) Aggregates of larger size, well graded for minimum void, need a smaller amount of cement paste, and attendant shrinkage will be smaller.
(c) Harder and denser aggregates of low water absorptions and high modulus of elasticity will exhibit small shrinkage.
(d) The water-cement ratio and proportion of cement paste should be kept maximum to reduce shrinkage.

34. Which of the following techniques belong to 'Project Time Plan':
(a) Critical path method
(b) Precedence network analysis
(c) Line of balance technique
(d) Linear programme chart

35. Which of the following assumptions are made in the analysis of hydraulic jump:
(a) It is assumed that before and after jump formation the flow is essentially two-dimensional and that the pressure distribution is hydrostatic.
(b) The length of the jump is small so that the losses due to friction on the channel floor are small and hence neglected.
(c) The channel floor is horizontal or the slope is small that the weight component of the water mass comprising the jump is negligibly small.
(d) It is assumed that before and after jump formation the flow is uniform and the pressure distribution is hydrostatic.

36. Which of the following are component parts for an oil pressure governor in modern turbines:
(a) Servomotor, known as relay cylinder
(b) Oil sump
(c) Oil pump which is driven by belt connected to turbine main shaft
(d) Draft tube

37. Which of the following statements relates to a retarding reservoir:
(a) There are no gates at the outlets and hence the possibility of human error in reservoir operation is eliminated.
(b) The high cost of gate installation and also its operation is saved.
(c) An automatic regulation may cause coincidence of flood crest farther downstream where two or more channels taking off from retarding reservoirs join together.
(d) There are 3 gates at the outlets and hence the possibility of human error in reservoir operation.

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38. Depending upon the source from which the water is drawn, flow irrigation can be sub-divided into:
(a) River canal irrigation
(b) Reservoir or tank irrigation
(c) Combined storage and lift irrigation
(d) Combined storage and diversion irrigation

39. Which of the following statements for selecting building stones are correct:
(a) Seasoning of stones is essential and is done by soaking in water
(b) Specific gravity of stone is to be more than 2.7
(c) Porosity of stone affects its durability
(d) Climatic conditions decide the type of stone to be used in construction

40. Which of the following statements are correct:
(a) Hydrophobic cement grains possesses low wetting ability
(b) Rapid-hardening cement is useful in concreting under static, or running water
(c) Quick-setting cement helps concrete to attain high strength in the initial period
(d) White cement is just a variety of ordinary cement free of colouring oxides

41. Which of the following statements are correct:
(a) Workability of concrete increases with the increase in the proportion of water content
(b) Concrete having small-sized aggregates is more workable than that containing large-sized aggregate
(c) For the same quantity of water, rounded aggregates produce a more workable concrete mix as compared to angular and flaky aggregates
(d) A concrete mix with no slump shown in the slump cone test indicates its very poor workability

42. Which of the following statements with reference to the design of welded tension members are correct:
(a) The entire cross-sectional area of the connected leg is assumed to contribute to the effective area in the case of angles
(b) Two angles, back-to-back and tack-welded as per the codal requirements, may be assumed to behave as a tee-section
(c) A check on slenderness ratio may be necessary in some cases
(d) Two angles, back-to-back and tack-welded as per the codal requirements, may be assumed to behave as a L-section

43. Which of the following statements in respect of column splicing are correct:
(a) Splices should be provided close to the point of inflection in a member.
(b) Splices should be located near to the point of lateral restraint in a member.
(c) Machined columns for perfect bearing would need splices to be designed for axial force only.
(d) Machined columns for perfect bearing would need splices to be designed for axial force and bending moment.

44. Which of the following statements for the design of a laced column are correct:
(a) In a bolted construction, the minimum width of the lacing bar shall be three times the nominal diameter of the end bolt
(b) The thickness of the flat of a single lacing system shall be not less than one-fortieth of its effective length

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(c) The angle of inclination of the lacing bar should be less than 40° with the axis of the built-up column
(d) The lacing shall be designed for a transverse shear of 2.5% of the axial load on the column

45. Which of the following statements regarding labour welfare are correct:
(a) Work prompted by mere sympathy and kindness may degenerate and may injure the worker's sense of self-respect.
(b) Rapid industrialization on a large scale poses problem in respect of labour and its welfare.
(c) Construction labour is still largely unorganized, and, hence, lacks in welfare measures.
(d) Rapid industrialization on a small scale poses problem in respect of labour and its welfare.

46. Which of the following statements are correct:
(a) All soils can be identified in the field by visual examination
(b) Fine-grained soils can be identified in the field by visual examination and touch
(c) Fine-grained soils can be identified in the field by dilatancy test
(d) By visual examination, only coarse-grained soils can be identified

47. Which of the following situations can be attributed to sustained excessive ground water pumping in a basin:
(a) Drying up of small lakes and streams over a period in spite of normal rainfall
(b) Deterioration of groundwater quality in certain aquifers
(c) Land subsidence in the basin
(d) Increased cost of groundwater extraction

48. Which of the following statements regarding turbines are correct:
(a) The main function of a governor is to maintain a constant speed even as the load on the turbine fluctuates
(b) In the case of Pelton turbines, the governor closes or open the wicket gates
(c) In the case of Francis turbines, the governor opens to closes the needle valve
(d) In the case of Kaplan turbine, the governor swings the runner blades appropriately in addition to further closing or further opening of the wicket gates

49. Which of the following will pose difficulties in adopting *u.h.g.* principles and processes in evaluating flood hydrographs of basins:
(a) Non-uniform ~~areal~~ aerial distribution within a storm
(b) Intensity variation within a storm
(c) The centre of the storm varying from storm to storm in case of large catchments
(d) Dividing into a number of sub-basins and routing the individual DRHs through their respective channels to obtain the composite DRH at the basin outlet

50. Which of the following statements regarding groundwater pollutants are correct:
(a) Most of the groundwaters are generally non-alkaline
(b) A moderate amount of fluoride, about 0.6 mg/*l* to 1.5 mg/*l*, in drinking water, would help in good development of teeth
(c) Natural waters do not have dissolved mineral matter in them
(d) Most of the groundwaters are generally alkaline

51. Which of the following statements regarding anchorage of pipelines conveying water are correct:
(a) At bends, pipes tend to pull apart

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(b) At bends, forces exerted on the joint due to longitudinal shearing stresses are enormous and the joints may get loosened
(c) To avoid problems by hydrodynamic effects, pipes are anchored using concrete blocks which absorb side thrusts at bends
(d) Pipes are also anchored on steep slopes

52. Which of the following statements with reference to bioenergy as a renewable energy source are correct:
(a) Plants ensure continuous supply of gas due to their continuous growth
(b) Cost of obtaining energy from biogas is less than that from fossil fuels
(c) Digestion of sludge may produce H_2S and NO_x which are injurious to human health
(d) 'Floating dome' installation is the preferred option as it supplies gas at constant pressure irrespective of quantity of gas produced

53. Which of the following statements regarding waste stabilization ponds are correct:
(a) The pond has a symbiotic process of waste stabilization through algae on one hand and bacteria on the other
(b) The oxygen in the pond is provided by algae through photosynthesis
(c) The detention period is of the order of two to three days
(d) The bacteria which develop in the pond are aerobic bacteria

54. Which of the following statements are correct:
(a) When a soil sample is dried beyond its shrinkage limit, the volume of the soil slowly decreases
(b) Plastic limit is always lower than the liquid limit for any type of soil
(c) At the liquid limit, the soil behaves like a liquid and possesses no shear strength at all
(d) When subjected to drying, the volume of the soil remains unchanged once the water content of the soil goes below its shrinkage limit

55. Which of the following statements in respect of the troposphere are correct:
(a) The gaseous content constantly churns by turbulence and mixing
(b) Its behavior makes the weather
(c) The ultimate energy source for producing any weather change is the sun
(d) The height of the troposphere is nearly 11 km at the equatorial belt and is 5 km at the poles

56. The theory of consolidation predicts settlement due to primary consolidation; it cannot include settlement due to initial compression nor due to secondary consolidation. This happens because of the following assumptions made in developing the theory:
(a) Soil grains and water are incompressible
(b) Soil is fully saturated
(c) Compression takes place in the vertical direction only
(d) Time lag in consolidation is entirely due to low permeability of soil

57. Which of the following statements are correct:
(a) Secondary consolidation results due to prolonged dissipation of excess hydrostatic pressure
(b) Primary consolidation happens under expulsion of both air and water from voids in early stages
(c) Initial consolidation in the case of fully saturated soils is mainly due to compression of solid particles
(d) Primary consolidation happens more quickly in coarse-grained soils than in fine-grained soils

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58. Which of the following statements with regard to Soil Testing are correct:
(a) The origin and pole are at the same point in a Mohr's circle
(b) The shear stress is maximum on the failure plane
(c) Mohr's circle drawn with data from an unconfined compression test passes through the origin
(d) Maximum shear stress occurs on a plane inclined at 45° to the principal plane

59. Which of the following assumptions regarding Coulomb's Wedge Theory are correct:
(a) There is equilibrium of every element within the soil mass of the material
(b) There is equilibrium of the whole of the material
(c) Backfill is wet, cohesive, and ideally elastic
(d) The wall surface is rough

60. Which of the following statements with regard to Global Positioning Systems (GPS) are correct:
(a) The position of an object can be exactly determined by a single satellite
(b) The position of the observer (moving person or vehicle) on ground is determined by an orbiting satellite
(c) Atomic clocks are fixed in satellites to calculate the positioning of the satellite to aid in determining travel times
(d) Absolute positioning, where accuracy of 1 cm to 5 cm is needed, depends upon the health of the satellite

61. Which the following statements regarding Remote Sensing Survey are correct:
(a) Information transfer is accomplished by use of electromagnetic radiation
(b) Remote Sensing from space is done by satellites
(c) Remote Sensing has no application in Earthquake prediction
(d) Remote Sensing has application in Earthquake prediction

62. The rate of equilibrium superelevation on a road is:
(a) Directly proportional to the square of vehicle velocity
(b) Inversely proportional to the radius of the horizontal curve
(c) Directly proportional to the square of the radius of the horizontal curve
(d) Inversely proportional to the vehicle velocity

63. As per IRC 37 : 2012, the fatigue life of a flexible pavement consisting of granular base and sub-base depends upon:
(a) Resilient Modulus of bituminous layers
(b) Horizontal tensile strain at the bottom of bituminous layer
(c) Mix design of bitumen
(d) Vertical subgrade strain

64. 'Composite Sleeper Index' is relevant in determining:
(a) Required and adoptable sleeper density
(b) Durability of sleeper units
(c) Mechanical strength of the stock of wooden sleepers
(d) Suitability of a particular timber for use as a sleeper

65. Which of the following statements are correct:
(a) IS 3583 refers to Burnt Clay Paving Bricks.
(b) IS 5779 refers to Burnt Clay Soling Bricks.

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(c) IS 3952 refers to Burnt Clay Hollow Bricks.
(d) IS 2222 refers to Burnt Clay Lay Bricks.

66. Which of the following statements are correct:
(a) A high aggregate impact value indicates strong aggregates.
(b) A low aggregate crushing value indicates high crushing strength of aggregates.
(c) Aggregates having elongation index values greater than 15% are generally considered suitable for pavement construction.
(d) Flakiness index of aggregates should not be less than 25% for use in road construction.

67. Which of the following statements regarding refractory bricks in furnaces are correct:
(a) The furnace is fired at temperatures more than 1700°C.
(b) Silica content in the soil should be less than 40%.
(c) Water absorption of bricks should not exceed 10%.
(d) Chrome bricks are known as basic bricks.

68. Consider the following statements about lime :
(a) Calcination of limestone results in quick lime.
(b) Lime produced from pure variety of chalk is hydraulic lime.
(c) Hydrated lime is obtained by treating quick lime with water.
(d) Calcium react in the lime kiln with the clay minerals to produce silicates that enables some of lime to set through hydration. Any unreacted calcium is slaked to $Ca(OH)_2$ which sets through carbonation

69. Which of the following statements are correct:
(a) If more water is added to concrete for increasing its workability, it results into concrete of low strength.
(b) No slump is an indication of a good workable concrete,
(c) Higher the slump of concrete, lower will be its workability.
(d) Workability of concrete is affected by water content as well as water-cement ratio.

70. Pozzolana used as an admixture in concrete has the following advantages:
(a) It improves workability with lesser amount of water.
(b) It increases the heat of hydration and so lets the concrete set quickly.
(c) It increases the resistance of concrete to attack by salts and sulphates.
(d) It leaches out calcium hydroxide.

71 Which of the following statements regarding Cyclopean Concrete are correct:
(a) Size of aggregate is more than 150 mm.
(b) Size of aggregate is less than 150 mm.
(c) High slump.
(d) High temperature rise due to heat of hydration.

72. Which of the following statements are correct:
(a) The shear stress distribution across the section of a circular shaft subjected to twisting varies parabolically.
(b) The shear stress at the centre of a circular shaft under twisting moment is zero.
(c) The shear stress at the extreme fibres of a circular shaft under twisting moment is maximum.
(d) The shear stress distribution across the section of a circular shaft subjected to twisting varies linearly.

73. Which the following statements in respect of arched construction made of voussoirs are correct:
(a) The superimposed load is transferred to the sidewalls only by the strength of cohesion of the mortar between the voussoirs.

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(b) The arch may fail under crushing when the compressive stress or thrust in it exceeds the safe crushing strength of the voussoir material.
(c) Every element in the arch is subjected to compression only.
(d) Failure of the arch due to the sliding of any voussoir past the adjacent one due to transverse shear can be avoided by reducing the height of the voussoirs.

74. Which of the following are examples of indeterminate structures are correct:
(a) Fixed beam
(b) Continuous beam
(c) Two-hinged arch
(d) Beam overhanging on both sides

75. Which of the following statements are correct:
(a) When the number of members (n) and joints (j) are such that the equation $n = (2j - 3)$ is satisfied, the framed structure is said to be a perfect structure.
(b) In a redundant frame, the number of members is less than that required for a perfect frame.
(c) If, in a framed structure, the number of members provided is less than that required for a perfect frame, it is called as a deficient frame.
(d) In a redundant frame, the number of members is more than that required for a perfect frame.

76. The design strength of a tension member is governed by
(a) Rupture at a critical section
(b) Yielding of gross area
(c) Block shear of end region
(d) Rupture at a non-critical section

77. Gantry girders can be designed:
(a) As laterally supported beams.
(b) As laterally unsupported beams.
(c) By using channel sections.
(d) As I-section with plates or channels on compression flange

78. Which of the following measures are relevantly considered for earthquake loading and lateral stability of tall buildings:
(a) Minimizing gravity loads
(b) Adding masses at floor levels
(c) Ensuring ductility at the locations of maximum moments
(d) Providing shear walls

79. Which of the following statements regarding quality control are correct:
(a) It refers to absolute conformity to specifications.
(b) It may not vouch against overspending.
(c) It may unknowingly resort to overdesign in the hope of risk minimization.
(d) It is intended to reduce maintenance costs.

80. Which of the following statements are correct:
(a) Depression of mercury in a capillary tube is dependent on density and surface tension.
(b) Modelling of flow-induced drag on a ship is done invoking both of Froude number and Reynolds number.
(c) Flow of a fluid in a narrow pipe is relatable to both Reynolds number and Cauchy number.
(d) Formation and collapse of a soap bubble is analyzed through employing surface tension and external pressure.

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81. Which of the following factors are non-dimensional:
(a) 11.6 as a measure of the sub-layer
(b) $\frac{H}{N^2D^2}$ employed in comparing performance of pumps
(c) $\frac{Q^2}{D^5}$ employed in computations in pipe networks
(d) $\frac{U}{\sqrt{gL}}$ used in estimating wave-making drag

82. A fluid flow field is given by:

$$U = 2xy\hat{i} + yz\hat{j} - \left(2yz + \frac{z^2}{2}\right)\hat{k}$$

(a) The flow is viscous.
(b) The flow is steady.
(c) The flow is incompressible.
(d) The magnitude of the total velocity vector at a point (1, 4, 3) is nearest to 27 units.

83. Which of the following statements regarding flow net are correct:
(a) It helps determine the quantity of seepage.
(b) It helps determine the upward lift below a hydraulic structure.
(c) It is applicable to rotational flow only.
(d) It is applicable to irrotational flow only.

84. Consider the following statements regarding a turbine:
(a) Specific speed plays an important role in the selection of the type of turbine.
(b) An increase in specific speed of the turbine is accompanied by higher maximum efficiency.
(c) The runner of too high specific speed with high available head increases the cost of the turbine on account of the high mechanical strength required.
(d) An increase in specific speed of the turbine is accompanied by lower maximum efficiency.

85. Which of the following statements in connection with hydraulic turbines are correct:
(a) The Kaplan turbine is a radial flow turbine in which the guide vane angles as well as the runner vane angles are adjustable.
(b) Francis and Kaplan turbines are provided with draft tubes which carry water from exit of runner to tailwater to increase the gross head across the turbine.
(c) The parts of turbines susceptible to cavitation are the guide vanes and runner vanes — drastically reducing the turbine efficiency.
(d) The specific speed of a 4-jet Pelton turbine will be 28 if the specific speed of a single-jet Pelton turbine is 14.

86. Which of the following statements are correct:
(a) Surge tanks are not substitutes for forebays.
(b) Pumped storage power plants are a boon to power generation.
(c) Water hammer in penstocks is not dangerous.
(d) Kaplan turbines are used in low head power plants.

87. Which of the following statements concerning precipitation are correct:
(a) The Isohyetal map method of determining the average precipitation is considered to be better than the Thiessen method.
(b) There is no possibility of damaging the storms because of cloud seeding activity.
(c) Water that percolates through the soil emerges as the dry weather flow in streams.

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(d) There is a possibility of damaging the storms because of cloud seeding activity.

88. Which of the following statements in respect of ground water aquifers are correct:
(a) Specific storage is specific capacity per unit depth of the aquifer.
(b) Specific capacity is storage coefficient per unit aquifer depth.
(c) Specific capacity is a constant for a given well.
(d) For one-dimensional flow in a confined aquifer between two water bodies, the piezometric head line in the aquifer is a straight line.

89. Which of the following statements in connection with soil-water-crop relationship are correct:
(a) Water utilization by plants is mainly from capillary water.
(b) The amount of irrigation water required to meet the evapotranspiration needs of the crop during its full growth duration is its consumptive irrigation requirement.
(c) The depth of water required to bring the soil-moisture level of a given soil up to its field capacity is called hygroscopic water.
(d) With continuous increase in quantity of water applied, the yield of most crops increases up to a certain limit and then is expected to be constant.

90. Which of the following statements regarding design of channel by Lacey and Kennedy are correct:
(a) The theoretical concept of silt transportation is the same in both the theories.
(b) Lacey improved upon Kennedy's formula.
(c) There are no defects in either the theories of Lacey or of Kennedy.
(d) There are defects in either the theories of Lacey or of Kennedy.

91. Which of the following statements in respect of dams are correct:
(a) In a gravity dam, a grout curtain is provided near the toe to reduce the exit gradient.
(b) A drainage gallery with its drainage pipe system provided in a gravity dam reduces the uplift pressure at all levels below the upstream water level.
(c) An earthquake acceleration of 0.1 g acting vertically downward causes a decrease of 10% in the unit weight of concrete and of water in a gravity dam.
(d) The Tehri dam is a gravity dam.

92. Objectives for river training are:
(a) High flood discharge may pass safely through the reach.
(b) Sediment load (including bed and suspended load) may be transported efficiently.
(c) By making the river course unstable whereby to increase bank erosion.
(d) By making the river course stable whereby to decrease bank erosion.

93. Which of the following statements regarding coagulant aids are correct:
(a) They are employed when temperature is low as they then accelerate the process of coagulation.
(b) They are employed when floes are small and water is coloured.
(c) With their use, water purification capacity of the plant is increased.
(d) Most widely used materials are oxidants, absorbents, weighing agents, activated carbon and polyelectrolytes.

94. Which of the following statements with regards to the shear force diagram for the beam ABCD are correct:

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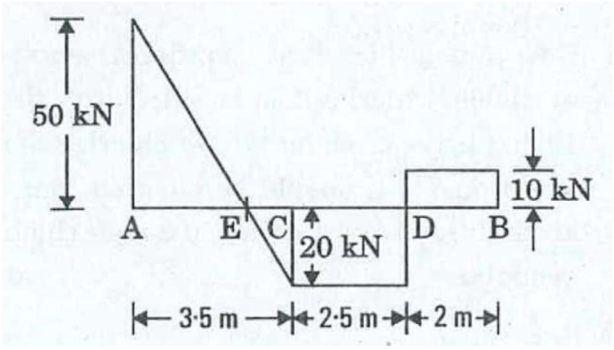

(a) The beam ABCD is an overhanging beam having supports at A and D only.
(b) The beam carries a concentrated load of 10 kN at the endB.
(c) The beam is an overhanging beam having supports at C and D only.
(d) The beam carries a uniformly distributed load of 70 kN over the left hand portion AC only.

95. A good disinfectant:
(a) Should be persistent enough to prevent regrowth of organisms in the distribution system.
(b) Must be toxic to micro-organisms at concentrations well above the toxic thresholds of humans and higher animals.
(c) Should have a fast rate of kill of micro-organisms.
(d) Must be toxic to micro-organisms at concentrations well below the toxic thresholds of humans and higher animals.

96. Which of the following statements regarding removal of impurities from water are correct:
(a) Settleable solids are removed by filtration.
(b) Volatile solids are removed through sedimentation.
(c) Dissolved solids are removed through reverse osmosis.
(d) Colloidal solids are removed by coagulation.

97. Which of the following statements regarding contact stabilization process are correct:
(a) Primary settling tank is not required in some cases.
(b) BOD removal occurs in two stages.
(c) Aeration volume requirements are approximately 50% of those of a conventional — or tapered — aeration plant,
(d) Returned sludge is aerated for 30 min to 90 min in sludge aeration tank.

98. Which of the following statements regarding pyrolysis are correct:
(a) It is an irreversible chemical change brought about by the action of heat in oxygen-free atmosphere.
(b) Range of temperature is 500°C to 1000°C.
(c) Internal heating causes organic matter to decompose physically and chemically rather than burn.
(d) It is a highly exothermic process.

99. Which of the following statements regarding air pollution are correct:
(a) The pollutant caused by incomplete combustion of organic matter is carbon monoxide.
(b) Depletion of ozone in outer atmosphere may trigger skin cancer.
(c) Acid rains are caused by SO_2 and NO_x.
(d) The permissible standard for SO_2 in air for residential areas in India is 80 $\mu g/m^3$.

100. Which of the following statements are correct:
(a) Illite is the mineral largely responsible for the swelling and shrinkage behaviour of clayey soils.
(b) A differential free swell value of 55% indicates a soil with low degree of expansiveness.

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(c) Higher the plasticity index of a soil, greater its swelling potential.
(d) A low shrinkage limit of a soil indicates possibility of swelling at low water content.

101. Which of the following effects as indicative of complete saturation of a soil sample are correct:
(a) Pore water pressure is positive.
(b) Volume of water to volume of voids is equal to 1.
(c) Relative density is equal to 1.
(d) Relative density is more than 1.

102. Which of the following statements are correct:
(a) Secondary consolidation of soil follows Terzaghi's one-dimensional theory of consolidation.
(b) Consolidation is a function of total stress.
(c) Even after complete dissipation of excess pore pressure, the soil undergoes a little more consolidation.
(d) Consolidation is a function of effective stress.

103. Which of the following statements regarding permeability of soils are correct:
(a) Permeability of coarse grained soil is inversely proportional to the specific surface at a given porosity.
(b) Direct measurement of permeability of a soil specimen at any stage of loading in oedometer test can be made only in fixed-ring type oedometer.
(c) The permeability of an aquifer increases with decrease in temperature of water moving through it.
(d) The permeability of an aquifer decreases with decrease in temperature of water moving through it.

104. Which of the following statements are correct:
(a) Stress Isobar can be prepared using Boussinesq's stress distribution theory.
(b) Equivalent point load method yields accurate results.
(c) Newmark's method relates the vertical stress with the help of influence chart.
(d) Westergaard's method helps in determination of stress distribution for layered soils.

105. Which of the following statements are correct:
(a) Immediate settlement takes place as soon as the load is placed.
(b) Secondary settlement is significant in the case of organic soil.
(c) Secondary settlement is estimated based on the Void ratio versus time curve' for a particular load under consolidation test.
(d) Secondary settlement is significant in not the case of organic soil.

106. Which of the following statements are correct:
(a) According to Terzaghi, a foundation is shallow if its depth is equal to or less than its width.
(b) Spread footing, strap footing and raft footing are types of shallow foundations.
(c) Combined footing may be trapezoidal if the two columns carry unequal loads; and rectangular if both columns carry equal loads.
(d) For water tanks, providing raft foundations will avoid unequal settlements.

107. Which of the following statements are correct:
(a) A braced cofferdam is used in shallow trench excavation as well as in deep excavation exceeding 6 m in depth.
(b) Cofferdams, braced or un-braced, are temporary structures either on land or in water bodies.
(c) When sheet piling is used for retaining soil, or soil and water, without any bracing, it is called a bulkhead.
(d) When sheet piling is used for retaining soil, or soil and water, without any bracing, it is called cantilever sheet pile.

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108. Which of the following characteristics of contours are correct:
(a) A uniform slope is indicated when contour lines are uniformly spaced.
(b) Contour lines cannot end anywhere but can close on themselves.
(c) A set of closed contours indicates a depression or a summit, according to the lower or higher values being respectively inward.
(d) Contour lines end anywhere.

109. The type of levelling operations carried out for laying a railway track are
(a) Longitudinal levelling (L. S.)
(b) Fly levelling
(c) Barometric levelling
(d) Cross-sectioning

110. Cleavage is a mode of folding:
(a) It is a process wherein all internal movements are along shear planes which do not change their position during the entire process.
(b) It is a process wherein all internal movements are along shear planes which change their position during the process.
(c) The process involves dilation in the vertical direction.
(d) The process involves compression in a lateral direction.

111. Consider the following statements concerning engineering geology:
(a) Dams on sedimentary impervious strata dipping upstream will be unsafe.
(b) In general, igneous rocks are hard and are suitable for construction of large hydraulic structures.
(c) Construction of a major dam must be preceded by thorough geotechnical investigations.
(d) Construction of dams is never indicated in any active zone of seismicity.

112. For an unconfined aquifer, the specific yield is 20%, specific retention is 15%, and permeability is 35 m/day. Consider the following statements:
(a) The porosity of the aquifer is 35%.
(b) The transmissibility is 35 m/day.
(c) The volume of water lost from storage per metre drop in the water table per 100 km^2 area of the aquifer is 20 million m^3.
(d) The transmissibility is 30 m/day.

113. Which of the following statements concerning railways are correct:
(a) A level stretch equal to the maximum train length is to be provided between the gradient reaches where a rising gradient is followed by a falling gradient.
(b) Vertical curves in railway tracks are not set out as parabolas.
(c) Diamond crossings can be laid on curves also.
(d) Curves should be avoided at the top level segment of bridges.

114. Which of the following options increase the sensitivity of a bubble tube:
(a) Using a liquid of greater surface tension
(b) Increasing the diameter of the tube
(c) Increasing the length of the tube
(d) Decreasing the diameter of the tube

115. Which of the following statements in the context of capillary pressure in soils are correct:
(a) Pore water pressure is negative in capillary zone.
(b) Water is in tension in capillary zone.
(c) Capillary pressure is more in coarse grained soils.
(d) Capillary pressure is less in coarse grained soils.

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116. For a rigid footing placed at the ground surface on sand, the contact pressure:
(a) is maximum at the edges.
(b) is zero at the edges.
(c) distribution is parabolic.
(d) is uniform throughout the base of the footing.
Which of the above statements are correct ?
(a) 1 and 3 only
(b) 1 and 4 only
(c) 2 and 3 only
(d) 2 and 4 only

117. Which of the following statements are correct:
(a) There will be no defects in select grade timbers.
(b) The codal values for strength of grade-II timber without defects may be reduced by 37.5%
(c) For timber used as columns, the permissible stress in ungraded timbers is adopted with a multiplying factor of 0.50.
(d) In case of wind force and earthquakes, a modification factor of 1.33 is adopted.

118. Which of the following statements regarding timber are correct:
(a) The strength of timber increases by Kiln seasoning.
(b) Cutting of wood is to be done prior to treatment.
(c) Water seasoning is good for prevention of warping.
(d) ASCU treatment enhances the strength of wood.

119. Disintegration of brick masonry walls is primarily due to:
(a) Efflorescence
(b) Magnesium sulphate in bricks
(c) Calcined clay admixtures
(d) Kankar nodules

120. Which of the following tests are relevant to testing of tiles:
(a) Transverse strength test
(b) Water absorption test
(c) Impact test
(d) Breaking strength test

ANSWER KEY

1.	(b, c, d)	**2.**	(b, c)	**3.**	(a, c, d)	**4.**	(a, b, d)	**5.**	(a, b, d)
6.	(a, b, c)	**7.**	(a, b)	**8.**	(a, b, c)	**9.**	(b, c, d)	**10.**	(a, b, c, d)
11.	(a, b, c)	**12.**	(a, b, c, d)	**13.**	(a, c, d)	**14.**	(a, b, c)	**15.**	(a, b, c, d)
16.	(a, b, c, d)	**17.**	(a, b, d)	**18.**	(a, b, c, d)	**19.**	(a, b, d)	**20.**	(a, b, c, d)
21.	(a, b)	**22.**	(a, c, d)	**23.**	(a, b, d)	**24.**	(a, b, c)	**25.**	(b, c, d)

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26.	(a, c, d)	**27.**	(a, b, c)	**28.**	(a, b, d)	**29.**	(b, c, d)	**30.**	(a, b, d)
31.	(a, b)	**32.**	(a, c, d)	**33.**	(a, b, c)	**34.**	(a, b, c)	**35.**	(b, c, d)
36.	(a, b, c)	**37.**	(a, b, c)	**38.**	(a, b, d)	**39.**	(b, c, d)	**40.**	(a, b, c, d)
41.	(a, c, d)	**42.**	(a, b, c)	**43.**	(a, b, d)	**44.**	(a, b, d)	**45.**	(a, b, c)
46.	(c, d)	**47.**	(a, b, c, d)	**48.**	(a, d)	**49.**	(a, b, c)	**50.**	(b, d)
51.	(a, b, c, d)	**52.**	(a, c, d)	**53.**	(a, b)	**54.**	(b, d)	**55.**	(a, b, c)
56.	(a, b, d)	**57.**	(c, d)	**58.**	(c, d)	**59.**	(b, d)	**60.**	(b, c, d)
61.	(a, b, d)	**62.**	(a, b)	**63.**	(a, b, c)	**64.**	(c, d)	**65.**	(a, b, c)
66.	(b, c)	**67.**	(a, c)	**68.**	(a, c, d)	**69.**	(a, d)	**70.**	(a, c, d)
71.	(a, d)	**72.**	(b, c, d)	**73.**	(b, c)	**74.**	(a, b, c)	**75.**	(a, c, d)
76.	(a, b, c)	**77.**	(a, b, d)	**78.**	(a, c, d)	**79.**	(a, d)	**80.**	(a, b, d)
81.	(a, d)	**82.**	(b, c)	**83.**	(a, b, d)	**84.**	(a, c, d)	**85.**	(a, d)
86.	(a, d)	**87.**	(a, c, d)	**88.**	(a, d)	**89.**	(a, b)	**90.**	(a, b)
91.	(a, c)	**92.**	(a, b, d)	**93.**	(a, b, c, d)	**94.**	(a, b, d)	**95.**	(a, c, d)
96.	(c, d)	**97.**	(a, b, c)	**98.**	(a, b, c)	**99.**	(a, b, c, d)	**100.**	(c, d)
101.	(a, b, d)	**102.**	(c, d)	**103.**	(a, b, d)	**104.**	(a, c, d)	**105.**	(a, b, c)
106.	(a, b, c, d)	**107.**	(a, b, d)	**108.**	(a, b, c)	**109.**	(a, b, d)	**110.**	(b, c, d)
111.	(b, c)	**112.**	(a, c)	**113.**	(a, c)	**114.**	(b, c)	**115.**	(a, b, d)
116.	(b, c)	**117.**	(b, d)	**118.**	(a, b, c)	**119.**	(a, b, c, d)	**120.**	(a, b, c, d)

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