

1. If 20% of the reservoir capacity is earmarked for dead storage in a storage reservoir of 40 M cum; and the average annual silt deposition in the reservoir is 0.1 M- cum, then the useful life of the reservoir will start reducing after

$$\frac{0.2 \times 40}{0.1}$$

- A) 400 years B) 80 years
C) 2000 years D) 200 years

2. A soil has a field capacity of 25%, permanent wilting point of 15%, and specific weight of 15 kN/m³. If the root zone depth of the grown crop is 98 cm and the unit weight of water is 9.8 kN/m³, then its available moisture holding capacity in centimeter is

$$\frac{15 \times 15}{100} \times \frac{10}{9.8} \times 98$$

- A) 15 B) 30 C) 150 D) 60

3. An irrigation canal is to be designed to deliver 6 cumecs to meet the peak Rabu demand of a total of 6400 hectares of cropped area. The estimated canal losses are 25% of the head discharge. The duty on capacity of this canal in hectares/cumecs will be

$$x 0.75 = 6$$

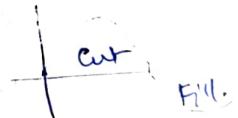
$$\frac{6400 \times 0.75}{10}$$

$$6 \times 1066.7 \times \frac{3}{4}$$

$$\frac{64}{6} \times \frac{8}{4}$$

- A) 1066.7 B) 266.7
C) 800 D) 480

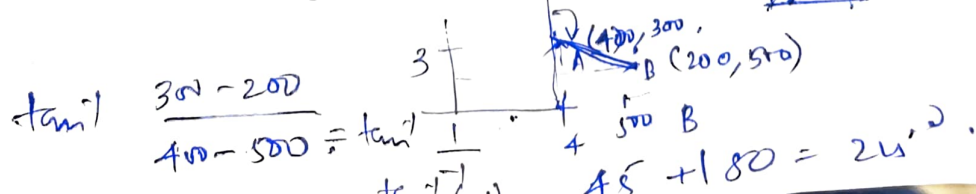
4. A contractor reports that the mass diagram for a road project is continuously rising throughout the project length. Which of the following is the most appropriate interpretation ?



- A) Excavation exceeds embankment throughout the project.
B) Embankment exceeds excavation throughout the project.
C) Cut and fill are balanced throughout the project.
D) Borrow earth is required throughout the project.

5. Station A has coordinates Easting, E = 400 m, Northing, N = 300 m, while station B has coordinates E = 500 m, N = 200 m. The whole-circle bearing of line AB is

- A) 45° B) 135°
C) 225° D) 315°



6. In pipe flow
- A) for constant heat flux, the initial length is more effective compared to the end length
 - B) for constant wall temperature the initial length are less effective compared to the end lengths
 - C) In fully developed flow and constant wall temperature, the effectiveness increases with length
 - D) In fully developed flow and constant heat flux, the effectiveness decreases with length
7. Whenever a plate is held immersed at some angle with the direction of flow of the liquid, it is subjected to some pressure. The component of this pressure, in the direction of flow of the liquid, is called
- A) drag
 - B) lift
 - C) bulk modulus
 - D) none of these
8. Out of the following four, which case a boundary is known as hydrodynamically smooth viscous form ?
- A) $K/\delta = 0.3$
 - B) $K/\delta > 0.3$
 - C) $K/\delta < 0.25$
 - D) $K/\delta = 0.5$
9. Which of the following statements is true regarding the Bulk Modulus of Elasticity ?
- A) The ratio of tensile stress to linear strain
 - B) The ratio of tensile stress to volumetric strain
 - C) The ratio of compressive stress to linear strain
 - D) The ratio of compressive stress to volumetric strain
10. Which specific corporate ethics reporting mechanism allows employees to report ethical concerns anonymously ?
- A) Compliance portal
 - B) Whistleblower hotline
 - C) Formal grievance committee
 - D) Ombuds person program

11. As per IS 456 : 2000, in the limit state method of design, the partial safety factor for the material strength of concrete is
 A) 1.0 B) 1.15 • C) 1.5 D) 1.75
12. In the designation Fe 415 of reinforcing steel, the number 415 denotes
 A) the ultimate tensile strength in N/mm^2
 • B) the characteristic yield strength in N/mm^2
 C) the modulus of elasticity in kN/mm^2
 D) the percentage elongation at fracture
13. A rectangular reinforced concrete slab supported on all four sides is designed as a ONE-WAY slab when the ratio of the longer span to the shorter span is
 A) less than 1 B) equal to 1
 C) less than 2 • D) greater than 2
14. As per IS 800 : 2007, the modulus of elasticity of structural steel to be adopted in design is
 A) $1.0 \times 10^5 \text{ N/mm}^2$ • B) $2.0 \times 10^5 \text{ N/mm}^2$
 C) $2.0 \times 10^6 \text{ N/mm}^2$ D) $3.0 \times 10^5 \text{ N/mm}^2$
15. A retaining wall H m high retains dry sand with unit weight γ . According to Rankine's theory, the resultant active earth pressure acts at a height of
 A) $H/2$ above the base
 • B) $H/3$ above the base
 C) $H/4$ above the base
 D) $2H/3$ above the base
16. Most suitable conveyor for transportation of bulk loose materials
 A) screw conveyor
 B) pneumatic conveyor
 C) belt conveyor
 D) forklifts



17. Choose the correct option for the following screens in the order of their highest capacity.

- i. Grizzlies
- ii. Shaking screen
- iii. Vibrating screen

A) i > ii > iii B) ii > iii > i C) i > iii > ii D) iii > ii > i

18. In constant pressure filtration the rate of filtration is

- A) proportional to square of the filtrate volume
- B) directly proportional to filtrate volume
- C) inversely proportional to the filtrate volume
- D) does not depend on the filtrate volume

$$\frac{A \times \Delta P}{L}, \frac{2 \Delta P}{L}$$

19. Which of the following size reduction equipment's are used as intermediate grinders ?

- i. Gyratory crushers
- ii. Rod mills
- iii. Attrition mills
- iv. Hammer mills

A) i and ii B) ii and iii C) ii, iii and iv D) i, ii and iii

$$\frac{A \times \Delta P}{L}, \frac{2 \Delta P}{L}$$

$$2 + \frac{2}{2}$$

$$7/3$$

$$5/2$$

20. For a mixing tank the power number varies with diameter of the impeller as

A) D^5 B) $D^{0.5}$ C) $D^{-0.5}$ D) D^{-5}

21. A steel cube with a side length of 100 mm is subjected to a tensile force of 10 kN along each of the x, y and z axes. Given that the material has a Young's modulus of 200 GPa and a Poisson's ratio of 0.3, determine the resulting change in volume of the cube.

A) 5 mm³ B) 6 mm³ C) 7 mm³ D) 4 mm³

22. A solid circular shaft with a diameter of 100 mm transmits 314 kW of power while rotating at 100 rpm. Calculate the maximum shear stress induced in the shaft due to torsion.

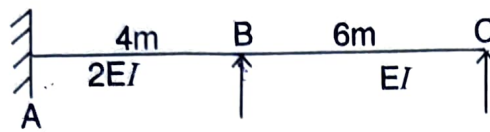
A) $\frac{48}{\pi}$ MPa B) $\frac{480}{\pi}$ MPa C) $\frac{4800}{\pi}$ MPa D) $\frac{480}{2\pi}$ MPa

$$\frac{\Delta V}{V} = \frac{10 \times 10^3}{10^4 \times 2 \times 10^5} (1 - 0.6) = \frac{0.5}{2 \times 10^6} \times 10^6 = \underline{\underline{0.25}}$$

$$\epsilon_x + \epsilon_y + \epsilon_z = \frac{\sigma}{E} - \nu \left(\frac{\sigma_y + \sigma_z}{E} \right) = \frac{1}{E} \left\{ \sigma_x + \sigma_y + \sigma_z \right\} - \frac{2\nu}{E} \left(\frac{\sigma_x + \sigma_y + \sigma_z}{2} \right)$$

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23. In the given structure, what is the relative stiffness of the members BA and BC ?



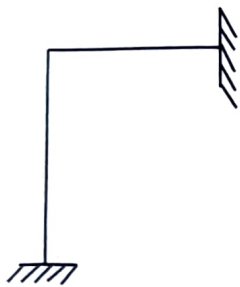
A) $\frac{I}{2}$ and $\frac{I}{6}$

C) $\frac{I}{4}$ and $\frac{I}{6}$

B) $\frac{I}{2}$ and $\frac{I}{8}$

D) $\frac{3I}{8}$ and $\frac{I}{6}$

24. The degree of redundancy of the rigid jointed frame shown in figure is equal to



A) 0

B) 4

C) 1

D) 3

25. A turbine works at 60 m head and 400 rpm speed. Its 1 : 2 scale model to be tested under a head of 15 m should have a rotational speed of

A) 400 rpm

C) 200 rpm

B) 800 rpm

D) 300 rpm

26. Nylon-6,6 is produced from the following raw material.

A) Cellulose

C) Caprolactam

B) Adipic acid

D) Polyols

27. Which raw material is employed in the production of polyacrylonitrile ?

A) Hexamethylene diamine

B) Dimethyl Terephthalate

C) Propylene

D) Ethylene

D

$$\frac{\tau}{J} = \frac{\tau}{r}$$

$$\tau = \frac{30 \times 10^3 \times 10^3 \times 2 \times 32}{2 \times \pi \times 10^4} = \frac{48 \times 10^3}{\pi \times 10^4} = \frac{30 \times 10^3}{\pi}$$

$$p = \frac{2\pi NT}{60}$$

$$314 \times 10^3 = \frac{2 \times \pi \times 100 \times T}{60}$$

28. Which catalyst is used in the manufacturing of high-density polyethylene ?
- A) Titanium tetrachloride
 - B) Antimony
 - C) Vanadium pentoxide
 - D) Aluminum oxide
29. Which polymerization is employed in the manufacturing of Butadiene-Styrene copolymer ?
- A) Bulk polymerization
 - B) Solution polymerization
 - C) Emulsion polymerization
 - D) Suspension polymerization
30. Which polymer exhibits highest glass transition temperature ?
- A) Polyethylene
 - B) Polystyrene
 - C) Polyisoprene
 - D) Nylon-6,6
31. Which of the following processes is followed by unsaturated air (with dry bulb temperature 12°C and relative humidity 47%) passing through water spray washer (temperature of water being constant at 40°C) ?
- A) Humidification only
 - B) Heating only
 - C) Both heating and humidification
 - D) Evaporative cooling

32. Match the following :

Principle of operation	Device
i. An emf is generated across the junctions of two dissimilar metals when the junction is heated	a. Piezo electric device
ii. An emf is generated when external force is applied on certain crystalline materials	b. Thermocouple
iii. Resistance of a thin film is varied by convection cooling in stream of liquid flows	c. Resistance strain gage
iv. Resistance of metallic wire element is changed by elongation or compression due to externally applied stress	d. Hot film anemometer
A) i-b, ii-c, iii-d, iv-a	B) i-d, ii-c, iii-b, iv-a
C) i-a, ii-d, iii-a, iv-b	D) i-b, ii-a, iii-d, iv-c

33. The unit impulse response of a first order process is given by $2e^{-0.5t}$. The gain and time constant of the process are, respectively,

- A) 4 and 2
- B) 2 and 2
- C) 2 and 0.5
- D) 1 and 0.5

34. In the five level automation hierarchy of computer integrated industrial process, using bottom up approach, order the following: Corporate level management information, Plant control level, Supervisory control level, Process control level and Measurement level
- A) Corporate level management information -> Plant control level -> Supervisory control level -> Process control level -> Measurement level
 - B) Process control level -> Measurement level -> Supervisory control level -> Plant control level -> Corporate level management information
 - C) Measurement level -> Process control level -> Supervisory control level -> Plant control level -> Corporate level management information
 - D) Process control level -> Supervisory control level -> Measurement level -> Plant control level -> Corporate level management information
35. For steady-state equimolar counter diffusion of two gases A and B, which of the following expressions correctly represents the molar flux N_A ?
- A) $N_A = \frac{D_{AB}}{RTz} (\bar{p}_{A1} - \bar{p}_{B1})$
 - B) $N_A = \frac{D_{AB}}{RTz} (\bar{p}_{B1} - \bar{p}_{A1})$
 - C) $N_A = \frac{D_{AB}}{RTz} (\bar{p}_{A2} - \bar{p}_{A1})$
 - D) $N_A = \frac{D_{AB}}{RTz} (\bar{p}_{A1} - \bar{p}_{A2})$
36. What is the main purpose of an Activated Sludge Process ?
- A) Remove solid waste from wastewater
 - B) Facilitate biological decomposition of organic matter
 - C) Neutralize acidic wastewater
 - D) Kill pathogens using chlorine
37. What is the primary disadvantage of using trickling filters ?
- A) High energy consumption
 - B) Requires continuous chemical dosing
 - C) Inefficient in removing nitrogen compounds
 - D) Clogging and biofilm build-up

38. The sludge digestion process in an anaerobic digester primarily produces

- A) Carbon monoxide
- B) Methane and carbon dioxide
- C) Oxygen and nitrogen
- D) Hydrogen sulphide and ammonia

39. The efficiency of a sedimentation tank depends on

- A) Flow velocity and detention time
- B) pH of the water
- C) Amount of dissolved oxygen
- D) Chemical composition of sludge

40. Which of the following is a major concern in the disposal of wastewater effluent into natural water bodies ?

- A) Increase in pH levels
- B) Thermal pollution
- C) Eutrophication
- D) Decrease in salinity

41. Which of the following crystal structures have the same coordination number ?

- i. FCC
- ii. BCC
- iii. HCP

- A) i and ii
- C) i and iii

- B) ii and iii
- D) all of the above

42. Match the different elastic constants against their significance.
- | | |
|--------------------------|---|
| i. Modulus of elasticity | a. deformation orthogonal to the direction of the applied force |
| ii. Bulk modulus | b. behaviour under shear |
| iii. Rigidity modulus | c. characteristic under pressure |
| iv. Poisson's Ratio | d. strength of the material |
- A) i-d; ii-a; iii-b; iv-c
 B) i-c; ii-d; iii-b; iv-a
 C) i-b; ii-c; iii-d; iv-a
 D) i-d; ii-c; iii-b; iv-a
43. The equation of motion for a damped viscous vibration is $3\ddot{x} + 9\dot{x} + 27x = 0$. The damping factor will be
 A) 0.25 B) 0.5 C) 0.75 D) 1.0
44. A mass of 1 kg is attached to the end of a spring with a stiffness of 0.9 N/mm. The critical damping coefficient in N/(m/s) of this system will be
 A) 60 B) 30 C) 120 D) 90
45. The damping force in a forced vibration with reference to spring force
 A) Leads by π radians B) Lags by π radians
 C) Leads by $\pi/2$ radians D) Lags by $\pi/2$ radians
46. Which component in a pumping system is primarily responsible for controlling water hammer damage ?
 A) Surge Tank B) Check Valve
 C) Gate Valve D) Foot Valve
47. In a water audit, which parameter is used to determine the percentage of unaccounted-for water (UFW) ?
 A) (Water Supplied – Water Billed) / Water Supplied
 B) (Water Supplied – Water Lost) / Total Customers
 C) (Water Billed / Water Supplied) $\times 100$
 D) (Water Revenue – Operational Cost) / Total Population

$$w_c = \sqrt{\frac{k}{m}}$$

$$= \sqrt{\frac{0.9}{1}}$$

$$= 3 \times$$

48. Which of the following flow meter types is best suited for measuring water flow in a partially filled pipe ?

- A) Vortex Flow Meter
- B) Venturi Meter
- C) Orifice Meter
- D) Electromagnetic Flow Meter

49. Which telemetry and SCADA system parameter is most critical for real-time monitoring of a water distribution network ?

- A) Water Hardness
- B) pH Value
- C) Pressure and Flow Rate
- D) Chlorine Concentration

50. In water treatment, chlorinated copperas is preferred as a coagulant when the raw water is

- A) Low in turbidity and high in alkalinity
- B) High in turbidity and low in alkalinity
- C) Low in turbidity and low in alkalinity
- D) High in turbidity and high in alkalinity

A	B
72	71
1.8	2.4
1.8	1.4
75.6	74.8

51. Two contractors submitted quotations for a concrete work. Contractor A quoted a material cost of ₹ 72,000 and proposed 2 masons at ₹ 900/day and 3 helpers at ₹ 600/day. Contractor B quoted a material cost of ₹ 71,000 and proposed 3 masons at ₹ 800/day and 2 helpers at ₹ 700/day. If the work is to be completed in 2 days and both contractors charge 8% profit on the total material and labour cost, the contract should be awarded to

- A) Contractor A
- B) Contractor B
- C) Both have the same quoted amount
- D) Cannot be determined

52. A Civil Engineer is asked to prepare a map showing flood-prone villages, major roads, schools, and hospitals so that evacuation routes can be planned efficiently. Which feature of Geographical Information Systems (GIS) makes this task possible ?

- A) Electromagnetic wave propagation B) Digital image compression
- C) Layer-based integration of spatial data D) Compass correction

53. Segregation in cement concrete occur due to

- i. Lack of sufficient quantity of finer aggregates
- ii. Dropping of concrete from greater height
- iii. Over vibration

- A) Only ii and iii B) Only ii
- C) Only i and iii • D) All of the above i, ii, iii

54. A truss with two vertical posts is termed as

- A) Queen post truss B) King post truss
- C) Bel fast truss D) Bow string truss

55. Which of the following statements are correct in the case of bleeding in concrete ?

- ✓ i. Rich mixes are less prone to bleeding.
- + ii. Bleeding decreases with increase in fineness of cement.
- iii. Rate of bleeding increases with increase in temperature.
- iv. Mineral admixtures reduce bleeding.

- A) Only i and iii • B) Only ii and iv
- ✗ C) None of the above D) All of the above

56. What is the primary purpose of a clariflocculator in water treatment ?

- A) To filter suspended particles
- B) To facilitate coagulation and sedimentation
- C) To disinfect water
- D) To adjust pH levels

57. What is the typical rate of filtration in a slow sand filter ?

- A) 10-50 l/m²/hr
- B) 50-100 l/m²/hr
- C) 100-200 l/m²/hr
- D) 200-300 l/m²/hr

58. How does the settling velocity of inorganic particles (size between 0.1 mm and 1 mm) vary with their diameter (d) ?

- A) Proportional to $d^{0.5}$
- B) Proportional to d
- C) Proportional to d^2
- D) Proportional to d^3

59. What is the primary function of a foot valve in a water pumping system ?

- A) Prevent backflow of water in suction pipes
- B) Regulate pressure in distribution lines
- C) Control flow velocity in discharge pipes
- D) Reduce energy consumption in pumps

60. What is the primary purpose of using activated carbon in water treatment ?

- A) Removing dissolved gases
- B) Eliminating turbidity
- C) Removing taste and odours
- D) Disinfecting water

61. Which of the following statements are correct ?

- ☒ i. The necessary condition for equilibrium of three forces is that they must be concurrent.
- ☒ ii. The principle of transmissibility can be applied in situations where only the state of the system is considered and not the deformation.
- ☒ iii. The moment of the resultant of a system of forces about an axis is equal to the algebraic sum of the moments of its components.

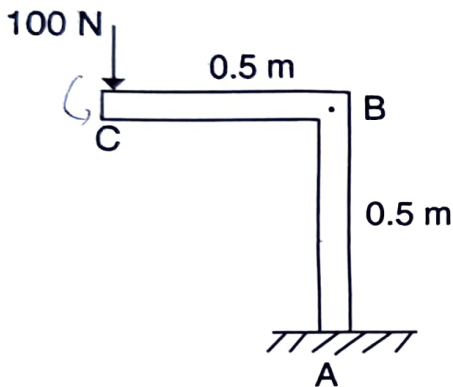
A) i and ii

B) ii and iii

C) i and iii

D) i, ii and iii

62. A bracket ABC is fixed at A and loaded by 100 N force at C as shown. What is its effect at point B ?



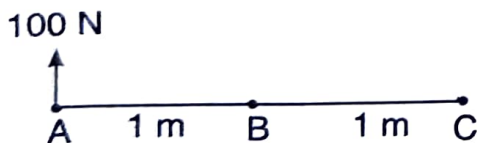
A) A clockwise moment of 50 Nm

B) A counter clockwise moment of 50 Nm

C) A counter clockwise moment of 50 Nm and a downward force of 100 N

D) A clockwise moment of 50 Nm and a downward force of 100 N

63. A force of 100 N acting at A is to be resolved into two components at B and C. What will be their values ?



A) B = 200 N up and C = 100 N up

B) B = 200 N up and C = 100 N down

C) B = 100 N up and C = 200 N down

D) B = 100 N up and C = 200 N horizontal

$$100 \times 2 = 200 \times 2$$

64. Choose the correct statement(s) related to a TTT diagram for plain carbon eutectoid steel
- i. the area between the nose of the curve and the temperature axis shows a meta stable state.
 - ii. austenite stays in the area above the curve.
 - iii. along the temperature axis from top to bottom, the transformation happen from martensite to pearlite.
- A) only i and ii are true B) only ii and iii are true
C) only ii is true D) only iii is true

65. Which of the following are true in the case of stress-strain diagrams ?
- i. ductile materials exhibit large strain and yielding before they fail.
 - ☒ ii. brittle materials have relatively large Young's moduli and ultimate strength.
 - ☒ iii. brittle materials fail at higher strain than ductile materials.
- A) only i B) only i and ii
C) only iii D) only i and iii

66. In wastewater treatment, the F/M ratio (Food to Microorganism ratio) is used to control
- A) Sludge retention time
 - B) Oxygen supply
 - C) Pathogen removal efficiency
 - ☒ D) The growth rate of activated sludge bacteria

67. In the design of wastewater treatment plants, what is the significance of Hydraulic Retention Time (HRT) ?
- A) Determines the time needed for bacteria to grow
 - ☒ B) Defines the time wastewater spends in the treatment unit
 - C) Measures the efficiency of disinfection
 - D) Calculates sludge volume index

68. In an UASB reactor, what is the primary mechanism for sludge stabilization ?
- A) Chemical oxidation
 - B) Aerobic biodegradation
 - C) Sedimentation and coagulation
 - D) Anaerobic microbial digestion
69. The concept of "Zero Liquid Discharge" (ZLD) in industrial wastewater management primarily aims to
- A) Minimize the use of chemicals
 - B) Reduce carbon footprint
 - C) Enhance aeration efficiency
 - D) Recycle wastewater leaving only solid waste
70. In a Sequencing Batch Reactor (SBR) system, the treatment process is carried out in
- A) A continuously flowing system
 - B) A series of interconnected tanks
 - C) A trickling filter followed by a clarifier
 - D) A single tank in sequential batch mode
71. The absorption factor is defined as
- Where
- L = liquid flow rate,
- G = gas flow rate and
- m = slope of the equilibrium line
- A) $\frac{L}{mG}$
 - B) $\frac{G}{mL}$
 - C) $\frac{mL}{G}$
 - D) $\frac{mG}{L}$

72. For the system air-water vapor, $\frac{h_G}{k_Y C_S}$ is approximately equal to C_S (or) approximately $\frac{h_G}{k_Y C_S} = 1$. This is so called

Where

h_G = heat transfer coefficient

k_Y = gas-phase mass transfer coefficient

C_S = humid heat

- A) Psychrometric ratio
- B) Lewis relation
- C) Wet-bulb depression
- D) Reynolds relation

73. The rate of heat transferred from hot bulk air (surroundings) to the surface the wet solid is exactly equal to the rate of heat absorbed for drying. This period of drying is called

- A) Heat absorption period
- B) Falling rate period
- C) Constant rate period
- D) Initial adjustment period of drying

74. At the minimum reflux ratio, the distillation column requires

- A) Minimum number of trays, and consequently the fixed cost and the operating costs are least.
- B) Finite number of trays, and consequently the fixed cost is finite but the operating costs are least.
- C) Infinite number of trays, and consequently the fixed cost is infinite but the operating costs are least.
- D) Maximum number of trays, and consequently the fixed cost and the operating cost are maximum.

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} \quad \text{low}$$

$$\frac{2 \times 5}{300} = \frac{P \times 2}{600}$$

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81. A gas occupies 5 L at 2 atm and 300 K. It is compressed to 2 L and heated to 600 K. The final pressure is approximately
 A) 2 atm • B) 10 atm C) 11.25 atm D) 15 atm
82. A gas mixture contains 4 mol N_2 , 3 mol O_2 and 1 mol CO_2 . If the total pressure is 800 kPa, the partial pressure of oxygen is
 A) 100 kPa B) 150 kPa $\frac{3}{8} \times 800$
 C) 250 kPa • D) 300 kPa
83. A gas mixture contains 40 mol% methane, 35 mol% nitrogen and 25 mol% carbon dioxide. If total pressure is 12 bar, the partial pressure of CO_2 is
 A) 2 bar B) 2.5 bar • C) 3 bar D) 4 bar $12 \times \frac{25}{100} =$
84. What metal combination is used to construct a Type K thermocouple ?
 A) Iron/Constantan B) Copper/Constantan
 C) Chromel/Alumel D) Platinum/Rhodium
85. The actual velocity at vena-contracta for flow through an orifice from a reservoir is given by
 • A) $C_v \sqrt{2gH}$ B) $C_c \sqrt{2gH}$
 C) $C_d \sqrt{2gH}$ D) $C_v C_a$
86. If $\omega/\omega_n = \sqrt{2}$, where ω is the frequency of excitation and ω_n is the natural frequency of vibrations, then transmissibility of vibrations will be
 A) 0.5 B) 2.0 C) 1.5 D) 1.0
87. The product of circular pitch and diametral pitch in gears is equal to
 A) module B) unity C) $1/\pi$ D) π
88. The maximum efficiency in case of worm and worm wheel is
 A) $(1 - \sin\phi)/(1 + \sin\phi)$ B) $(1 - \sin\phi)/\sin\phi$
 C) $(1 + \sin\phi)/(1 - \sin\phi)$ D) $\sin\phi/(1 - \sin\phi)$

89. When a hot metal piece is left to cool in air the time rate of cooling of the outer layer will be
- A) slower at start and faster near the end
 - B) faster at start and slower near the end
 - C) both rates will be the same
 - D) this will depend on the material
90. In steady state conduction with variable thermal conductivity if the conductivity decreases along the flow direction, then the temperature gradient along the flow direction will become
- A) steeper
 - B) flatter
 - C) remain constant
 - D) either of the three depending on heat flow rate
91. Which of the following methods is most effective for detecting hidden leaks in a water distribution system ?
- A) Visual inspection
 - B) Pressure drop analysis
 - C) Acoustic leak detection
 - D) Dye testing
92. The Hardy Cross method is primarily used for ?
- A) Pipe sizing
 - B) Flow rate estimation in loops
 - C) Chlorine dosage calculation
 - D) Leak detection
93. What is the major disadvantage of using open channels for water transmission ?
- A) High capital cost
 - B) Difficult maintenance
 - C) High evaporation and contamination risk
 - D) High pressure loss
94. As the pH of water decreases, the contact time required for effective chlorination
- A) Decreases
 - B) Increases
 - C) Stays constant
 - D) Varies randomly

95. Which of the following statements about pressure filters is TRUE ?
- A) They require a higher initial cost than slow sand filters
 - B) They are less efficient in removing suspended solids than slow sand filters
 - C) They cannot be backwashed
 - D) They operate at very low pressure
96. According to Terzaghi's effective stress principle, the effective stress is equal to
- A) Total stress plus pore water pressure
 - B) Total stress minus pore water pressure
 - C) Pore water pressure minus total stress
 - D) Total stress divided by pore water pressure
97. Negative skin friction on a pile is likely to develop when
- A) The pile settles more than the surrounding soil
 - B) The surrounding soil settles more than the pile
 - C) The pile is subjected only to uplift load
 - D) The pile is driven into dense sand
98. The liquid limit of a soil is the water content at which the soil changes from
- A) Solid state to semi-solid state
 - B) Semi-solid state to plastic state
 - C) Plastic state to liquid state
 - D) Liquid state to plastic state
99. The aggregate crushing value test indicates the
- A) Abrasion resistance
 - B) Resistance to crushing under gradually applied compressive load
 - C) Resistance to weathering
 - D) Shape characteristics
100. Which planning principle is primarily aimed at minimizing urban sprawl while ensuring efficient utilization of infrastructure ?
- A) Ribbon development
 - B) Leapfrog development
 - C) Linear settlement
 - D) Compact city development

