168/2025

Question Booklet Alpha Code: **A**

Question Booklet Serial Number:

Total No. of questions : 100 Time : 1 Hour 30 Minutes

Maximum : 100 Marks

INSTRUCTIONS TO CANDIDATES

1. The question paper will be given in the form of a Question Booklet. There will be four versions of question booklets with question booklet alpha code viz. A, B, C & D.
2. The Question Booklet Alpha Code will be printed on the top left margin of the facing sheet of the question booklet.
3. The Question Booklet Alpha Code allotted to you will be noted in your seating position in the Examination Hall.
4. If you get a question booklet where the alpha code does not match to the allotted alpha code in the seating position, please draw the attention of the Invigilator IMMEDIATELY.
5. The Question Booklet Serial Number is printed on the top right margin of the facing sheet. If your question booklet is un-numbered, please get it replaced by new question booklet with same alpha code.
6. The question booklet will be sealed at the middle of the right margin. Candidate should not open the question booklet, until the indication is given to start answering.
7. Immediately after the commencement of the examination, the candidate should check that the question booklet supplied to him contains all the 100 questions in serial order. The question booklet does not have unprinted or torn or missing pages and if so he/she should bring it to the notice of the Invigilator and get it replaced by a complete booklet with same alpha code. This is most important.
8. A blank sheet of paper is attached to the question booklet. This may be used for rough work.
9. **Please read carefully all the instructions on the reverse of the Answer Sheet before marking your answers.**
10. Each question is provided with four choices (A), (B), (C) and (D) having one correct answer. Choose the correct answer and darken the bubble corresponding to the question number using Blue or Black Ball-Point Pen in the OMR Answer Sheet.
11. **Each correct answer carries 1 mark and for each wrong answer 1/3 mark will be deducted. No negative mark for unattended questions.**
12. No candidate will be allowed to leave the examination hall till the end of the session and without handing over his/her Answer Sheet to the Invigilator. Candidates should ensure that the Invigilator has verified all the entries in the Register Number Coding Sheet and that the Invigilator has affixed his/her signature in the space provided.
13. Strict compliance of instructions is essential. Any malpractice or attempt to commit any kind of malpractice in the Examination will result in the disqualification of the candidate.

168/2025

Maximum : 100 marks

Time : 1 hour and 30 minutes

1. Which among the following represent control chart for attributes?

(i) R chart;

(ii) c chart;

(iii) p chart;

(iv) X-bar chart

(A) (i) and (iv)

(B) Only (i)

(C) (ii) and (iii)

(D) Only (iv)

2. In the case of transportation problem, where 'm' denotes the supply points and 'n' denotes the demand points, the solution is non-degerate if :

(A) there are exactly $m+n-1$ non-zero allocations and the allocations are in independent positions.

(B) the number of allocations is less than $m+n-1$.

(C) a closed loop can be formed by moving through the allocated cells.

(D) there are exactly $m+n-1$ allocations and a closed loop can be formed by moving through the allocated cells.

3. The length of time by which the completion time of any non-critical activity can be delayed without causing any delay to its immediate successor activities is called :

(A) Total float

(B) Free float

(C) Independent float

(D) Interfering float

4. Which among the following are the features of process layout?

(i) All similar facilities are grouped together.

(ii) Large quantity production, only a few products.

(iii) Sequence of facilities located according to the processing sequence of the product.

(iv) Low quantity production, large range of products.

(A) (i) and (ii)

(B) (ii) and (iii)

(C) (iii) and (iv)

(D) (i) and (iv)

5. Consider a data set, where one of the data point is zero. Its geometric mean is :

(A) Positive

(B) Zero

(C) Negative

(D) Indeterminate

6. Which of the following is a relative measure of dispersion?

(A) Variance
(B) Range
(C) Coefficient of Variation
(D) Standard Deviation

7. Match the Therbligs indicated in List I with their corresponding color codes indicated in List II :

	List I		List II
(a)	Search	(1)	Gray
(b)	Find	(2)	Purple
(c)	Position	(3)	Black
(d)	Use	(4)	Blue

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

8. Which among the following organizational structures has the feature of dual reporting?

(A) Matrix
(B) Functional
(C) Line
(D) Divisional

9. When a eutectoid steel is rapidly cooled to a temperature just above the *nose* of the TTT curve and held isothermally, the microstructure formed is primarily :

(A) Martensite
(B) Bainite
(C) Fine Pearlite
(D) Coarse Pearlite

10. Consider the following statements regarding modern steelmaking processes :

(i) In the Basic Oxygen Furnace (BOF), the primary purpose of the oxygen jet is to oxidize carbon and impurities.

(ii) In Electric Arc Furnace (EAF) steelmaking, the chemical energy from oxidation reactions is the major heat source.

(iii) BOF requires mostly solid scrap, while EAF predominantly uses molten pig iron.

Choose the correct answer from the following options:

(A) Only (i)
(B) (i) and (ii)
(C) (ii) and (iii)
(D) (i), (ii) and (iii)

11. Which milling machine component is primarily responsible for moving the workpiece in the X, Y and sometimes Z directions to control feed?

(A) Spindle
(B) Arbor
(C) Table
(D) Knee

12. A forged steel crankshaft needs to be inspected for internal flaws such as shrinkage cavities or porosity without cutting or sectioning the component.

Which NDT method is most appropriate?

(A) Dye penetrant testing
(B) Magnetic particle testing
(C) Ultrasonic testing
(D) Visual inspection

13. Consider the following statements regarding gauges used in inspection :

Statement (1) : Plug gauges are primarily used to check internal dimensions such as hole sizes.
Statement (2) : Snap gauges are used to check external dimensions such as shaft diameters.
Statement (3) : Feeler gauges are used to measure clearance or gap between mating parts.

Which of the above statements are correct?

(A) (1) and (2) only
(B) (2) and (3) only
(C) (1) and (3) only
(D) (1), (2) and (3)

14. Consider the following statements about the functions of electrode coatings in arc welding :

Statement (1) : Electrode coatings supply deoxidizers that help prevent oxygen from entering and weakening the weld metal.
Statement (2) : The coating forms a slag layer which controls the cooling rate of the weld and improves bead shape.
Statement (3) : Gases produced from the electrode coatings reduces arc stability during welding.

Which of the above statements are correct?

(A) (1) and (2) only
(B) (2) and (3) only
(C) (1) and (3) only
(D) (1), (2) and (3)

15. During a machining operation, the cutting tool begins to produce built-up edge (BUE) on the tool tip.

Which corrective action is most likely to reduce or eliminate the built-up edge?

(A) Reducing the cutting speed
(B) Using a tool with a larger rake angle
(C) Increasing the depth of cut significantly
(D) Selecting a tool with lower hot hardness

16. A machinist needs to turn a long, slender shaft that is prone to deflection and vibration during machining. The operation requires the workpiece to be supported away from the chuck to maintain accuracy and prevent chatter.

Which lathe accessory should be used?

(A) Three-jaw chuck
(B) Faceplate
(C) Steady rest
(D) Mandrel

17. The property by virtue of which fluids undergo a change in volume under the action of external pressure is known as :

(A) Viscosity
(B) Capillarity
(C) Compressibility
(D) Friction

18. SI Unit of surface tension :

(A) N/m
(B) kg/m
(C) N/m^2
(D) Nm

19. Bernoulli's equation is derived from the principle of conservation of :

(A) Mass
(B) Momentum
(C) Energy
(D) Angular momentum

20. A fluid has density of 1000 kg/m^3, what is the pressure at a depth of 2 m :

(A) 19.62 kpa
(B) 137 kpa
(C) 43.3 kpa
(D) 12.5 kpa

21. The curve which gives an instantaneous picture of the location of the fluid particles, which have passed through a given point :

(A) Stream line
(B) William's line
(C) Pathline
(D) Streak line

22. If the operating head available is 100 m and specific speed ranging from 80 to 150 rpm which turbine is suitable?

(A) Francis
(B) Kaplan
(C) Propeller
(D) None of these

23. The condition for maximum efficiency of a jet of water striking a curved vane when the vane is moving in the direction of jet is :

(A) Vane velocity = jet velocity
(B) Vane velocity = one third of jet velocity
(C) Vane velocity = half of jet velocity
(D) Vane velocity = four third of jet velocity

24. For a centrifugal pump the ratio of power out of the pump to the power input to the pump is known as :

(A) Manometric efficiency
(B) Volumetric efficiency
(C) Mechanical efficiency
(D) Overall efficiency

25. A bar of circular cross section is subjected to a uniaxial tensile stress, which of the following statements are correct?

(i) The volumetric strain is zero when Poisson ratio is 0.5.

(ii) The lateral strain is always positive.

(iii) A higher Poisson's ratio indicates greater lateral contraction for the same axial strain.

(iv) For perfectly incompressible materials, the bulk modulus is zero.

(A) (ii) and (iii) only (B) (i) and (iii) only

(C) (ii), (iii) and (iv) (D) (i), (ii) and (iii)

26. When a body just begins to move on a horizontal rough surface :

(A) The frictional force decreases slightly and remains constant during motion.

(B) The frictional force suddenly becomes zero.

(C) The frictional force increases rapidly with speed.

(D) The frictional force remains equal to the applied force for all velocities.

27. Which of the following statements are correct for a simply supported beam?

(i) The shear force at a section is equal to the rate of change of bending moment at that section.

(ii) The bending moment is maximum where the shear force changes its sign.

(iii) The bending moment diagram under a uniformly distributed load is linear.

(iv) The bending moment at a section is equal to the rate of change of shear force at that section.

(A) (ii) and (iii) only (B) (i) and (iii) only

(C) (i) and (iv) only (D) (i) and (ii) only

28. Which of the following statement is correct, for double started square thread?

(A) The lead is equal to the pitch

(B) The pitch is twice the lead

(C) The lead is twice the pitch

(D) The lead angle is smaller than for a single-start thread of the same pitch

29. Which of the following statements are correct regarding mechanisms where Coriolis acceleration appears?

(i) Coriolis acceleration always acts opposite to the direction of sliding.

(ii) Coriolis acceleration becomes zero if either the angular velocity of the link or the sliding velocity becomes zero.

(iii) In a shaper mechanism, Coriolis acceleration may appear when the ram is connected through a rotating slotted link.

(iv) Coriolis acceleration always acts opposite to centrifugal acceleration.

(A) (ii) and (iii) only (B) (i) and (iii) only

(C) (i) and (iv) only (D) (i) and (ii) only

30. Consider two shafts A and B have identical length and are made from the same material. Shaft A is solid of diameter d, while Shaft B is hollow with same outer diameter d and an inner diameter 0.6 d. Both shafts must transmit the same torque but must also satisfy the same angle of twist per unit length. Which shaft requires less material cost while satisfying this conditions?

(A) Both require same weight

(B) Solid shaft A

(C) Hollow shaft B

(D) Cannot be determined without modulus values

31. Which of the following statements are correct?

(i) For involute gears, the velocity ratio remains constant even if the center distance slightly increases.

(ii) The velocity ratio changes if the pressure angle is changed while keeping the number of teeth the same.

(iii) In an involute profile, the path of contact shortens if the addendum is increased.

(iv) The pressure angle remains constant throughout the meshing action in involute gears.

(A) (ii) and (iii) only (B) (i) and (iii) only

(C) (i) and (iv) only (D) (i) and (ii) only

32. Which of the following statements are correct, bearing characteristics/operation?

(i) Increasing viscosity of the lubricant always increases load-carrying capacity, regardless of speed.

(ii) A hydrodynamic bearing can generate a supporting pressure only when there is a relative motion between the journal and the bearing.

(iii) The basic dynamic load rating of a bearing indicates the load under which it can operate for one million revolutions with 90% reliability.

(iv) Deep-groove ball bearings are better suited for heavy radial loads than cylindrical roller bearings.

(A) (ii) and (iii) only (B) (i) and (iii) only

(C) (i) and (iv) only (D) (i) and (ii) only

33. Which one of the following statements is not true for an Air Standard Otto cycle?

(A) An increase in compression ratio will improve the Air standard efficiency.

(B) Consists of four internally as well as externally reversible processes.

(C) Heat addition and heat rejection occurs at constant volume and constant pressure respectively.

(D) Has higher efficiency than a Diesel cycle having the same compression ratio.

34. Which one of the following statements is not true about the Morse test?

(A) Is done on multi-cylinder engines

(B) Can be done on both petrol and diesel engines

(C) Is used to find the volumetric efficiency of the engine

(D) Is used to find out the frictional power of the engine

35. Which one of the following statements is not true about Prandtl number?

(A) Is a non-dimensional number used in forced convection analysis.

(B) It is the ratio of momentum diffusivity to thermal diffusivity.

(C) It is the ratio of momentum thickness to displacement thickness.

(D) Indicates the ratio of hydrodynamic boundary layer thickness to the thermal boundary layer thickness.

36. The critical radius of insulation (thermal conductivity K, heat transfer coefficient h) of a spherical shell is given by :

(A) K/h (B) h/K

(C) K/2h (D) 2K/h

37. In a two stage reciprocating compressor operating between pressures P_1 and P_3, the ideal intermediate pressure (P_2) is given by :

(A) $\sqrt{P_3/P_1}$ (B) $(P_1 + P_3)/2$

(C) $\sqrt{P_1 P_3}$ (D) $\sqrt{P_1^{\,2} + P_3^{\,2}}$

38. Governing method used in a diesel engine is :

(A) Quality Governing (B) Centrifugal Governing

(C) Quantity Governing (D) Hit and Miss Governing

39. For air with a relative humidity of 70% :

(A) The dew point and wet bulb temperatures are equal

(B) The dry bulb temperature is less than the wet bulb temperature

(C) Wet bulb temperature is less than dew point temperature

(D) Dew point-temperature is less than wet bulb temperature

40. In a vapour compression refrigeration system with Liquid suction heat exchanger, the state of refrigerant before it enters the evaporator is :

(A) Saturated liquid (B) Sub-cooled liquid

(C) Dry saturated vapour (D) Wet vapour

41. _____ is a secondary tillage implement.

(A) MB plough (B) Harrow

(C) Disc plough (D) Seed drill

42. Choose the correct options from the following statement :

(i) Landside is a part of Disc plough.

(ii) Landside is a part of MB plough

(iii) Landside is made of soft centre steel or mild steel or cast iron

(iv) Landside is made of high carbon steel

(A) (i) alone is correct (B) (i) and (iii) are correct

(C) (ii) and (iv) are correct (D) (ii) and (iii) are correct

43. Choose the correct answer :

(A) Better penetration is achieved at higher disc angle and optimum value being 44 degrees.

(B) Draft of the disc plough is not influenced by the speed of operation.

(C) Soil moisture content will not affect the draft.

(D) Increase in tilt angle decrease the draft

44. The main part of a mower is a cutter bar and is to cut crops and separate it from uncut portion. Pick up the correct answer after reading carefully the statements below :

(i) The knife sections move back and forth and cut plants in both direction.

(ii) The section of knife should always stop at the centre of the guard on each stroke.

(iii) Guards are provided with ledger plates on which the knife section move.

(iv) Knife clips hold the sections down against the ledger plates but allow it to move freely.

(A) All statements are wrong

(B) Only statements (i), (ii) and (iii) are correct

(C) Only statements (iii) and (iv) are correct

(D) All statements are correct

45. The main purpose of which of the following unit is; 'to work as compensating mechanism, so that when the tractor takes a turn the outer wheel may move faster than the inner one and still share the load equally and to function as a second speed reduction point in the tractor power trains'.

(A) Transmission system (B) Differential

(C) Final drives (D) Clutches

46. 'Toe-in' of tractors and even of other machines must be provided :

(i) For smooth steering control and longer front tyre life.

(ii) For smooth steering and longer back tyre life.

(iii) For proper 'toe in'; the spacing of two front wheels should be 3 to 10 mm shorter than that of the rear of the wheels.

(iv) For proper 'toe in'; the spacing of two back wheels should be 3 to 10 mm shorter than that of the front of the wheels.

(A) (i) and (iii) are correct
(B) (i) alone is correct
(C) (iii) alone is correct
(D) (ii) and (iv) are correct

47. Read carefully the following statements regarding draft of pull type implements and its measurement :

(i) Draft is the component of pull in direction of travel.

(ii) To measure the draft, spring-type of dynamo meter is connected between tractor drawbar and the implement hitch and is read directly.

(iii) Spring type dynamometer is suitable for accurate measurement of draft.

(iv) Strain-gage dynamometer is often used for measuring drawbar pull.

Choose the correct options :

(A) (i) and (ii) alone are correct
(B) (i), (ii) and (iii) are correct
(C) All are correct
(D) (iii) is incorrect

48. Find out the horsepower developed by a pair of bullocks in pulling up a plough at a forward speed of 3 kmph. The dynamometer indicates an average draft of 75 kgf :

(A) 8.3 hp
(B) 8.3×10^{-1} hp
(C) 8.3×10^{-2} hp
(D) 8.3×10^{-3} hp

49. The most common and practical method of calculation of depreciation which gives a constant annual charge of depreciation throughout the life of the machine is :

(A) Declining balance method

(B) Sum - of - the - years - digit method

(C) Estimated value method

(D) Straight line method

50. High temperature (50 degree celsius) test in laboratory, belt test, track test in field are carried out at testing stations to assess the likely performance in the field transport and stationery job to be performed, is associated with :

(A) Fuel Efficiency test
(B) Combine harvester test
(C) Transplanter test
(D) Tractor test

51. Bicycle ergo meter can be used for human energy measurement for different agricultural operation under local environment condition through measurement of physiological parameters corresponding to 'Mechanical work output' using the equation _____; where 'T1-T2' is the load on rear wheel in 'kg', 'D' is the diameter of rear wheel in 'm' and 'N' is the 'rpm' of the wheel.

(A) $PS = \frac{\pi D(T1 - T2)N}{4500}$

(B) $PS = \frac{\pi D(T1 - T2)N}{746}$

(C) $PS = \frac{\pi R(T1 - T2)N}{4500}$

(D) $PS = \frac{\pi D(T1 - T2)N}{60}$

52. Value of CR (Concentration Ratio) of Concentrated Collector is :

(A) 1

(B) $1 < CR \leq 1000$

(C) $1 \leq CR \leq 1000$

(D) $CR > 1000$

53. Which of the following statement are correct with respect to Betz limit?

Statement 1 : Theoretical minimum power that may be captured by a wind machine is 59.3% of incoming energy in the wind.

Statement 2 : The major factor influencing energy in the wind is its velocity

Statement 3 : Doubling the wind speed will increase the available power eight times

Statement 4 : The equation for practical output power of a wind turbine is based on betz limit.

(A) Statement (1) and (2) are correct

(B) Statement (1) and (3) are correct

(C) Statement (2), (3) and (4) are correct

(D) Statement (1), (2) and (4) are correct

54. Average chemical composition of producer gas delivered from the gasifier is :

(A) CO – 15 - 30%
H_2 – 18 - 22%
CH_4 – upto 4%
CO_2 – 5 - 15%
N_2 – 45 - 60%

(B) CO – 35 - 40%
H_2 – 18 - 22%
CH_4 – upto 4%
CO_2 – 5 - 15%
N_2 – 45 - 60%

(C) CO – 15 - 30%
H_2 – 30 - 35%
CH_4 – upto 4%
CO_2 – 5 - 15%
N_2 – 45 - 60%

(D) CO – 15 - 30%
H_2 – 18 - 22%
CH_4 – upto 4%
CO_2 – 1 - 3%
N_2 – 45 - 60%

55. Three stages or process involved in biogas formation are :

(A) Hydrolysis, Fermentation acid formation

(B) Fermentation acid formation, methane generation

(C) Hydrolysis acid formation, methane generation

(D) Pyrolysis, Fermentation, methane generation

56. The lower limit of available moisture range in a soil is called :

(A) Saturation capacity

(B) Permanent wilting point

(C) Field capacity

(D) Wilting Coefficient

57. _____ equation of infiltration expresses the decrease of infiltration capacity with time as an exponential decay.

(A) Philips equation

(B) Kostiakov Equation

(C) Green and Ampt equation

(D) Hortons equation

58. Drainage Density is related to the average length of overland flow by the equation :

(A) $L_O = 1/2\,Dd$

(B) $Dd = 1/L_O$

(C) $L_O = 1/Dd$

(D) $Dd = 2/L_O$

59. The elevation difference between two points is accurately determined when instrument cannot be set between the two points by :

(A) Differential Levelling

(B) Profile Levelling

(C) Cross sectioning

(D) Reciprocal Levelling

60. In Remote Sensing, the smallest size of a feature the sensor is able to identify is called _____ resolution.

(A) Spatial Resolution

(B) Temporal Resolution

(C) Radiometric Resolution

(D) Spectral Resolution

61. The most efficient rectangular channel section, the condition is :

(A) depth of flow should be twice the base width

(B) Hydraulic radius is twice the depth of flow

(C) Depth of flow should be half the base width

(D) Hydraulic radius should be half the base width

62. Interceptor drain helps to control waterlogging by :

(A) Lowering the water table

(B) Preventing the subsoil water from reaching the area

(C) Draining out excess water to natural drains

(D) Allowing vertical drainage

63. The discharge per unit drawdown of a well is called :

(A) Specific storage (B) Specific capacity

(C) Specific retention (D) Storage coefficient

64. If the speed of the centrifugal pump is doubled, the power required will be increased by :

(A) 2 times (B) 4 times

(C) 6 times (D) 8 times

65. In the hydraulic design of lateral or submain in Drip irrigation, as the number of outlets increases, the value of outlet factor F

(A) Does not change (B) Increases

(C) Decreases (D) Same as no. of outlets

66. The property that describes the micro structure of food and the rate and nature of deformation under stress is :

(A) Petrology (B) Microbiology

(C) Zoology (D) Rheology

67. The relationship of Equilibrium RH with the moisture content of grain at a particular temperature is expressed by a curve :

(A) Psychometric chart (B) Grain Isotherm

(C) Hysterisis curve (D) Drying curve

68. The recommended air flow rate of LSU type dryer is :

(A) 65 cum/min/tonne (B) 70 cum/min/tonne

(C) 50 cum/min/tonne (D) 12 cum/min/tonne

69. The minimum temperature required for Low acid foods with ph > 4.6 for sterilization is

(A) 98°C (B) 100°C

(C) 155°C (D) 121°C

70. The process of storing grains or seeds inside sealed compartments to avoid gas changes with the environment is :

(A) Hermetic storage (B) CAP storage

(C) Bukhari (D) Kothar

71. In which of the following sequences does the silica content of igneous rocks decrease?

(A) Granite > Diorite > Basalt > Peridotite

(B) Basalt > Peridotite > Granite > Diorite

(C) Peridotite > Granite > Basalt > Diorite

(D) Basalt > Diorite > Peridotite > Granite

72. In an anticline, the rock layers dip :

(A) Vertical
(B) Randomly
(C) Away from the axis
(D) Towards the axis

73. The freezing method in shaft sinking is primarily used for :

(A) Hard rock strata
(B) Water-bearing unconsolidated strata
(C) Coal seams
(D) Ventilation shaft lining

74. If the advance per round in a shaft sinking operation is 2.4 m and the duration of each cycle is 6 hours, then the daily average sinking rate will be :

(A) 5 m
(B) 9.6 m
(C) 7.2 m
(D) 4.8 m

75. The most commonly used method of ventilation during vertical shaft sinking is :

(A) Induced ventilation
(B) Natural ventilation
(C) Recirculation system
(D) Mechanical ventilation by forcing fan

76. The required minimum clear over-run space between the detaching-hook attachment point and the detaching bell or plate when the bucket is at the top landing shall be :

(A) 2 m
(B) 3 m
(C) 3.6 m
(D) 4.5 m

77. How often must every electrical shot-firing apparatus be tested to ensure it is in safe working order?

(A) Once every month
(B) Once every six months
(C) Once every three months
(D) Once every year

78. What is the maximum quantity of explosives that can be kept in a single case or container?

(A) 2 kg
(B) 5 kg
(C) 10 kg
(D) 20 kg

79. Before connecting shot-firing cables, what must be ensured?

(A) Shot-holes are half-filled
(B) All surplus explosives are removed
(C) All workers leave the mine
(D) The detonators are in position

80. The main purpose of a safety beam along the outer edge of a bench in opencast mine is :

(A) To increase the coal production

(B) To prevent trucks and other machineries from backing over

(C) To prevent the dilution of work (mixing of overburden to Coal)

(D) None of these

81. The bench height in opencast mine must be :

(A) Above the digging height of the loading machine

(B) Below the digging height of the loading machine

(C) Both (A) and (B)

(D) None of these

82. Which of the following is not a reinforcement measure of pit slope stability?

(A) Rock bolting system

(B) Retaining type structure

(C) Buttressing

(D) None of these

83. Which of the following is not a laboratory sizing technique?

(A) Hand Screening

(B) Automatic Screening

(C) Sedimentation

(D) None of these

84. The size of protection pillars does not depend on the one of the factor :

(A) Area to be protected

(B) Depth

(C) Grade of coal

(D) Thickness and type of strata above coal

85. Blasting Gallery (BG) method is applicable for extraction of coal seam :

(A) More than 5.5 m thick

(B) Less than 1 m thick

(C) Less than 2 m thick

(D) Less than 3 m thick

86. Which of the following is not a part of the permanent adjustment of the theodolite?

(A) Collimation adjustment

(B) Plate levels

(C) Levelling the instrument

(D) Telescope level

87. Which mode of access must be available for Direct Traversing method of correlation survey?

(A) two adits/drifts

(B) One shaft and one adit/drift

(C) two shafts

(D) None of these

88. The correct expression for determining factor of safety for the pillar design for development working in underground mine is :

(A) $\frac{\text{Pillar Stress}}{\text{Pillar Strength}}$ (B) $\frac{\text{Pillar Strength}}{\text{Pillar Stress}}$

(C) $\frac{\text{Pillar Strength}}{\text{Poisson Ratio}}$ (D) $\frac{\text{Pillar Stress}}{\text{Poisson Ratio}}$

89. Which of following rock parameter is suggested for the design of the modern support system for permanent and temporary galleries in the underground coal mine of India?

(A) Q-system (B) RQD (Rock Quality Designation)

(C) RMR (Rock Mass Rating) (D) None of these

90. The correct expression for determining the pillar stress using the tributary area method for extensive area development, more than twice the depth and for regular size pillar is : (Where : H= depth, e = extraction ratio, σ_p = pillar stress in kg/cm^2) :

(A) $\sigma_P = \frac{0.25\text{H}}{1-\text{e}}$ (B) $\sigma_P = \frac{1-\text{e}}{0.35\,H}$

(C) $\sigma_P = \frac{1-\text{e}}{0.55\,H}$ (D) $\sigma_P = \frac{1-\text{e}}{0.65\,H}$

91. In a bi-cable aerial ropeway system, what is the primary function of the “track rope"?

(A) It is the moving rope that pulls the carrier (buckets)

(B) It is a stationary, high-strength rope that acts as the “rail” or track on which the carriers run

(C) It is the return rope for the empty carriers only

(D) It is a safety rope than runs parallel to the main haulage rope

92. According to the Tirbutary Area Theory for pillar design, if a mine has square pillars of width ‘Wp’ and square openings of width 'Wo', what is the total area of overburden supported by a single pillar?

(A) Wp^2 (B) Wo^2

(C) $(W_P + W_O)^2$ (D) $(W_P + W_O/2)^2$

93. What is the primary objective of “stowing” or "filling" in underground mining?

(A) To create new roadways for transport

(B) To extinguish underground fires

(C) To dispose of waster rock from development headings only

(D) To fill the extracted void (goaf) to control strata movement, manage subsidence

94. A cyclone separator is a common air pollution control device. On what physical principle does it primarily rely on to remove particulate matter from a gas stream?

(A) Centrifugal force
(B) Filtration (sieving)
(C) Electrostatic attraction
(D) Gravitational settling

95. If the pressure (P) required to move air through a mine is given by Atkinson's Law ($P=RQ^2$), how does the Air power (Wa) relate to the airflow quantity (Q)?

(A) Air Power is proportional to Q
(B) Air Power is proportional to Q^2
(C) Air Power is proportional to Q^3
(D) Air Power is proportional to $\sqrt{Q}$

96. In mine climate monitoring, the Kata Thermometer (both wet and dry) is an instrument specifically designed to measure :

(A) The "cooling power" of the air on a human body
(B) The barometric pressure and altitude
(C) The wet bulb and dry bulb temperature
(D) The temperature in Kata degrees

97. Under the Mines Rules, 1955, the provision of a "Canteen" is mandatory for every mine where the number of persons ordinarily employed is more than :

(A) 100
(B) 150
(C) 500
(D) 250

98. Which government body in India is primarily responsible for enforcing the mining safety legislation?

(A) Ministry of Environment, Forest and Climate Change (MoEFCC)
(B) Directorate General of Mines Safety (DGMS)
(C) Central Pollution Control Board (CPCB)
(D) Indian Bureau of Mines (IBM)

99. As per the Mines Act, 1952, what is the minimum age for a person to be employed in any part of a mine?

(A) 16 years
(B) 18 years
(C) 20 years
(D) 21 years

100. As per The Metalliferous Mines Regulations (MMR), 1961, special precautions are needed when approaching old workings which may be filled with water. Workings cannot advance within _____ of such a place without prior permission and the use of advanced boreholes.

(A) 15 meters
(B) 30 meters
(C) 60 meters
(D) 120 meters

SPACE FOR ROUGH WORK

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