132/22

Question Booklet Alpha Code

A

A

Question Booklet Sl. No.

Total Number of Questions : 100 **Time : 90 Minutes**

Maximum Marks : 100

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/her 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.

A

1. Which one is a contribution by F. W. Taylor ?
   A) Fair days task
   B) Method study
   C) Therbligs
   D) Micro motion study

2. Optimistic and pessimistic times of doing an activity are 1 hour and 5 hours respectively. Variance of the activity is
   A) 2/3
   B) 4/9
   C) 4/3
   D) 16/9

3. Moving average forecasting is a _____ method of forecasting.
   A) Trend projection
   B) Judgmental method
   C) Time series
   D) Chain ratio

4. If the fixed cost is Rs. 4,000, variable cost per unit item is Rs. 16 and selling price is Rs. 21, then break even sales is
   A) Rs. 800
   B) Rs. 16,800
   C) Rs. 4,000
   D) Rs. 12,800

5. Which one is an attribute ?
   A) Height in cm
   B) Weight in Kg
   C) Both
   D) None

6. Surface hardness and fatigue life of steel alloys can be improved by
   A) Annealing
   B) Normalizing
   C) Quenching
   D) Carburizing

7. Transient creep is also known as
   A) Primary creep
   B) Secondary creep
   C) Tertiary creep
   D) None of the above

8. For a small number of very large castings, which pattern is best suitable ?
   A) Solid pattern
   B) Match plate pattern
   C) Skeleton pattern
   D) Gated pattern

9. While machining a brittle material, which of the following chips is most probable to form ?
   A) Continuous chip
   B) Discontinuous chip
   C) Built-up chip
   D) All of the above

10. Which of the following factors does not affect machinability ?
    A) Geometry of the cutting tool
    B) Feed
    C) Type of machining operation
    D) None of the above

11. An oil of specific gravity 0.9 has viscosity of 0.28 stokes at 38°C. What will be its viscosity in N-s/m^2 ?
    A) 0.2520
    B) 0.0311
    C) 0.0252
    D) 0.0206

12. If the number of jets in Pelton turbine is n, then the specific speed is
    A) Proportional to n^2 B) Proportional to n
    C) Proportional to $n^{1/2}$ D) Independent of n

13. In an open u-tube containing mercury, oil of specific gravity 0.9 is poured into one of its limbs so that the length of the column of oil is about 50 cm. Then level of mercury column in that limb is lowered approximately by how much ?
    A) 2.4 cm B) 1.6 cm C) 3.2 cm D) 0.5 cm

14. The volute casing of a centrifugal pump has which of the following functions ?
    1. Eliminating loss of head due to change in velocity after exit from impeller
    2. Directs the flow towards the delivery pipe
    3. Converts a part of the velocity head to pressure head
    4. Gives a constant velocity of flow

    Select the correct answer using the codes given below :
    A) 1, 2 and 4 B) 2 and 3 only C) 1 and 4 only D) 2 and 4 only

15. In a two dimensional incompressible steady flow, the velocity component $u = Ae^x$ is obtained. What is the other component of velocity ?
    A) $v = Ae^y$ B) $v = Ae^xy$ C) $v = - Ae^xy$ D) $v = -Ae^x$

16. A journal bearing has shaft diameter of 50 mm and a length of 50 mm. The shaft is rotating at 25 rad/s and the viscosity of the lubricant is 25 mPas. The clearance is 0.025 mm. The shearing stress offered by the lubricant is approximately
    A) 625 N/mm^2 B) 725 N/mm^2 C) 575 N/mm^2 D) 775 N/mm^2

17. A steel rod 10 mm diameter and 1 m long is heated from 30 to 110 degree Celsius. If Young's modulus of the rod material is 200 GPa and coefficient of thermal expansion is 12×10^{-6} per degree Celsius, the thermal stress developed is
    A) 192 MPa (Tensile) B) 292 MPa (Tensile)
    C) 192 MPa (Compressive) D) 292 MPa (Compressive)

18. At the point of contraflexure, the value of bending moment is
    A) Maximum B) Zero
    C) Can't be determined D) Minimum

19. The radius of gyration for a circular column is
    A) D B) D/2 C) D/4 D) None

20. The tearing resistance of a plate in single riveted butt joint is 45 kN. The shearing and the crushing resistances of the rivet are 20 kN and 35 kN respectively. If the strength of the unriveted plate is 25 kN, the efficiency of the rivet joint could be
    A) 0.7 B) 0.6 C) 0.8 D) 0.5

21. Decreasing the evaporator pressure in a vapour compression refrigeration system has the following effect :
    i. Decreases refrigeration effect
    ii. Increases refrigeration effect
    iii. Decreases C.O.P.
    iv. Increases C.O.P.
    Which of these statements is/are correct ?
    A) Only i and iii B) Only ii and iv C) Only i and iv D) Only ii and iii

22. The air standard efficiency of Otto cycle is greater than that of Diesel cycle when both cycles have the same
    A) Maximum cycle pressure and heat addition
    B) Compression ratio and heat addition
    C) Maximum cycle pressure and heat rejection
    D) All of the above

23. For a fixed suction pressure and clearance volume, as the delivery pressure of a reciprocating compressor increases, its volumetric efficiency
    A) Remains unaffected B) First increases and then decreases
    C) Increases D) Decreases

24. For a 4-cylinder diesel engine, the following results were obtained when a Morse test was conducted :
    Brake Power with all cylinders firing = 30 kW
    Brake Power with the 1^{st} cylinder cut-off = 19.1 kW
    Brake Power with the 2^{nd} cylinder cut-off = 19.5 kW
    Brake Power with the 3^{rd} cylinder cut-off = 20 kW
    Brake Power with the 4^{th} cylinder cut-off = 19.8 kW
    What is the mechanical efficiency of the engine ?
    A) 44% B) 52% C) 62% D) 72%

25. A furnace wall is made of 3 layers : an inner layer of 20 cm thickness and 0.2 W/m°C thermal conductivity, a middle layer of 15 cm thickness and 1.5 W/m°C thermal conductivity and an outer layer of thickness 30 cm and 3 W/m°C thermal conductivity. If the inner and outer surface temperatures of the wall are 1060°C and 60°C respectively and the surface area of the wall is 1.2 m^2, the rate of heat transfer through the wall is
    A) 10 W B) 100 W C) 1000 W D) 10000 W

26. The first tractor demonstration was held at
    A) Nebaraska B) Birmingham
    C) New York D) Paris

27. Thermal efficiency of diesel engine varies between
    A) 70 to 75% B) 20 to 60%
    C) 32 to 38% D) 80 to 85%

28. A tractor pulls a draft load of 1000 kg while travelling at a speed of 60 m/min. Find the horse power (hp) developed by the tractor.
    A) 13.33 hp B) 15.38 hp
    C) 18.45 hp D) 14.67 hp

29. The function of differential lock is to develop full traction on
    A) Single drive wheel B) Both drive wheels unevenly
    C) Both drive wheels equally D) Right side drive wheel

30. The alignment of centre line of knife section with the centre line of guard
    A) Alignment B) Casting
    C) Registration D) None of these

31. The rear bottom of the landside is called as
    A) Heel B) Wing
    C) Share D) Shin

32. _____ process converts vegetable oils to biodiesel.
    A) Combustion B) Transterification
    C) Evapo transporation D) None of these

33. Plant protection operation (Spraying) in which total volume of liquid applied amounts to less than 51/ha
    A) High volume B) Low volume
    C) Ultra low volume D) Foaming

34. The removal of soil from the land surface by the concentrated runoff to form small channels
    A) Gully erosion B) Sheet erosion
    C) Stream bank erosion D) Rill erosion

35. The potential maximum retention is used in this empirical equation for finding peak discharge from a watershed area
    A) Curve number method
    B) Rational formula
    C) Chezy's formula
    D) Dicken's formula

36. The imaginary line joining points of equal rainfall is called as
    A) Isobaths
    B) Isohyets
    C) Isobars
    D) Isotherms

37. Void fraction of soil is termed as
    A) Bulk density
    B) Porosity
    C) Volume
    D) Dry density

38. The time needed by water to flow from most remotest point of a watershed to the outlet
    A) Form factor
    B) Stream frequency
    C) Time of concentration
    D) Recurrence interval

39. How many classes are there in land capability classification ?
    A) 6
    B) 4
    C) 7
    D) 8

40. A structure used to measure overland flow and soil loss under controlled condition in the field
    A) Multiple slot divisor
    B) Runoff plot
    C) H flume
    D) Coshocton wheel sampler

41. Maximum suction lift of a centrifugal pump in sea level is
    A) 7.6 m
    B) 9 m
    C) 3 m
    D) None of these

42. _____ refers to the sensitivity of a remote sensor to variations in the reflectance levels.
    A) Temporal resolution
    B) Radiometric resolution
    C) Spectral resolution
    D) Spatial resolution

43. One ton of refrigeration is equivalent to
    A) 50 kJ/min
    B) 2100 kJ/min
    C) 210 kJ/min
    D) 50 kJ/h

44. A sample of food material has moisture content of 7.5% (w.b.). The moisture content on dry basis is
    A) 8.1%
    B) 8.5%
    C) 6.9%
    D) 7.1%

45. D-value is the time required to reduce the number of microorganism to
    A) 10%
    B) 90%
    C) 100%
    D) 0%

46. Which of the following equipment does not separate material on the basis of size ?
    A) Spiral separator
    B) Intended cylinder separator
    C) Screen separator
    D) Diverging belts

47. According to which law, the energy required for size reduction is proportional to change in surface area ?
    A) Kicks law
    B) Rittingers law
    C) Bonds law
    D) None of the above

48. Falling rate drying occurs if
    A) Initial moisture content is less than critical moisture content
    B) Final moisture content is greater than critical moisture content
    C) Equilibrium moisture content is greater than critical moisture content
    D) Moisture content is continuously falling during drying

49. The dimensionless number in mass transfer operations which is analogous to Nusselt number in heat transfer is known as
    A) Schmidt number
    B) Sherwood number
    C) Peclet number
    D) Lewis number

50. Freezing time is directly proportional to the _____ of the material being dried.
    A) Thickness
    B) Cube of the thickness
    C) Square of the thickness
    D) Fourth power of the thickness

51. Use of tubular or box section of the frame improves the
    A) Shear force acting on the frame
    B) Moment of inertia of the vehicle
    C) Bending moment of the vehicle
    D) Torsional strength of the frame

52. Rubber springs have good combination of shear and compression, then what is the reason for not utilizing rubber springs in most of the passenger cars.
    A) It is worst in tension since there is a tendency for the cracks to open out
    B) They are free of maintenance
    C) They have very high torsional stability
    D) Comfortability can be easily achieved

53. In a recirculating ball steering, the use of small bearings between the worm and the nut is
    A) To reduce the damping force
    B) To reduce friction and steering effort
    C) To reduce the shearing force
    D) To reduce the stability of the vehicle

54. In an engine exhaust brake system coupled with service brake, what is the reason for butter valve seizure ?
    A) Appling the brakes at low speed
    B) Lubrication would get burnt in the exhaust manifold and the carbon deposit
    C) Quality of fuel and presence of sulphur content in the fuel
    D) Influence of increased combustion chamber temperature

55. What is the approximate amount of force generated by system of levers for release of clutch in the mechanism of a clutch ?
    A) 250 N
    B) 120 N
    C) 180 N
    D) 725 N

56. Which of the following is true when a gear box is mounted in a vehicle ?
    i. Gear box is fitted between the clutch and the rear axle
    ii. To permit the engine to revolve at a relatively high speed while the wheels turn at slower speeds
    A) i is true
    B) ii is true
    C) Both i and ii are true
    D) None of them is true

57. Excessive wear pattern at the tread shoulders or the outer edges of a tyre is due to
    A) Under inflation, lack of rotation and high speed cornering
    B) Incorrect toe in
    C) Unbalanced wheel and tyre assembly
    D) All of the above

58. The lines, patterns, words except road signs which are applied or attached to the carriageway or kerbs or to objects within or adjacent to the carriageway for controlling, warning, guiding and informing the road users are called as
    A) Road marking
    B) Road user
    C) State highways
    D) Stopping

59. Engineering in bus transport management involves the following
    A) Breakdowns, Replacements, Docking, Overhauls and Stores
    B) Fare Policy, Training Public Relations, Publicity and Secretariat
    C) Costing, Budgeting, Traffic, Accounts and Stores Accounts
    D) Bus schedule, Crew schedule, Tickets and Inspection

60. Influence of parking facility or lack of parking have its major effect on which of the following ?
    i. Parking impacts land use, specially institutional and commercial activities in the zone.
    ii. It influences prevailing landscape, environment and architectural experiences over time in the area.
    iii. It influences urban development and redevelopment in business districts.
    iv. Parking, especially on-street parking, adds to traffic congestion and consequential accidents and pollution in the area.
    A) i and ii
    B) ii and iii
    C) iii and i
    D) All of the above

61. Ignition delay quality of the diesel fuels generally measured in terms of
    A) Auto ignition temperature
    B) Cetane number
    C) Viscosity
    D) Rate of evaporation

62. The specific gravity of the electrolyte in a battery can be checked with
    A) Hygro meter
    B) Volt meter
    C) Multi meter
    D) Hydro meter

63. The optimal spark timing of petrol engine is on
    A) 23°BTDC
    B) 27°BTDC
    C) 39°BTDC
    D) 35°BTDC

64. The combined current and voltage vibrating regulator consist of
    A) Cut out relay
    B) Current regulator
    C) Voltage regulator
    D) All of the above

65. The wattage (Power) of the indicator bulb is normally
    A) 20 W
    B) 21 W
    C) 22 W
    D) 23 W

66. Which of the following is not affecting the SI engine knocking or detonation ?
    A) Compression ratio
    B) Humidity of air
    C) Turbulence
    D) Calorific value of the fuel

67. In the compression ignition engine, the ignition delay is increased by
    A) Advancing the injection angle
    B) Increasing the cetane number
    C) Increasing the compression ratio
    D) Increasing the fuel temperature

68. What is the general formula and molecular arrangement for Paraffin ?
    A) C_nH_{2n+2} and Ring
    B) C_nH_{2n} and Ring
    C) C_nH_{2n+2} and Chain
    D) C_nH_{2n-2} and Ring

69. In roots blower type supercharger, the blower is runs at _____ times of the engine speed.
    A) 1.19
    B) 1.50
    C) 2.00
    D) 1.89

70. The temperature of the 70 kg rigid body is identified as 392°F. Find the temperature of the body in degree Celsius (°C).
    A) 100°C
    B) 200°C
    C) 300°C
    D) 400°C

71. Lateral deflection of vehicle body damage often results from
    A) A hit from an angle
    B) A hit from front
    C) A hit from rear
    D) All of the above

72. Drum brakes are more affected by wet and heat than disc brakes because
    A) Water is trapped inside the drum
    B) Heat is trapped outside the drum
    C) Both water and heat are trapped inside the drum
    D) Both water and heat are trapped outside the drum

73. When vehicle is moving off from rest, a torque converter
    A) Can double the applied torque
    B) Can triple the applied torque
    C) Can't double the applied torque
    D) Can't triple the applied torque

74. If the vehicle is misfiring as well, this may indicate that
    A) An ignition timing faults
    B) An injection timing faults
    C) Both injection and ignition timing faults
    D) None of the above

75. Big end bearings are lubricated
    A) By oil mist that rises from agitation of oil in the sump
    B) By splash lubrication piston
    C) By oil that is fed to them through oil ways in the crankshaft
    D) By oil that is fed to them through holes drilled in the connecting rod

76. A single phase transformer when supplied from 240 V, 50 Hz has an eddy current loss of 100 W. If supply is changed to 360 V, 50 Hz, the new eddy current loss in the transformer would be
A) 100 W B) 150 W C) 200 W D) 225 W

77. The per unit impedance of a circuit element is j0.12. If the base MVA and base kV are halved, then the new value of the per unit impedance of the circuit element will be
A) j0.03 B) j0.06 C) j0.24 D) j0.48

78. For a transistor connected in CE configuration, it is given that I_B = 100 μA, I_{CO} = 10 μA and α = 0.98. The value of collector current I_C of the transistor will be
A) 5.4 mA B) 5 mA C) 5.001 mA D) 5.5 mA

79. A single phase load draws 6A at 230 V for 5 hours. The watt meter connected in the circuit makes 2000 revolutions in this time. The watt meter constant is 500 rev/kWh. The power factor of load is
A) 0.8667 B) 0.6910 C) 0.5797 D) 0.2588

80. The octal equivalent of the HEX number DC.BA is
A) 334.564 B) 570.564 C) 334.272 D) 570.272

81. A dc shunt generator delivers 195 A at 250 V. The resistance of the shunt field and armature winding are 50 Ω and 0.05 Ω respectively. The induced emf in the generator will be
A) 250.25 V B) 259.75 V C) 260 V D) 259.5 V

82. When single conductors are replaced with bundled conductors, the effective inductance and capacitance of transmission line will respectively
A) increase and decrease
B) decrease and remain unaffected
C) decrease and increase
D) remain unaffected and increase

83. In a common emitter amplifier circuit, the un-bypassed emitter resistance provides
A) positive voltage feedback B) negative voltage feedback
C) positive current feedback D) negative current feedback

84. The Thevenin equivalent of a dc network is a voltage source of 100 V in series with a resistance of 100 kΩ. In order keep the error in voltage measurement across its terminals below 1%, the voltage measuring device should have a resistance of
A) at least 10 MΩ B) at least 100 MΩ
C) at least 1 MΩ D) 100 kΩ

85. In machine tool drive application, the speed of a separately excited dc motor is to be controlled both below and above rated speed of the motor. Which of the following methods is best suited for this purpose ?
    A) $I_f = I_{f,rated}$ and V_a variable
    B) I_f variable and V_a fixed
    C) both I_f and V_a variable with $I_f \leq I_{f,rated}$
    D) both I_f and V_a variable with $I_f \geq I_{f,rated}$

86. If the speed of a DC machine increases with increase in load torque, then it is a
    A) shunt motor
    B) series motor
    C) differentially compounded motor
    D) cumulatively compounded motor

87. The insulation of modern EHV lines is designed based on
    A) the lightning voltages
    B) the switching surges
    C) corona
    D) radio interference with communication networks

88. Two logic inputs A and B are available whereas their complements $\overline{A}$ and $\overline{B}$ are not available. What is the minimum number of two input NAND gates required to implement $A \oplus B$?
    A) 5 B) 3 C) 4 D) 2

89. A 1 mA ammeter has a resistance of 100 Ω. The value of shunt resistance required to convert it into an ammeter to measure 1 A is
    A) 100 kΩ B) 100 Ω C) 0.1001 Ω D) 0.001 Ω

90. A single phase AC voltage regulator is feeding a load of $(4 + j4)\Omega$. The control range of firing angle is
    A) $45° < \alpha < 180°$ B) $90° < \alpha < 180°$ C) $45° < \alpha < 90°$ D) $0° < \alpha < 90°$

91. If a three phase slip ring induction motor is fed from the rotor side with stator winding short circuited, then frequency of the current flowing in the stator winding will be
    A) Supply frequency
    B) Zero
    C) Frequency corresponding to rotor speed
    D) Slip frequency

92. The main criterion for selection of the size of a distribution feeder on a radial distribution system is
    A) Temperature rise of the conductor
    B) Corona loss in the conductor
    C) Capital cost
    D) Voltage drop in the conductor

93. If a differential amplifier has a CMRR of 80 dB and common mode gain 4, then its differential gain will be
A) 10,000 B) 20,000 C) 40,000 D) 80,000

94. A CRO screen has 10 divisions on the horizontal scale. If a voltage of 10 sin(314 t + 60°) is observed on the CRO with a line base setting of 5 ms / div., the no. of cycles of the voltage signal displayed on the screen will be
A) 2.5 cycles B) 5 cycles C) 7.5 cycles D) 10 cycles

95. A single phase voltage source square wave inverter feeds a purely inductive load. The wave form of the load current will be
A) Square B) Triangular C) Sinusoidal D) Trapezoidal

96. A cylindrical rotor synchronous motor is energized with its field winding shorted, then it will
A) Not start
B) Start and run as a synchronous motor
C) Start as an induction motor and then will run as a synchronous motor
D) Start and run as an induction motor

97. Two identical alternators each rated for 100 MVA, 11 kV, having sub-transient reactance of 10% are working in parallel. The short circuit level at the bus bars is
A) 2000 MVA B) 1000 MVA
C) 200 MVA D) 100 MVA

98. A counter made up of 10 flip flops is initially at '0'. What will be the count after 2050 pulses.
A) 011 101 1101 B) 000 000 0010
C) 000 001 0011 D) 100 101 0101

99. An analog voltmeter uses external multiplier settings. With a multiplier setting of 20 kΩ, it reads 440 V and with a multiplier setting of 80 kΩ, it reads 352 V. What will be the voltmeter reading if the multiplier setting is 60 kΩ ?
A) 377 V B) 361 V C) 380 V D) 393 V

100. A chopper feeding a resistive load has an input voltage V_S and duty cycle α. For this chopper, rms value of the output voltage is
A) αV_S B) V_S/α C) $\sqrt{\alpha}\, V_S$ D) $V_S/\sqrt{\alpha}$

Space for Rough Work