

065/23

Question Booklet Alpha Code

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.

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1. A cube of 1 m side has weight 11000 N in air. What will be its weight in water ($g = 10 \text{ m/s}^2$) ?
A) 900 N
B) 100 N
C) 1100 N
D) 1000 N
2. If one litre of a fluid has a mass of 6.5 kg then its specific gravity is
A) 0.65
B) 6.5
C) 65
D) 650
3. In an inclined plane submerged in water, the centre of pressure is located
A) above the centroid
B) anywhere in the plane
C) below the centroid
D) at the centroid
4. The ratio of gauge pressures between two points located respectively at depths of 0.4 m and 8 m below water level in a tank is
A) 1 : 20
B) 1 : $\sqrt{2}$
C) 1 : 8
D) 1 : 16
5. The type of flow in which the velocity at any given time does not change with respect to space is called
A) Uniform flow
B) Compressible flow
C) Steady flow
D) Rotational flow
6. A venturimeter is preferred to an orifice plate because
A) It is cheaper
B) It is easy to install
C) Energy loss is less
D) It has very high life
7. Hydraulic radius of a Notch is equal to
A) Area divided by the square of wetted perimeter
B) Area divided by the wetted perimeter
C) Wetted perimeter divided by area
D) Square root of area
8. The unit of Chezy's constant 'C' in the Chezy's formula is
A) m/s
B) m/s^2
C) m^2/s
D) $\text{m}^{1/2}/\text{s}$

9. Which of the following head loss is significant in a pipe flow ?
- A) Loss of head due to gradual contraction
 - B) Loss of head due to friction
 - C) Loss of head due to sudden enlargement
 - D) Loss of head due to sudden contraction
10. In fluid mechanics, the continuity equation is a mathematical statement embodying the principle of
- A) Conservation of momentum
 - B) Conservation of weight
 - C) Conservation of energy
 - D) Conservation of mass
11. Force exerted by a jet of water impinging on a moving flat plate is
- A) $\rho a(V-u)^2$
 - B) $\rho a(V-u)$
 - C) $0.5 \rho a(V-u)^2$
 - D) $0.5 \rho a(V-u)$
12. A series of normal flat vanes are mounted on the periphery of a wheel, the vane speed being V . For maximum efficiency the speed of the liquid jet striking the vanes should be
- A) $V/3$
 - B) $V/2$
 - C) V
 - D) $2V$
13. The speed ratio of a Pelton wheel varies from
- A) 0.6 to 0.7
 - B) 0.8 to 0.9
 - C) 0.45 to 0.5
 - D) It cannot be defined
14. Which relation is incorrect ?
- A) Pelton Turbine – Impulse Turbine
 - B) Francis Turbine – Impulse Turbine
 - C) Kaplan Turbine – Reaction Turbine
 - D) Francis Turbine – Reaction Turbine

15. The hydraulic efficiency of a turbine is the ratio of
- A) Mechanical energy in the output shaft at coupling and hydrodynamic energy available from the fluid
 - B) Mechanical energy supplied by the rotor and hydrodynamic energy available from the fluid
 - C) Useful hydrodynamic energy in the fluid at final discharge and mechanical energy supplied to the rotor
 - D) Useful hydrodynamic energy in the fluid at final discharge and mechanical energy supplied to the shaft and coupling
16. In reaction turbine, draft tube is used
- A) To transport water downstream without eddies
 - B) For safety to turbine
 - C) To convert the kinetic energy to flow energy by a gradual expansion of the flow cross-section
 - D) To increase the flow rate
17. When a centrifugal pump is started, there will be no flow of water until the pressure rise in the impeller is large enough to overcome the
- A) Manometric head
 - B) Total head
 - C) Static head
 - D) Friction head
18. Slip of reciprocating pump becomes negative when
- A) Theoretical discharge is more than actual discharge
 - B) Pump is running at low speed
 - C) Theoretical discharge is equal to actual discharge
 - D) Actual discharge is more than theoretical discharge
19. In a centrifugal pump the liquid enters the pump
- A) at the centre
 - B) at the top
 - C) at the bottom
 - D) from sides
20. Indicator diagram of a reciprocating pump is a graph between
- A) Flow vs Swept Volume
 - B) Flow vs Speed
 - C) Pressure vs Speed
 - D) Pressure in cylinder vs Stroke Length

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21. Open system is one in which
- A) Only energy transfer
 - B) Only mass transfer
 - C) Both energy and mass transfer
 - D) None of the above
22. Properties which are independent of the mass in the system are known as
- A) Extensive properties
 - B) Intensive properties
 - C) Both A) and B)
 - D) None of the above
23. A series of state changes such that the final state is identical with the initial state is known as
- A) Thermodynamic cycle
 - B) Macroscopic property
 - C) Intensive property
 - D) None of the above
24. First law of thermodynamics is a formulation of
- A) Principle of conservation of energy
 - B) Principle of conservation of mass
 - C) Both A) and B)
 - D) None of the above
25. Heat transferred to the system at constant volume
- A) Decreases internal energy of the system
 - B) Increases internal energy of the system
 - C) Does not change internal energy
 - D) None of the above
26. Specific Enthalpy is
- A) Intensive property of the system
 - B) Extensive property of the system
 - C) Not a property
 - D) None of the above
27. Work is said to be a
- A) High grade energy
 - B) Low grade energy
 - C) Not an energy
 - D) None of the above

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28. COP of Heat pump is
- A) 0
B) 1
C) COP of refrigerator + 1
D) COP of refrigerator – 1
29. Carnot cycle has
- A) Two reversible isotherms and two reversible adiabatic process
B) Two irreversible isotherms and two irreversible adiabatic process
C) Two reversible isochoric and two reversible adiabatic process
D) Two irreversible isochoric and two irreversible adiabatic process
30. Entropy of an isolated system can never
- A) increase
B) decrease
C) change
D) none of the above
31. The main content of a fuel are
- A) Oxygen and Hydrogen
B) Hydrogen and Sulphur
C) Oxygen and Sulphur
D) Carbon and Hydrogen
32. Bomb calorimeter is used to find
- A) Lower calorific values
B) Higher calorific values
C) Specific heat
D) None of the above
33. If m_g represents mass of dry steam and m_f represents mass of water in suspension, dryness fraction of steam is
- A) $\frac{m_g}{m_g + m_f}$
B) $\frac{m_f}{m_g + m_f}$
C) $\frac{m_g + m_f}{m_g}$
D) $\frac{m_g + m_f}{m_f}$
34. Super heating of steam before entering for isentropic expansion in Rankine cycle
- A) Increases work done
B) Increases net cycle efficiency
C) Both A) and B)
D) None of the above

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35. Air refrigerator works on
- A) Joule Cycle
 - B) Stirling Cycle
 - C) Otto Cycle
 - D) Bell-Coleman Cycle
36. In case of impulse steam turbine
- A) Velocity increases at nozzle and reduces at moving blades
 - B) Velocity increases at nozzle and remain constant at moving blades
 - C) Velocity increases at nozzle and moving blades
 - D) Velocity reduces at nozzle and moving blades
37. In case of reaction steam turbine degree of reaction is the ratio of
- A) heat drop at fixed blade to moving blade
 - B) heat drop at moving blade to fixed blade
 - C) heat drop at moving blade to total heat drop at moving and fixed blade
 - D) heat drop at fixed blade to total heat drop at moving and fixed blade
38. Compounding of impulse steam turbine is done to
- A) Improve efficiency
 - B) Reduce rotor speed
 - C) To reduce exit losses
 - D) All of the above
39. Gas turbines work based on
- A) Joule Cycle
 - B) Reversed Joule Cycle
 - C) Otto Cycle
 - D) Carnot Cycle
40. Inter cooler in gas turbine
- A) Improves efficiency
 - B) Reduce efficiency
 - C) Does not change efficiency
 - D) None of the above

41. The centre of gravity of a solid hemisphere of radius r lies at a distance of
A) $(3/8)r$ from the base
B) $(8/3)r$ from the base
C) $(3/4)r$ from the base
D) None of these
42. The area of a section is in mm^2 and the distance of the centre of area from a line is in mm, then the units of the moment of inertia of the section about the line is expressed in
A) mm^3
B) mm^2
C) mm^5
D) mm^4
43. The shear force and bending moment are zero at the free end of a cantilever beam, if it carries a
A) Point load at the free end
B) Point load at the middle of its length
C) Uniformly distributed load over the whole length
D) None of the above
44. A beam extending beyond the supports is called
A) Simply supported beam
B) Overhanging beam
C) Fixed beam
D) Cantilever beam
45. For a given material, the modulus of rigidity is 100 GPa and the Poisson's ratio is 0.25. The value of modulus of elasticity is
A) 150 GPa
B) 225 GPa
C) 125 GPa
D) 250 GPa
46. Within elastic limit in a loaded material, stress is
A) Inversely proportional to strain
B) Directly proportional to strain
C) Equal to strain
D) None of the above
47. When a body is subjected to three mutually perpendicular stresses of equal intensity, the ratio of direct stress to the corresponding volumetric strain is known as
A) Poisson's ratio
B) Modulus of elasticity
C) Modulus of rigidity
D) Bulk modulus
48. A steel bar is heated from 15°C to 40°C and it is free to expand. The bar will induce
A) Shear stress
B) Tensile stress
C) No stress
D) Compressive stress
49. When a solid shaft is subjected to torsion, the shear stress induced in the shaft at its centre is
A) Zero
B) Minimum
C) Maximum
D) Average

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50. A column of length l is hinged at its both ends. Its equivalent length will be equal to
A) $2l$ B) l C) $0.5l$ D) $0.707l$
51. The most abundant metal in the earth's crust is
A) Aluminium B) Iron C) Calcium D) Sodium
52. Which of the following is the primary element used for making stainless steel alloy ?
A) Vanadium B) Indium C) Chromium D) Zirconium
53. The heat treatment process used for softening hardened steel is
A) Carburising B) Normalising C) Annealing D) Tempering
54. The lower critical temperature for all steel is
A) 613°C B) 723°C C) 813°C D) 923°C
55. Heat treatment of metals is necessary
A) To produce certain desired properties
B) To make good appearance on the component
C) To increase strength of the metal
D) To make the metal rust-proof
56. The process of heating steel to about 40°C above the upper critical temperature and cooling it in still air to room temperature is known as
A) Hardening B) Annealing C) Normalizing D) Tempering
57. Which of the following has a fine gold colour and is used for imitation jewellery ?
A) Silicon bronze B) Aluminium bronze
C) Gun metal D) Babbit metal
58. Alloy of copper and zinc is known as
A) Brass B) Nickle C) Bronze D) Duralumin
59. The plastics are
A) Semi conductors
B) Conductors
C) Conducts at above room temperature only
D) Insulators
60. Which of the following carbides are used for cutting tools ?
A) Silicon carbide B) Tungsten carbide
C) Vanadium carbide D) Chromium carbide

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71. In first angle projection, if the both projections of a point lie in reference line (xy-line) then
- A) Point will be above HP and in VP
 - B) Point will be both in HP and in VP
 - C) Point will be in HP and in front of VP
 - D) Point will be in VP and below HP
72. If a line is parallel to any one of the reference planes and inclined to the other then
- A) Its projection on that plane to which it is parallel will show the true length
 - B) Its projection on that plane to which it is parallel will show the true inclination
 - C) Both (A) and (B)
 - D) None of these
73. Which is/are not the central conic/s ?
- A) Ellipse
 - B) Parabola
 - C) Hyperbola
 - D) All of these
74. In the isometric projection of a cube how many non isometric lines have true lengths of the sides of the cube ?
- A) 2
 - B) 3
 - C) 4
 - D) 5
75. In the cavalier oblique projection of a cube the angle between the plane of projection and the line of projection is
- A) 30°
 - B) 45°
 - C) $63^\circ 26'$
 - D) $53^\circ 4'$
76. A screw which has threads at both ends is called
- A) Cap screw
 - B) Machine screw
 - C) Stud
 - D) Tap bolt
77. Strap end of a connecting rod is usually connected by
- A) Cotter joint
 - B) Flange coupling
 - C) Knuckle joint
 - D) Screwed joint
78. Which type of rivet heads are used for ship building ?
- A) Snap head
 - B) Counter sunk head
 - C) Ellipsoid head
 - D) Mushroom head

79. When the power transmitted in a belt drive is maximum, then
 A) (1/2) of the maximum tension is absorbed as centrifugal tension
 B) (1/3) of the maximum tension is absorbed as centrifugal tension
 C) (1/4) of the maximum tension is absorbed as centrifugal tension
 D) None of these
80. Herringbone gears are
 A) Spiral gears
 B) Single helical gears
 C) Double helical gears
 D) Bevel gears
81. In an IC engine the material/s for the inlet valve is/are
 A) Plain Nickel steel
 B) Nickel-Chrome steel
 C) Chrome Molybdenum steel
 D) (A), (B) and (C) are correct
82. In a fuel injector which type of nozzle/s is/are used for pre-combustion and for air cell engines ?
 A) Single hole
 B) Multi hole
 C) Pintle type
 D) Both (A) and (B)
83. In four cylinder in line engine the best firing order/s is/are
 A) Either 1-2-4-3 or 1-3-4-2
 B) Either 1-3-4-2 or 1-4-3-2
 C) Either 1-2-4-3 or 1-4-3-2
 D) Both (A) and (B)
84. The difference of the work done in expelling the exhaust gases and the work done by the fresh charge during suction stroke in an IC engine is called
 A) Exhaust blow down loss
 B) Pumping loss
 C) Rubbing friction loss
 D) None of these
85. Factors which favour the elimination of knock in the C I engine are
 A) Short ignition delay period and low self ignition temperature of the fuel
 B) Long ignition delay period and low self ignition temperature of the fuel
 C) Long ignition delay period and high self ignition temperature of the fuel
 D) Short ignition delay period and high self ignition temperature of the fuel
86. Externally fired boiler is
 A) Lancashire boiler
 B) Cochran boiler
 C) Cornish boiler
 D) Babcock and Wilcox boiler

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87. Example for once through boiler is
- A) Benson boiler
 - B) Lamont boiler
 - C) Babcock and Wilcox boiler
 - D) Locomotive boiler
88. Function of junction valve in a boiler is
- A) Remove sludge or sediments collected at the bottom most point in the water space in the boiler
 - B) Shut off steam or regulate the flow of steam to requirements
 - C) Prevent the steam pressure in the boiler exceeding the desired rated pressure
 - D) None of these
89. Which boiler accessory is used for feed water heating by utilizing the heat of waste furnace gases ?
- A) Super heater
 - B) Economizer
 - C) Air preheater
 - D) Feed pump
90. High steam and low water safety valve is suitable for
- A) Lancashire boiler and Cornish boiler
 - B) Lancashire boiler and Locomotive boiler
 - C) Locomotive boiler and Marine boiler
 - D) None of these
91. Thermal conductivity for a given material
- A) Vary with temperature only
 - B) Does not change with temperature
 - C) Vary with pressure and temperature
 - D) Vary with structure, humidity, pressure and temperature
92. Convection heat transfer involves
- A) Conduction and mixing motion
 - B) Mixing motion with density difference of the fluid only
 - C) Mixing motion with external means such as pump or blower only
 - D) Both (B) and (C)

93. When two bodies taking part in heat transfer, at zero thermal potential
- A) Radiation and conduction cease
 - B) Radiation and conduction continue
 - C) Radiation continues
 - D) Conduction continues
94. Thermal radiation involves
- A) Ultra violet and Gamma rays
 - B) Visible light and Infrared rays
 - C) Infrared rays and Ultrasonic rays
 - D) Ultra violet and X rays
95. For a perfect black body
- A) Absorptivity=0, Reflectivity=0, Transmissivity=1
 - B) Absorptivity=1, Reflectivity=0, Transmissivity=0
 - C) Absorptivity=0, Reflectivity=1, Transmissivity=0
 - D) None of these
96. Energy performance ratio of a heat pump is
- A) Less than 1
 - B) Greater than 1
 - C) Equal to 1
 - D) Between 0 and 1
97. 1 ton of refrigeration is equal to
- A) 3.5 W
 - B) 3.5 kW
 - C) 211 kJ/sec
 - D) 50 cal/min
98. Ammonia refrigerants are commonly used with
- A) Iron and Steel
 - B) Copper and Brass
 - C) Iron and Copper
 - D) Steel and Brass
99. In a psychrometric chart constant specific volume lines are
- A) Curved lines
 - B) Horizontal straight lines
 - C) Vertical straight lines
 - D) Inclined straight lines
100. Weight of water vapour present per kg of dry air is called
- A) Relative humidity
 - B) Humidity ratio
 - C) Degree of saturation
 - D) Absolute humidity
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Space for Rough Work