

093/2017

Question Booklet
Alpha Code

A

Question Booklet
Serial Number

101897

Total No. of Questions: 100

Maximum : 100 Marks

Time : 75 Minutes

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.

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Maximum: 100 Marks

Time : 1 hour and 15 minutes

1. Who became the first Viceroy of India after the revolt of 1857 ?
(A) Lord Minto (B) Lord Canning
(C) Lord Litton (D) Lord Wellesley
2. The Second session of the Indian National Congress was held at _____ in 1886.
(A) Calcutta (B) Bombay
(C) Delhi (D) Madras
3. National song Vande Matharam was composed by
(A) Rabindra Nath Tagore (B) Mahatma Gandhi
(C) Bankim Chandra Chatterjee (D) Devendra Nath Tagore
4. The study of inscriptions is known as
(A) Numismatics (B) Palaeography
(C) Archaeology (D) Epigraphy
5. Who was known as 'Grand old man of India' ?
(A) Dadabhai Naoroji (B) Bal Gangadhar Tilak
(C) Jawaharlal Nehru (D) Subhash Chandra Bose
6. The most densely populated desert in the world is
(A) Gobi desert (B) Arabian desert
(C) Sahara desert (D) Thar desert
7. Sabarigiri Hydro-electric project is in which river ?
(A) Kaveri (B) Pampa
(C) Periyar (D) Bharathapuzha
8. Devadasi system in Travancore was abolished by
(A) Shri Moolam Thirunal (B) Marthanda Varma
(C) Setu Lakshmi Bai (D) Shri Chithira Thirunal
9. The first post office of Kerala was founded in 1857 in _____ district.
(A) Alappuzha (B) Pathanamthitta
(C) Kozhikkodu (D) Thiruvananthapuram
10. Salal Project is built on which river ?
(A) Ganga (B) Hoogly
(C) Chenab (D) Yamuna

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11. Who led Kallumala Agitation in 1915 ?
(A) Chattampi Swami (B) Kumara Guru
(C) Dr. Palpu (D) Ayyankali
12. Vakkom Moulavi was the founder of which News paper ?
(A) Rajya Samacharam (B) Swadeshabhimani
(C) Kesari (D) Deshabhimani
13. In which year Blessed Kuriakose Elias Chavara died ?
(A) 1861 (B) 1871
(C) 1881 (D) 1891
14. Who was the founder of Ananda Mahasabha ?
(A) Shri Narayana Guru (B) Pandit Karuppan
(C) Brahmananda Swami Sivayogi (D) Kumaranasan
15. Who conducted "Panthi Bhojanam" for the first time in India ?
(A) Thycadu Ayya (B) Ayya Vaikundar
(C) Shri Narayana Guru (D) Vagbhatananda
16. Emmanuelle Riva who passed away was the famous personality of which field ?
(A) Scientist (B) Writer
(C) Sports (D) Actress
17. The book "The Man Who Could Never Say No" has been authored by whom ?
(A) S. Muthiah (B) Milan Vaishnav
(C) Vikram Seth (D) Nitin Bose
18. Ranji Trophy is associated with which of the following game ?
(A) Football (B) Hockey
(C) Cricket (D) Basketball
19. The Buxa Tiger Reserve is located in _____
(A) Karnataka (B) Gujarat
(C) Orissa (D) West Bengal
20. World population day is observed on
(A) June 11 (B) July 11
(C) June 5 (D) July 5

21. For the same maximum pressure and heat input thermal efficiency of which cycle is more for ?
- (A) Diesel Cycle (B) Otto Cycle
(C) Dual Cycle (D) None
22. If the equivalence ratio of an air fuel mixture is greater than unity, the mixture is said to be
- (A) lean (B) rich
(C) stoichiometric (D) None
23. The early opening of exhaust valve releases the pressure of the gas before the piston reaches the bottom dead centre is known as
- (A) Pumping Loss (B) Scavenging
(C) Exhaust Blow Down (D) Leakage Losses
24. When the ignition is switched off and the throttle valve is closed, the condition in which the engine continues to fire is called
- (A) run on (B) run away
(C) uncontrolled combustion (D) pre-ignition
25. Exhaust re-circulation is used in modern automobile engines to reduce the
- (A) carbon monoxide (B) carbon dioxide
(C) oxides of nitrogen (D) sulphur dioxide
26. Octane number of gasoline is obtained by comparing the performance the engine when running on a mixture of the following hydrocarbon :
- (A) ethane and methane (B) normal heptane and iso octane
(C) iso-heptane and octane (D) iso octane and TEL
27. An electrically heated plate dissipates heat by convection at rate of 8000 W/m^2 into ambient air at 25°C . If the temperature of the hot plate is at 125°C , the heat transfer coefficient between plate and air in $\text{W/m}^2\text{ }^\circ\text{C}$ is
- (A) 90 (B) 70
(C) 80 (D) 60

28. During which component of vapour compression refrigeration system, the enthalpy remains constant ?
- (A) Compressor (B) Condenser
(C) Evaporator (D) Throttle valve
29. During dehumidification process of removing moisture the dry bulb temperature
- (A) decreases (B) increases
(C) remains constant (D) unpredictable
30. In winter air conditioning the air is
- (A) cooled and humidified (B) heated and humidified
(C) cooled and dehumidified (D) heated and dehumidified
31. The three dimensional steady state heat conduction equation with internal heat generation is known as
- (A) Poisson equation (B) Laplace equation
(C) Fourier equation (D) Momentum equation
32. In a free convection the product of Grashoff and Prandtl numbers appears often and is called
- (A) Nusselt number (B) Reynolds number
(C) Kirchoff number (D) Rayleigh number
33. Heat transfer from the surface to the fluid within the boundary layer is maximum in the
- (A) laminar region (B) transition region
(C) turbulent region (D) All of the above
34. Fouling factor in a heat exchanger
- (A) increases the resistance of heat transfer
(B) decreases the resistance of heat transfer
(C) keep the resistance for heat transfer constant
(D) None of the above
35. The total emissive power (W/m^2) of a black body at $100^\circ K$ is
- (A) 5669 (B) 56.69
(C) 566.9 (D) 5.669

36. The work done on a reversed heat engine is 80 kJ and the heat transfer to the engine from the low temperature reservoir is 200 kJ. The C.O.P as a heat pump is
 (A) 2 (B) 2.5
 (C) 3.5 (D) 4
37. An isentropic process is always
 (A) reversible and adiabatic (B) reversible and isothermal
 (C) frictionless and irreversible (D) irreversible and adiabatic
38. In the polytropic process equation $p v^n = \text{constant}$, if n is infinitely large, the process is termed as
 (A) constant volume (B) constant pressure
 (C) constant temperature (D) adiabatic
39. Helmholtz function is expressed as
 (A) $(u - Ts)$ (B) $(h - Ts)$
 (C) $(-sdT + vdp)$ (D) $(u + pv)$
40. The efficiency of an ideal Carnot engine depends on
 (A) working substance
 (B) on the temperature of the source only
 (C) on temperature of the sink only
 (D) on the temperatures of both the sink and source only
41. If the thermal efficiency of a Carnot heat engine is 40 percent, then coefficient of performance of a refrigerator working within the same temperature limits would be
 (A) 1.5 (B) 2.5
 (C) 3.5 (D) 4.5
42. Under what condition the change in the enthalpy of a system equals heat supplied?
 (A) Constant volume (B) Constant pressure
 (C) Constant temperature (D) Standard temperature and pressure condition
43. A tank of 1 m deep is in free fall under gravity with negligible drag. The pressure at the bottom of the tank if atmospheric pressure is 101 kPa
 (A) 0 (B) 101 kPa
 (C) 1.01 kPa (D) 10.1 kPa

44. In a reaction turbine water entering the runner possess
- (A) pressure energy only
 - (B) kinetic energy only
 - (C) pressure energy as well as kinetic energy
 - (D) None of the above
45. Fluid flow is called subsonic if Mach Number is
- (A) more than one
 - (B) less than one
 - (C) equal to one
 - (D) none of the above
46. A fast centrifugal pump impeller will have
- (A) backward facing blades
 - (B) forward facing blades
 - (C) radial blades
 - (D) propeller type blades
47. Saving of work done and power by fitting an air vessel to double acting pump is of the order of
- (A) 84.8%
 - (B) 68.8%
 - (C) 49.2%
 - (D) 39.2%
48. For laminar flow through a circular pipe the shear stress
- (A) remains constant over the cross-section
 - (B) varies parabolically with radial distance
 - (C) must be zero at all points
 - (D) varies linearly with the radial distance
49. Which one of the following pump is not a positive displacement pump ?
- (A) Reciprocating pump
 - (B) Centrifugal pump
 - (C) Vane pump
 - (D) Lobe pump
50. Negative slip occurs in reciprocating pumps when delivery pipe is
- (A) long and suction pipe is short and pump is running at low speed
 - (B) long and suction pipe is short and pump is running at high speed
 - (C) short and suction pipe is long and pump is running at low speed
 - (D) short and suction pipe is long and pump is running at high speed

51. A compound piping system consists of 1800 m of 0.50 m diameter, 1200 m of 0.40 m diameter and 600 m of 0.30 m diameter cast iron pipe connected in series. The equivalent length of 0.40 m diameter of pipe is
- (A) 3.14 km (B) 4.138 km
(C) 4.183 km (D) 4.318 km
52. Indicator diagram of a reciprocating pump is a graph between
- (A) flow vs swept volume (B) pressure in cylinder vs swept volume
(C) flow vs speed (D) pressure vs speed
53. A pelton turbine is considered suitable for which of the following head ?
- (A) 10 to 12 m (B) 20 to 30 m
(C) 35 to 50 m (D) 100 to 250 m
54. A Francis turbine running at 200 rpm develops a power of 5000 kW under head of 25 m. Determine the speed under a head of 100 m.
- (A) 300 rpm (B) 320 rpm
(C) 360 rpm (D) 400 rpm
55. Mechanical properties of the metal improves in hot working due to
- (A) recovery of grains (B) recrystallization
(C) grain growth (D) refinement of grain size
56. In arc welding the temperature of heat of arc is in the range
- (A) 1000 to 2000 (B) 2000 to 3000
(C) 4000 to 6000 (D) 6000 to 7000
57. In TIG arc welding the welding zone is shielded by an atmosphere of
- (A) helium gas (B) acetylene
(C) hydrogen (D) oxygen
58. Ratio of oxygen to acetylene for complete combustion is
- (A) 1 : 1 (B) 1.5 : 1
(C) 2 : 1 (D) 2.5 : 1

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59. In gas welding using oxygen and acetylene cylinder pressure of gas is more in
(A) acetylene cylinder (B) oxygen cylinder
(C) equal in both cylinders (D) none of the above
60. In press operation the size of the blanked part is dependent on the size of
(A) die (B) punch
(C) average of punch and die (D) die and clearance
61. A tooth-paste tube can be produced by
(A) solid forward extrusion (B) solid backward extrusion
(C) hollow backward extrusion (D) hollow forward extrusion
62. Which of the following is not a fusion welding process ?
(A) Gas welding (B) Arc welding
(C) Resistance welding (D) Brazing
63. A forging method for reducing the diameter of a bar and in the process making longer is termed as
(A) Fullering (B) Upsetting
(C) Punching (D) Extruding
64. Ring rolling is used
(A) for producing seamless tube (B) to increase the thickness of a ring
(C) to decrease the thickness of a ring (D) for producing large cylinder
65. Tempering of hardened steel is done to increase its
(A) grain size (B) surface condition
(C) carbon content (D) ductility
66. Dislocations in crystal structure are
(A) point imperfection (B) line imperfection
(C) planar imperfection (D) surface imperfection
67. In steels as the percentage of carbon increases, which of the following decreases ?
(A) Ultimate strength (B) Hardness
(C) Ductility (D) Malleability

68. The 18-4-1 high speed steel contains chromium to the tune of
(A) 0% (B) 18%
(C) 1% (D) 4%
69. Annealing is used
(A) to make steel soft (B) to make steel hard
(C) to add carbon to steel (D) none
70. Crystal structure of graphite is
(A) BCC structure (B) FCC structure
(C) HCP structure (D) None
71. Which allotropic form of iron does not have body centered cubic lattice ?
(A) Alpha iron (B) Beta iron
(C) Gamma iron (D) Delta iron
72. The behaviour of visco elastic materials is
(A) time dependant
(B) temperature dependant
(C) sensitive to magnetic fields intensity
(D) do not depend on any of the factors above
73. In the iron carbon diagram the abscissa represents
(A) time (B) temperature
(C) grain size (D) % of carbon
74. The structure of eutectoid steel is
(A) purely cementite (B) cementite and pearlite
(C) purely pearlite (D) pearlite and ferrite
75. Gun metal is an alloy of
(A) copper, tin and zinc (B) copper, tin and lead
(C) copper, nickel and chromium (D) copper, nickel and manganese

76. The carburising heat treatment process is used for
- (A) softening the metal
 - (B) hardening the outer surface of steel component while the core remain smooth
 - (C) refining the grain structure
 - (D) relieving the internal stresses
77. Guide ways of lathe beds are hardened by
- (A) carburising
 - (B) cyaniding
 - (C) nitriding
 - (D) flame hardening
78. The tooth profile most commonly used in gear drives for power transmission is
- (A) a cycloid
 - (B) an involute
 - (C) an ellipse
 - (D) a parabola
79. Quick return mechanism is an inversion of
- (A) four bar chain
 - (B) single slider crank chain
 - (C) double slider crank chain
 - (D) crossed slider crank chain
80. The direction of linear velocity of any point on a link with respect to another point on the same link is
- (A) parallel to the link joining the point
 - (B) perpendicular to the link joining the points
 - (C) at 45° to the link joining the point
 - (D) none of these
81. The curve traced by the end of a thread as it is unwound from a stationary cylinder is known as
- (A) circle
 - (B) cycloid
 - (C) epicycloid
 - (D) involute
82. The power transmitted by a belt is maximum when the maximum tension in the belt (T) is equal to
- (A) T_c
 - (B) $2T_c$
 - (C) $3T_c$
 - (D) $4T_c$
- Where T_c = Centrifugal Tension
83. The velocity ratio of two pulleys connected by an open belt or crossed belt is
- (A) directly proportional to the diameters
 - (B) inversely proportional to the diameters
 - (C) directly proportional to the square of the diameters
 - (D) inversely proportional to the square of the diameters

84. The type of gears used to connect two non-parallel non-intersecting shaft are
(A) spur gears (B) helical gears
(C) bevel gears (D) spiral gears
85. Motors with low starting torque, the type of clutch to be used is
(A) multiple plate clutch (B) cone clutch
(C) centrifugal clutch (D) single plate clutch with both sides effective
86. The power transmitted by belt drive is designed on the basis of
(A) angle of lap on the smaller pulley
(B) angle of lap on the larger pulley
(C) average angle of lap of two pulleys
(D) angle of lap of smaller pulley or larger pulleys
87. Watt mechanism is a
(A) four bar chain (B) six bar chain
(C) eight bar chain (D) none of the above
88. Ackerman steering gear consists of
(A) sliding pairs (B) turning pairs
(C) higher pairs (D) none
89. The essential condition for meshing of two gears is that they must have
(A) identical number of teeth (B) same addenda
(C) equal clearances (D) same module
90. The bolts of a flange coupling are designed in
(A) shear (B) tension
(C) compression* (D) torsion
91. The design stress for a component subjected to a completely reversible load is found by applying the factor of safety to
(A) yield strength (B) endurance strength
(C) ultimate strength (D) none of the above
92. Rankine theory of failure is applicable for which of the following type of materials ?
(A) brittle (B) ductile
(C) elastic (D) plastic

93. Which of the following bearing suitable for fluctuating demands ?
 (A) Needle ball bearing (B) Ball bearing
 (C) Tapered bearing (D) Cylindrical bearing
94. According to Indian standard specifications the total number of designated grades of fundamental tolerances are
 (A) 16 (B) 18
 (C) 21 (D) 25
95. For applications involving transmission in one direction only the type of thread best suited is
 (A) square thread (B) buttress thread
 (C) acme thread (D) whitworth thread
96. A spring having stiffness s has been cut into n equal parts, each portion of the cut spring will have a stiffness equal to
 (A) s (B) s/n
 (C) sn (D) $s/2n$
97. In a thick cylinder pressurized from inside, the hoop stress is maximum
 (A) at the centre of the wall thickness (B) the outer radius
 (C) the inner radius (D) both at the inner and outer radius
98. For a thin cylinder subjected to internal pressure the ratio of circumferential and longitudinal stresses conform to the ratio
 (A) 2 : 1 (B) 3 : 2
 (C) 1 : 1 (D) 1 : 2
99. A solid shaft is to transmit 20 kW at 200 rpm. The ultimate shear stress for the steel may be taken as 360 MPa and factor of safety as 8. The diameter of the solid shaft is
 (A) 45 mm (B) 46 mm
 (C) 48 mm (D) 50 mm
100. The difference between tensions on the tight and slack sides of a belt drive is 3000 N. If the belt speed is 15 m/s the transmitted power in kW is
 (A) 22.5 (B) 90
 (C) 100 (D) 45