

DO NOT OPEN THE SEAL OF THE BOOKLET UNTIL YOU ARE TOLD TO DO SO

TTH/2016

Test Booklet Code

A

Read the following instructions carefully before you begin to answer the questions.

Time: 100 min	No of Questions : 100	Max Mark : 400
Name of Candidate		
Register No.		
Signature of Candidate		

INSTRUCTIONS TO CANDIDATES

1. Immediately fill in the particulars on this page of the test booklet with blue / black ball point pen. Use of pencil is strictly prohibited.
2. This question booklet contains 100 questions. for each question, four answers are suggested and given against (a), (b), (c) and (d) of which, only one will be the **Most Appropriate Answer**. Mark the bubble containing the letter corresponding to the "Most Appropriate Answer" in the OMR Answer sheet, by using either **Blue or Black ball-point pen only**.
3. Candidates will be awarded 4 marks for each correct response. **No Negative Marking**. More than one answer marked against a question will be deemed as incorrect answer.
4. Rough work is to be done on the space provided for this purpose in the Test Booklet only. This space is given at the bottom of each page and in one page at the end of the booklet.
5. On completion of the test, the candidate must hand over the answer sheet to the invigilator on duty in the room. However, the candidates are allowed to take away this test Booklet with them.
6. Do not fold or make any stray mark on the Answer sheet.

IMMEDIATELY AFTER OPENING THIS QUESTION BOOKLET, THE CANDIDATE SHOULD VERIFY WHETHER THE QUESTION BOOKLET ISSUED CONTAINS ALL THE 100 QUESTIONS IN SERIAL ORDER. IF NOT, REQUEST FOR REPLACEMENT.

Warning: Any malpractice or any attempt to commit any kind of malpractice in the examination will DISQUALIFY THE CANDIDATE.



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1. The number of significant figures in 0.002305 is
 - (a) 6
 - (b) 4
 - (c) 7
 - (d) 2
2. A body travelling with uniform acceleration crosses two points A and B with velocities 20 m/s and 30 m/s respectively. The speed of the body at the mid-point of A and B is nearest to
 - (a) 25.5 m/s
 - (b) 25 m/s
 - (c) 24 m/s
 - (d) $10\sqrt{6}$ m/s
3. An aircraft is flying at height of 3400m above the ground. If the angle subtended at a ground observation point by the aircraft positions 10s apart is 30° . Then the speed of the aircraft is
 - (a) 19.63 m/s
 - (b) 1963 m/s
 - (c) 108 m/s
 - (d) 196.3 m/s
4. A spacecraft of mass 100Kg breaks into two when its velocity is 10^4 m/s. After the break, a mass of 10 Kg of the spacecraft is left stationary. The velocity of the remaining part is
 - (a) 10^3 m/s
 - (b) 11.11×10^3 m/s
 - (c) 11.11×10^2 m/s
 - (d) 10^4 m/s
5. A force $(4\hat{i} + \hat{j} - 2\hat{k})$ N acting on a body maintains its velocity at $(2\hat{i} + 2\hat{j} + 3\hat{k})$ m/s. The power exerted is
 - (a) 4W
 - (b) 5W
 - (c) 2W
 - (d) 8W
6. A flywheel of moment of inertia 3×10^2 Kg m^2 is rotating with uniform angular speed of 4.6 rad/s. If a torque of 6.9×10^2 Nm retards the wheel, then the time in which the wheel comes to rest is.
 - (a) 1.5s
 - (b) 2s
 - (c) 0.5s
 - (d) 1s
7. At what depth below the surface of earth, the value of 'g' is the same as that at a height of 5 Km?
 - (a) 1.25 Km
 - (b) 2.5 Km
 - (c) 10 Km
 - (d) 5Km
8. The Young's modulus of the material of a wire is 2×10^{10} N/ m^2 . If the elongation strain is 1 %, then the energy stored in the wire per unit volume in J/ m^3 is
 - (a) 10^6
 - (b) 10^8
 - (c) 2×10^6
 - (d) 2×10^8
9. Bernoulli's principle is not involved in the working/explanation of
 - (a) Movement of spinning ball
 - (b) Carburetor of automobile
 - (c) Blades of a Kitchen mixer
 - (d) Dynamic lift of Aeroplane
10. The thermodynamic process in which no work is done on or by the gas is
 - (a) Isothermal process
 - (b) Adiabatic process
 - (c) Isochoric process
 - (d) Isobaric process
11. The average total energy in one time period of a particle of mass 'm' execute SHM of amplitudes a and angular velocity w is
 - (a) $\frac{1}{2}mw^2a^2$
 - (b) $\frac{1}{4}mw^2a^2$
 - (c) 0
 - (d) mw^2a^2
12. The physical quantity that remains unchanged when a sound wave goes from one medium to another medium is
 - (a) Amplitude
 - (b) Speed
 - (c) Wavelength
 - (d) Frequency

13. A block of mass 10 Kg is moving horizontally with a speed of 1.5 m/s on a smooth plane. If a constant vertical force 10N acts on it, the displacement of the block from the point of application of the force at the end of 4s is
- (a) 5m (b) 20m
(c) 12m (d) 10m
14. A heater of 220V heats a volume of water in 5 minutes. The same heater when connected to 110V heats the same volume of water in minutes
- (a) 5 (b) 20
(c) 10 (d) 2.5
15. The self inductance of a long solenoid cannot be increased by
- (a) Increasing its area of cross section
(b) Increasing its length
(c) Increasing number of turns
(d) Increasing the current through it
16. A transformer is used to light a 100W and 110V lamp using a 220V main supply. If the supply current is 0.5A, then the efficiency of the transformer is
- (a) 100% (b) 99%
(c) 90.1% (d) 85%
17. The angle of incidence for an equilateral prism of refractive index $\sqrt{3}$ so that the ray is parallel to the base inside the prism is
- (a) 30° (b) 20°
(c) 60° (d) 45°
18. The principle of superposition is basic to the phenomenon of
- (a) Total internal reflection
(b) Interference
(c) reflection
(d) refraction
19. The work function of silver and sodium are 4.6 and 2.3 eV respectively. The ratio of the slope of the stopping potential versus frequency plot for silver to that of sodium is,
- (a) $\frac{1}{4}$ (b) 2
(c) 4 (d) zero
20. The waves that are bent down by the Ionosphere are
- (a) Ground waves
(b) Surface waves
(c) Space waves
(d) Sky waves
21. A gaseous hydrocarbon gives upon combustion 0.72g of water and 3.08 g of CO_2 . The empirical formula of the hydrocarbon is
- (a) C_2H_4 (b) C_3H_4
(c) C_6H_5 (d) C_7H_8
22. Number of atoms in the following samples of substances is the largest in
- (a) 4.0g of hydrogen
(b) 71.0g of Chlorine
(c) 127.0g of Iodine
(d) 48.0g of Magnesium
23. The de Broglie wavelength of a car of mass 1000Kg and velocity 36Km/hr is
- (a) 6.626×10^{-34}
(b) 6.626×10^{-38}
(c) 6.26×10^{-31}
(d) 6.626×10^{-30}

24. The correct sequence which shows decreasing order of the ionic radii of the elements is
- (a) $\text{Al}^{3+} > \text{Mg}^{2+} > \text{Na}^+ > \text{F}^- > \text{O}^{2-}$
 (b) $\text{Na}^+ > \text{Mg}^{2+} > \text{Al}^{3+} > \text{O}^{2-} > \text{F}^-$
 (c) $\text{Na}^+ > \text{F}^- > \text{Mg}^{2+} > \text{O}^{2-} > \text{Al}^{3+}$
 (d) $\text{O}^{2-} > \text{F}^- > \text{Na}^+ > \text{Mg}^{2+} > \text{Al}^{3+}$
25. The incorrectly matched pair, among the following is
- | Molecule | Shape |
|--------------------|----------------------|
| (a) BrF_5 | Trigonal bipyramidal |
| (b) SF_4 | See saw |
| (c) ClF_3 | T-shape |
| (d) NH_4 | Tetrahedral |
26. 56g of Nitrogen and 96g of Oxygen are mixed isothermally and at a total pressure of 10 atm. The partial pressures of oxygen and nitrogen (in atm) are respectively
- (a) 4, 6 (b) 6, 4
 (c) 2, 8 (d) 8, 2
27. Calculate the standard enthalpy change (in KJmol^{-1}) for the reaction
- $\text{H}_2(g) + \text{O}_2(g) \rightarrow \text{H}_2\text{O}_2(g)$, given that the bond enthalpy of $\text{H}-\text{H}$, $\text{O}=\text{O}$, $\text{O}-\text{H}$ and $\text{O}-\text{O}$ (in KJmol^{-1}) are respectively 438, 498, 464 and 138.
- (a) -130 (b) -65
 (c) +130 (d) -334
28. NaOH is a strong base. What will be pH of $5.0 \times 10^{-2} \text{M}$ NaOH solution? ($\log 2 = 0.3$, $\log 5 = 0.7$)
- (a) 14.00 (b) 13.70
 (c) 13.00 (d) 12.70
29. Given:
- $\text{XNa}_2\text{HAsO}_3 + \text{YNaBrO}_3 + \text{ZHCl} \rightarrow 6\text{NaCl} + 3\text{H}_3\text{AsO}_4 + \text{NaBr}$
- The values of X, Y and Z in the above redox reaction are respectively:
- (a) 2, 1, 2 (b) 2, 1, 3
 (c) 3, 1, 6 (d) 3, 1, 4
30. 'Hydride gap' is referred to which region of the periodic table?
- (a) Groups 3, 4, and 5
 (b) Groups 5, 6 and 7
 (c) Groups 4, 5 and 6
 (d) Groups 7, 8 and 9
31. The IUPAC name of the following compound is
- $(\text{CH}_3)_2\text{CH}-\text{CH}_2\text{CH}=\text{CH}-\text{CH}=\text{CH}-\text{CHCH}_3-\text{C}_2\text{H}_5$
- (a) 1, 1, 7, 7-tetramethyl-2, 5-octadiene
 (b) 2, 8-dimethyl-3, 6-decadiene
 (c) 1, 5 di-iso-propyl-1, 4-hexadiene
 (d) 2, 8-dimethyl-4, 6-decadiene
32. The Wurtz-fittig reaction involves condensation of
- (a) Two molecules of aryl halides
 (b) One molecule of each aryl-halide and Alkyl-halide
 (c) One molecule of each aryl-halide and Phenol
 (d) Two molecules of aralkyl-halides
33. How many time Oxyhaemoglobin is less stable than Carboxyhaemoglobin?
- (a) 50 (b) 200
 (c) 500 (d) 300
34. What is DDT among the following?
- (a) Green house gas
 (b) A fertilizer
 (c) Biodegradable pollutant
 (d) Non-biodegradable pollutant

35. The aqueous solution of which of the salts has pH close to 7?
- (a) FeCl_3
 (b) CH_3COONa
 (c) Na_2CO_3
 (d) $\text{CH}_3\text{COONH}_4$
36. Which of the following exists as covalent crystals in the solid state?
- (a) Iodine (b) Silicon
 (c) Sulphur (d) Phosphorus
37. 200 ml of water is added to 500 ml of 0.2 M solution. What is the molarity of this diluted solution?
- (a) 0.5010 M (b) 0.2897 M
 (c) 0.7093 M (d) 0.1428 M
38. Which one of the following is not an allylic halide?
- (a) 4-Bromopent-2-ene
 (b) 3-bromo-2-methylbut-1-ene
 (c) 1-Bromobut-2-ene
 (d) 4-Bromobut-1-ene
39. Which one among the following is not an analgesic?
- (a) Ibuprofen (b) Naproxen
 (c) Aspirin (d) Valium
40. Bakelite is obtained from phenol by reacting with
- (a) Acetal
 (b) CH_3CHO
 (c) HCHO
 (d) Chlorobenzene
41. Which among the following is not a characteristic of all living organisms?
- (a) Metabolism
 (b) Growth
 (c) Reproduction
 (d) Self consciousness
42. Smallest living cell
- (a) Mycobacterium
 (b) Mycoplasma
 (c) Varicella zoaster
 (d) Variola
43. Select odd one out
- (a) Marchantia (b) Funaria
 (c) Sphagnum (d) Selaginella
44. Select the wrongly matched pair
- (a) Sea anemone - Adamsia
 (b) Sea brain - Meandrina
 (c) Sea gooseberry - Hydra
 (d) Sea pen - Pennatula
45. Which among the following is not an excretory organ?
- (a) Proboscis gland
 (b) Malpighian tubule
 (c) Antannary gland (green gland)
 (d) Ctenedia
46. Which among the following is not a modified stem?
- (a) Potato (b) Sweet potato
 (c) Colocasia (d) Turmeric
47. Goblet cell is a part of
- (a) Squamous epithelium
 (b) Cuboidal epithelium
 (c) Compound epithelium
 (d) Columnar epithelium

48. Polysome is a
- Single ribosome
 - 3–4 ribosomes
 - Many ribosomes attached to an RNA
 - 50s subunit of ribosome.
49. Choose the wrongly matched pair of pigment and their function.
- Chlorophyll - Trapping sunlight
 - Amyloplast - Store carbohydrate
 - Elaioplast - Store fats and oil
 - Alaroplast - Store lipids
50. Which among the following is the simplest amino acid that show optical activity?
- Serine
 - Glycine
 - Alanine
 - Tryptophan
51. Which of the following is the monomer of chitin?
- Glucuronic acid
 - α -D-glucose
 - N-acetylene glucosamine
 - β -D-fructose
52. Synaptonemal complex is observed in
- Leptotene
 - Zygotene
 - Pachytene
 - Diploptene
53. Plasmolysis occurs when the external solution is
- Hypotonic
 - Hypertonic
 - Isotonic
 - Distilled water
54. Micro-nutrient among the following is
- Phosphorous
 - Magnesium
 - Manganese
 - Potassium
55. Which among the following is a function of auxin?
- Apical dominance
 - Parthenocarpy
 - Herbicidal
 - All of the above
56. Hepatopancreatic duct is guarded by
- Pyloric Sphincter
 - Gastro-Oesophageal sphincter
 - Sphincter of Oddi
 - Duodenal Sphincter
57. Which among the following is correct with the volumes and capacities?
- $IC = TV + ERV$
 - $FRC = IRV + RV + ERV$
 - $VC = IC + ERV$
 - $TLC = RV + ERV + TV$
58. ANF is released by
- Heart
 - Kidney
 - Lungs
 - Liver
59. Floating ribs include
- 7 – 12
 - 7 & 8
 - 10 – 12
 - 11 & 12
60. The study of fungi is called
- Mycology
 - Ethology
 - Cytology
 - Histology
61. If $n(A) = 8$, $n(A \cap B) = 2$ then $n[(A \cap B)' \cap A]$ is equal to
- 4
 - 6
 - 8
 - 10

62. If $f(x) = x^2 - 1$ and $g(x) = (x + 1)^2$ then $(g \circ f)(x)$ is
 (a) $(x + 1)^4 - 1$ (b) $x^4 - 1$
 (c) x^4 (d) $(x + 1)^4$
63. The number of solutions for $\cos 2\theta = \sin \theta$ in $(0, 2\pi)$ is
 (a) 3 (b) 0
 (c) 1 (d) 4
64. If $\cos x = \frac{-4}{5}$ where $x \in [0, \pi]$ then the value of $\cos\left(\frac{x}{2}\right)$ is equal to
 (a) $\frac{1}{10}$ (b) $\frac{2}{5}$
 (c) $\frac{1}{\sqrt{10}}$ (d) $\frac{-1}{\sqrt{10}}$
65. From the top of a tower, the angle of depression of a point on the ground is 60° . If the distance of this point from the tower is $\frac{1}{\sqrt{3} + 1}$ metres, then the height of the tower is
 (a) $\sqrt{3} + 1$ metres
 (b) $\frac{\sqrt{3} + 3}{2}$ metres
 (c) $\frac{\sqrt{3}}{2}$ metres
 (d) $\frac{3 - \sqrt{3}}{2}$ metres
66. The value of $\frac{\cos 30^\circ + i \sin 30^\circ}{\cos 60^\circ - i \sin 60^\circ}$ is equal to
 (a) i (b) $-i$
 (c) $\frac{1 + \sqrt{3}i}{2}$ (d) $\frac{1 - \sqrt{3}i}{2}$
67. If $(n + 2)! = 2550 \times n!$ then the value of n is equal to
 (a) 48 (b) 49
 (c) 50 (d) 51
68. The number of integers greater than 6000 that can be formed with 3, 5, 6, 7, 8, where no digits is repeated is
 (a) 120 (b) 72
 (c) 192 (d) 216
69. The coefficient of the middle term in the expansion of $(x + 2y)^6$ is
 (a) 6C_3 (b) 6C_4
 (c) $8({}^6C_3)$ (d) $8({}^6C_4)$
70. The perpendicular distance from the point $(1, -1)$ to the line $x + 5y - 9 = 0$ is equal to
 (a) $\sqrt{\frac{2}{13}}$ (b) $\sqrt{\frac{13}{2}}$
 (c) $\frac{13}{2}$ (d) $\frac{2}{13}$
71. If $(4, 0)$ is a point on the circle $x^2 + ax + y^2 = 0$, then the centre of the circle is at
 (a) $(2, 0)$ (b) $(-2, 0)$
 (c) $(0, 2)$ (d) $(0, -2)$
72. $\lim_{x \rightarrow 0} \frac{(1 + 2x)^{10} - 1}{x}$ is equal to
 (a) 5 (b) 10
 (c) 0 (d) 20
73. The value of $\cos\left[\sin^{-1}\left(\frac{2}{3}\right)\right]$ is equal to
 (a) $\frac{\sqrt{3}}{5}$ (b) $\frac{\sqrt{5}}{3}$
 (c) $\frac{5}{\sqrt{3}}$ (d) $\frac{3}{\sqrt{5}}$
74. If $A = \begin{bmatrix} 2 & 1 \\ 0 & x \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} 1/2 & 1/6 \\ 0 & 1/x \end{bmatrix}$ then the value of x is equal to
 (a) -3 (b) -2
 (c) 3 (d) -6

75. If $y = \tan^{-1} \left(\frac{\cos x}{1 + \sin x} \right)$, then $\frac{dy}{dx}$ is equal to
- (a) $\frac{1}{2}$ (b) 2
(c) $\frac{-1}{2}$ (d) -2
76. the function $f(x) = 3x^3 - 36x + 99$ is increasing for
- (a) $(-\infty, 2)$
(b) $(-2, 2)$
(c) $-2 < x < \infty$
(d) $x < -2$ or $x > 2$
77. $\int_0^1 xe^{-5x} dx$ is equal to
- (a) $\frac{1}{25} - \frac{6e^{-5}}{25}$
(b) $\frac{1}{25} + \frac{6e^{-5}}{25}$
(c) $\frac{-1 - 6e^{-5}}{25}$
(d) $\frac{1}{25} - \frac{e^{-5}}{5}$
78. The value of $\int_0^6 |x - 3| dx$ is equal to
- (a) 6 (b) 9
(c) 0 (d) 12
79. The solution of the differential equation $x \cdot \frac{dy}{dx} + y = \frac{1}{x^2}$ at $(1, 2)$ is
- (a) $x^2y + 1 = 3x$
(b) $x^2y + 1 = 0$
(c) $xy + 1 = 3x$
(d) $x^2(y + 1) = 3x$
80. A vector of magnitude 7 units parallel to the resultant of the vectors $\vec{a} = 2\hat{i} - 3\hat{j} - 2\hat{k}$ and $\vec{b} = -\hat{i} + 2\hat{j} + \hat{k}$ is
- (a) $\frac{7}{\sqrt{3}}(\hat{i} + \hat{j} + \hat{k})$
(b) $(\hat{i} - \hat{j} - \hat{k})$
(c) $\frac{7}{\sqrt{3}}(\hat{i} - \hat{j} + \hat{k})$
(d) $\frac{7}{\sqrt{3}}(\hat{i} - \hat{j} - \hat{k})$
81. Find the unit place in the expansion $25^{15} + 12^{21} + 23^{10}$
- (a) 9 (b) 0
(c) 4 (d) 6
82. The simplified value of $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \dots$
- (a) 2 (b) 1.9
(c) 2.5 (d) 3
83. If 35% of a number is 12 less than 50% of that number, then the number is
- (a) 80 (b) 60
(c) 50 (d) 40
84. 10% of 15% of 20% of 500 is
- (a) 225 (b) 150
(c) 67 (d) 1.50
85. If $a + b : b + c : c + a = 6 : 7 : 8$ and $a + b + c = 14$ then the value of c is
- (a) 6 (b) 7
(c) 8 (d) 14
86. If $a : 5 = b : 7 = c : 8$. Then $\frac{a + b + c}{a}$ is equal to
- (a) 2 (b) $\frac{1}{4}$
(c) 7 (d) 4

87. The average of 5 numbers is 42 while the average of another 8 numbers is 81. What is the combined average of all numbers together?
 (a) 66 (b) 60.5
 (c) 61.5 (d) 64
88. A man can do a piece of work in 5 days. But with the help of his son, he can do it in 3 days. In what time can the son do it alone?
 (a) 6.5 days (b) 8 days
 (c) 7 days (d) 7.5 days
89. 12 men can do a piece of work in 10 days. How many men would be required to do the same work in 8 days?
 (a) 14 (b) 18
 (c) 16 (d) 15
90. A car is traveling some distance at a speed of 60 Km/hr and it returns the same distance at a speed of 40 Km/hr. Then the average speed of the car is
 (a) 50 Km/hr (b) 48 Km/hr
 (c) 52 Km/hr (d) 60 Km/hr
91. A 200 m long train crosses a platform of double its length in 36 seconds. The speed of the train is
 (a) 60 Km/hr (b) 48 Km/hr
 (c) 64 Km/hr (d) 66 Km/hr
92. If the radius of a circle is increased by 50% then what will be the percentage increase in its area?
 (a) 125% (b) 100%
 (c) 75% (d) 50%
93. If the length of the diagonal of a cube is $4\sqrt{3}$ cm, then the length of its side is
 (a) 3 (b) 4
 (c) 6 (d) 2
94. In a certain code 'FILE' is written as 'UROV'. How will 'SOUR' be written in that code?
 (a) IFLT (b) HLF1
 (c) LIFT (d) IHIF
95. In a certain code 'GIRL' is written as '8101913' How is 'BOY' written in that code?
 (a) 31626 (b) 36152
 (c) 31525 (d) 31526
96. Among P, Q, R, S and T, each having a different height, Q is taller than S. T is shorter than P. R is taller than Q, but shorter than T. Who among them is the tallest?
 (a) S (b) P
 (c) R (d) Q
97. Pointing towards a person, a man said to a woman "His mother is the only daughter of your father." How is the woman related to that person?
 (a) Daughter (b) Sister
 (c) Mother (d) Wife
98. FAG, GAF, HAI, IAH
 (a) JAK (b) HAL
 (c) HAK (d) JAI
99. Find the odd one out: 2, 17, 29, 13, 18
 (a) 2 (b) 18
 (c) 13 (d) 29
100. Statements: "All fishes are grey in colour, some fishes are heavy."
 Based on the above statement, which of the following conclusions are true? [disregarding commonly known fact]
 Conclusion I: All heavy fishes are grey in colour
 Conclusion II: All light fishes are not grey in colour
 (a) Only conclusion I
 (b) Only conclusion II
 (c) neither I nor II
 (d) Both I and II