Set Code : T2

Booklet Code : A

*Note: (1) Answer **all** questions.*

*(2) Each question carries **1** mark. There are no negative marks.*

(3) Answer to the questions must be entered only on OMR Response Sheet provided separately by completely shading with H.B. Pencil, only one of the circles 1, 2, 3 or 4 provided against each question, and which is most appropriate to the question.

(4) The OMR Response Sheet will be invalidated if the circle is shaded using ink / ball pen

(CRT) CERAMIC TECHNOLOGY

INSTRUCTIONS TO CANDIDATES

1. Candidates should write their Hall Ticket Number only in the space provided at the top left hand corner of this page, on the leaflet attached to this booklet and also in the space provided on the OMR Response Sheet. **BESIDES WRITING, THE CANDIDATE SHOULD ENSURE THAT THE APPROPRIATE CIRCLES PROVIDED FOR THE HALL TICKET NUMBERS ARE SHADED USING H.B. PENCIL ONLY ON THE OMR RESPONSE SHEET. DO NOT WRITE HALL TICKET NUMBER ANY WHERE ELSE.**
2. Immediately on opening this Question Paper Booklet, check:
   (a) Whether **200** multiple choice questions are printed (**50** questions in Mathematics, **25** questions in Physics, **25** questions in Chemistry and **100** questions in Engineering)
   (b) In case of any discrepancy immediately exchange the Question paper Booklet of same code by bringing the error to the notice of invigilator.
3. Use of Calculators, Mathematical Tables and Log books is not permitted.
4. **Candidate must ensure that he/she has received the Correct Question Booklet, corresponding to his/her branch of Engineering.**
5. **Candidate should ensure that the booklet Code and the Booklet Serial Number, as it appears on this page is entered at the appropriate place on the OMR Response Sheet by shading the appropriate circles provided therein using H.B. pencil only. Candidate should note that if they fail to enter the Booklet Serial Number and the Booklet Code on the OMR Response Sheet, their Answer Sheet will not be valued.**
6. **Candidate shall shade one of the circles 1, 2, 3 or 4 corresponding question on the OMR Response Sheet using H.B. Pencil only. Candidate should note that their OMR Response Sheet will be invalidated if the circles against the question are shaded using Black / Blue ink pen / Ball pen / any other pencil other than H.B. Pencil or if more than one circle is shaded against any question.**
7. One mark will be awarded for every correct answer. **There are no negative marks.**
8. The OMR Response Sheet will not be valued if the candidate :
   (a) Writes the Hall Ticket Number in any part of the OMR Response Sheet except in the space provided for the purpose.
   (b) Writes any irrelevant matter including religious symbols, words, prayers or any communication whatsoever in any part of the OMR Response Sheet.
   (c) Adopts any other malpractice.
9. Rough work should be done only in the space provided in the Question Paper Booklet.
10. No loose sheets or papers will be allowed in the examination hall.
11. Timings of Test: 10.00 A.M. to 1.00 P.M.
12. Candidate should ensure that he / she enters his / her name and appends signature on the Question paper booklet, leaflet attached to this question paper booklet and also on the OMR Response Sheet in the space provided. Candidate should ensure that the invigilator puts his signature on this question paper booklet, leaflet attached to the question paper booklet and also on the OMR Response Sheet.
13. Before leaving the examination hall candidate should **return both the OMR Response Sheet and the leaflet attached to this question paper booklet** to the invigilator. Failure to return any of the above shall be construed as malpractice in the examination. **Question paper booklet may be retained by the candidate.**
14. This booklet contains a total of **32** pages including Cover page and the pages for Rough Work.

MATHEMATICS

1. If $A=\begin{bmatrix}3 & 0 & 0\\ 0 & 3 & 0\\ 0 & 0 & 3\end{bmatrix}$, then $A^4=$

(1) 3I (2) 9I (3) 27I (4) 81I

2. If $A=\begin{bmatrix}0 & 2 & 1\\ -2 & 0 & -2\\ -1 & x & 0\end{bmatrix}$ is a skew symmetric matrix, then the value of x is

(1) 1 (2) 2 (3) 3 (4) 4

3. What is the number of all possible matrices with each entry as 0 or 1 if the order of matrices is 3×3

(1) 64 (2) 268 (3) 512 (4) 256

4. If $A=\begin{bmatrix}1 & i & -i\\ i & -i & 1\\ -i & 1 & i\end{bmatrix}$, then $|A|=$

(1) 1 (2) 2 (3) 3 (4) 4

Set Code : T2
Booklet Code : A

5. The solution of a system of linear equations $2x-y+3z=9, x+y+z=6, x-y+z=2$ is

(1) $x=-1, y=-2, z=-3$ (2) $x=3, y=2, z=1$

(3) $x=2, y=1, z=3$ (4) $x=1, y=2, z=3$

6. If $\frac{1}{x^2+a^2}=\frac{A}{x+ai}+\frac{B}{x-ai}$ then A = _____, B = _____.

(1) $\frac{1}{2ai}, -\frac{1}{2ai}$ (2) $-\frac{1}{2ai}, \frac{1}{2ai}$ (3) $\frac{1}{ai}, -\frac{1}{ai}$ (4) $-\frac{1}{ai}, \frac{1}{ai}$

7. If $\frac{2x+4}{(x-1)^3}=\frac{A_1}{(x-1)}+\frac{A_2}{(x-1)^2}+\frac{A_3}{(x-1)^3}$ then $\sum_{i=1}^{3} A_i$ is equal to

(1) A_2 (2) $2A_2$ (3) $4A_2$ (4) $4A_1$

8. The period of the function $f(x)=|\sin x|$ is

(1) π (2) 2π (3) 3π (4) 4π

9. If A+B=45°, then (1−cotA) . (1−cotB) is

(1) 1 (2) 0 (3) 2 (4) −1

10. The value of sin 78° + cos 132° is

(1) $\frac{\sqrt{5}+1}{4}$ (2) $\frac{\sqrt{5}+1}{2}$ (3) $\frac{\sqrt{5}-1}{2}$ (4) $\frac{\sqrt{5}-1}{4}$

11. If A+B+C = π, then sin2A + sin2B + sin2C =

(1) 4 cosA sinB cosC (2) 4 sinA cosB sinC

(3) 4 cosA cosB cosC (4) 4 sinA sinB sinC

12. The principal solution of Tan$x$ = 0 is

(1) $x=n\pi, n\in Z$ (2) $x=0$

(3) $x=(2n+1)\pi/2, n\in Z$ (4) $x=n\pi+\alpha, n\in Z$

Set Code : T2
Booklet Code : A

13. The value of $\text{Tan}^{-1}(2) + \text{Tan}^{-1}(3)$ is

(1) $\frac{\pi}{4}$ (2) $\frac{\pi}{2}$ (3) $\frac{\pi}{3}$ (4) $\frac{3\pi}{4}$

14. If the sides of a right angle triangle are in A.P., then the ratio of its sides is

(1) 1:2:3 (2) 2:3:4 (3) 3:4:5 (4) 4:5:6

15. The value of $r.r_1.r_2.r_3$ is

(1) Δ^2 (2) Δ^{-2} (3) Δ^{-3} (4) Δ^4

16. $\frac{1}{r1}+\frac{1}{r2}+\frac{1}{r3}=$

(1) $\frac{1}{r}$ (2) $\frac{1}{2r}$ (3) $\frac{1}{R}$ (4) $\frac{1}{\Delta}$

17. If $a=6$, $b=5$, $c=9$, then the value of angle A is

(1) $\cos^{-1}(2/9)$ (2) $\cos^{-1}(2/5)$ (3) $\cos^{-1}(7/9)$ (4) $\cos^{-1}(1/3)$

18. The polar form of complex number $1-i$ is

(1) $\sqrt{2}e^{-i\pi/4}$ (2) $\sqrt{2}e^{i\pi/4}$ (3) $\sqrt{2}e^{i\pi/2}$ (4) $\sqrt{2}e^{-i\pi/2}$

19. If 1, ω, ω^2 be the cube roots of unity, then the value of $2^{\omega^3}.2^{\omega^5}.2^{\omega}$ is

(1) ω (2) ω^2 (3) 1 (4) 0

20. The intercept made on X-axis by the circle $x^2+y^2+2gx+2fy+c=0$ is

(1) $\sqrt{g^2-c}$ (2) $\sqrt{f^2-c}$ (3) $2.\sqrt{g^2-c}$ (4) $2.\sqrt{f^2-c}$

21. If one end of the diameter of the circle $x^2+y^2-5x-8y+13=0$ is (2, 7), then the other end of the diameter is

(1) (3, 1) (2) (1, 3) (3) (–3, –1) (4) (–1, –3)

Set Code : T2
Booklet Code : A

22. The radius of the circle $\sqrt{1+m^2}(x^2+y^2)-2cx-2mcy=0$ is
(1) $2c$ (2) $4c$ (3) $c/2$ (4) c

23. The parametric equations of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ are
(1) $x = a\sec\theta, y = b\tan\theta$ (2) $x = b\sin\theta, y = a\cos\theta$
(3) $x = a\cos\theta, y = b\sin\theta$ (4) $x = a\operatorname{cosec}\theta, y = b\cot\theta$

24. The equation of the directrix of the parabola $2x^2 = -7y$ is
(1) $8y+7=0$ (2) $8y-7=0$ (3) $7y+8=0$ (4) $8x-7=0$

25. The condition for a straight line $y = mx+c$ to be a tangent to the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ is
(1) $c = a/m$ (2) $c^2 = a^2m^2 - b^2$ (3) $c^2 = a^2m^2 + b^2$ (4) $c^2 = a/m$

26. $\lim_{x\to 1}\frac{\sqrt{5x-4}-\sqrt{x}}{x-1}$ is
(1) 3 (2) 2 (3) 4 (4) 1

27. $\log i =$
(1) $\pi/2$ (2) $\pi/4$ (3) $i\pi/2$ (4) $i\pi/4$

28. $\frac{d}{dx}[\log_7 X]=$
(1) $\frac{1}{x}$ (2) $X\log_7^e$ (3) $\frac{1}{x}\log^7_e$ (4) $\frac{1}{x}\log_7^e$

29. $\frac{d}{dx}[2\cosh x]=$
(1) $\frac{e^x+e^{-x}}{2}$ (2) $\frac{e^x-e^{-x}}{2}$ (3) e^x+e^{-x} (4) e^x-e^{-x}

Set Code : T2
Booklet Code : A

30. $\frac{d}{dx}\left[\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right]=$

(1) $\frac{1}{1+x^2}$ (2) $\frac{-1}{1+x^2}$ (3) $\frac{2}{1+x^2}$ (4) $\frac{-2}{1+x^2}$

31. If $x = at^2, y = 2at$, then $\frac{dy}{dx}=$

(1) $\sqrt{\frac{y}{x}}$ (2) $\sqrt{\frac{x}{a}}$ (3) $\sqrt{\frac{a}{x}}$ (4) $\sqrt{\frac{x}{y}}$

32. The derivative of e^x with respect to $\sqrt{x}$ is

(1) $\frac{2\sqrt{x}}{e^x}$ (2) $2\sqrt{x}e^x$ (3) $\frac{e^x}{2\sqrt{x}}$ (4) $\sqrt{x}.e^x$

33. The equation of the normal to the curve $y = 5x^4$ at the point (1, 5) is

(1) $x + 20y = 99$ (2) $x + 20y = 101$ (3) $x - 20y = 99$ (4) $x - 20y = 101$

34. The angle between the curves $y^2 = 4x$ and $x^2 + y^2 = 5$ is

(1) $\frac{\pi}{4}$ (2) $\tan^{-1}(2)$ (3) $\tan^{-1}(3)$ (4) $\tan^{-1}(4)$

35. If $u = x^3y^3$ then $\frac{\partial^3 u}{\partial x^3}+\frac{\partial^3 u}{\partial y^3}=$

(1) $6\,(x^3+y^3)$ (2) $6\,x^3\,y^3$ (3) $6x^3$ (4) $6y^3$

36. $\int \operatorname{cosec} x\,dx=$

(1) $\log(\operatorname{cosec} x + \cot x) + C$ (2) $\log(\cot x/2) + C$
(3) $\log(\tan x/2) + C$ (4) $-\operatorname{cosec} x.\cot x + C$

Set Code : T2
Booklet Code : A

37. $\int_0^{\frac{\pi}{2}} \cos^{11} x \, dx =$

(1) $\frac{256}{693}$ (2) $\frac{256\pi}{693}$ (3) $\frac{\pi}{4}$ (4) $\frac{128}{693}$

38. $\int f'(x)[f(x)]^n dx =$

(1) $\frac{[f(x)]^{n-1}}{n-1}+C$ (2) $\frac{[f(x)]^{n+1}}{n+1}+C$ (3) $n[f(x)]^{n-1}+C$ (4) $(n+1)[f(x)]^{n+1}+C$

39. $\int \frac{dx}{(x+7)\sqrt{x+6}} =$

(1) $Tan^{-1}(\sqrt{x+6})+C$ (2) $2Tan^{-1}(\sqrt{x+6})+C$

(3) $Tan^{-1}(x+7)+C$ (4) $2Tan^{-1}(x+7)+C$

40. $\int \tan^{-1} x \, dx =$

(1) $x.Tan^{-1}x+\frac{1}{2}\log(1+x^2)+C$ (2) $\frac{1}{1+x^2}+C$

(3) $x^2.Tan^{-1}x+C$ (4) $x.Tan^{-1}x-\log\sqrt{1+x^2}+C$

41. $\int \frac{dx}{1+e^{-x}} =$

(1) $\log(1+e^{-x})+C$ (2) $\log(1+e^{x})+C$

(3) $e^{-x}+C$ (4) $e^{x}+C$

42. $\int_{\frac{-\pi}{2}}^{\frac{\pi}{2}} \sin|x| \, dx =$

(1) 0 (2) 1 (3) 2 (4) −1

Set Code : T2
Booklet Code : A

43. Area under the curve $f(x) = \sin x$ in $[0, \pi]$ is
(1) 4 sq. units (2) 2 sq. units (3) 6 sq. units (4) 8 sq. units

44. The order of $x^3\frac{d^3y}{dx^3} + 2x^2\frac{d^2y}{dx^2} - 3y = x$ is
(1) 1 (2) 4 (3) 3 (4) 2

45. The degree of $\left[\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2\right]^{\frac{3}{2}} = a\frac{d^2y}{dx^2}$ is
(1) 4 (2) 2 (3) 1 (4) 3

46. The family of straight lines passing through the origin is represented by the differential equation
(1) $ydx + xdy = 0$ (2) $xdy - ydx = 0$ (3) $xdx + ydy = 0$ (4) $xdx - ydy = 0$

47. The differential equitation $\frac{dy}{dx} + \frac{ax + hy + g}{hx + by + f} = 0$ is called
(1) Homogeneous (2) Exact (3) Linear (4) Legender

48. The solution of differential equation $\frac{dy}{dx} = e^{-x^2} - 2xy$ is
(1) $ye^{-x^2} = x + c$ (2) $ye^x = x + c$ (3) $ye^{x^2} = x + c$ (4) $y = x + c$

49. The complementary function of $(D^3+D^2+D+1)y = 10$ is
(1) $C_1\cos x + C_2\sin x + C_3e^{-x}$ (2) $C_1\cos x + C_2\sin x + C_3e^x$
(3) $C_1 + C_2\cos x + C_3\sin x$ (4) $(C_1 + C_2x + C_3x^2)e^x$

50. Particular Integral of $(D-1)^4y = e^x$ is
(1) x^4e^x (2) $\frac{x^4}{24}e^{-x}$ (3) $\frac{x^4}{12}e^x$ (4) $\frac{x^4}{24}e^x$

Set Code : T2
Booklet Code : A

PHYSICS

51. Two quantities A and B are related by the relation A/B = m where m is linear mass density and A is force. The dimensions of B will be
(1) same as that of latent heat (2) same as that of pressure
(3) same as that of work (4) same as that of momentum

52. The dimensional formula of capacitance in terms of M, L, T and I is
(1) $[ML^2T^2I^2]$ (2) $[ML^{-2}T^4I^2]$ (3) $[M^{-1}L^3T^3I]$ (4) $[M^{-1}L^{-2}T^4I^2]$

53. If l, m and n are the direction cosines of a vector, then
(1) $l+m+n=1$ (2) $l^2+m^2+n^2=1$ (3) $\frac{1}{l}+\frac{1}{m}+\frac{1}{n}=1$ (4) $lmn=1$

54. The angle between i+j and j+k is
(1) 0° (2) 90° (3) 45° (4) 60°

55. A particle is moving eastwards with a velocity of 5 ms^{-1}. In 10 seconds the velocity changes to 5 ms^{-1} northwards. The average acceleration in this time is
(1) $\frac{1}{\sqrt{2}}$ ms^{-2} towards north-west (2) zero
(3) $\frac{1}{2}$ ms^{-2} towards north (4) $\frac{1}{\sqrt{2}}$ ms^{-2} towards north-east

56. The linear momentum of a particle varies with time t as $p = a+bt+ct^2$ which of the following is correct?
(1) Force varies with time in a quadratic manner.
(2) Force is time-dependent.
(3) The velocity of the particle is proportional to time.
(4) The displacement of the particle is proportional to t.

57. A shell of mass m moving with a velocity v suddenly explodes into two pieces. One part of mass $m/4$ remains stationary. The velocity of the other part is
(1) v (2) $2v$ (3) $3v/4$ (4) $4v/3$

Set Code : T2
Booklet Code : A

58. The velocity of a freely falling body after 2s is
(1) 9.8 ms^{-1} (2) 10.2 ms^{-1} (3) 18.6 ms^{-1} (4) 19.6 ms^{-1}

59. A large number of bullets are fired in all directions with the same speed u. The maximum area on the ground on which these bullets will spread is

(1) $\frac{\pi u^2}{g^2}$ (2) $\frac{\pi u^4}{g^2}$ (3) $\frac{\pi u^2}{g^4}$ (4) $\frac{\pi u}{g^4}$

60. The minimum stopping distance for a car of mass m, moving with a speed v along a level road, if the coefficient of friction between the tyres and the road is μ, will be

(1) $\frac{v^2}{2\mu g}$ (2) $\frac{v^2}{\mu g}$ (3) $\frac{v^2}{4\mu g}$ (4) $\frac{v}{2\mu g}$

61. When a bicycle is in motion, the force of friction excreted by the ground on the two wheels is such that it acts
(1) In the backward direction on the front wheel and in the forward direction on the rear wheel
(2) In the forward direction on the front wheel and in the backward direction on the rear wheel
(3) In the backward direction on both the front and the rear wheels
(4) In the forward direction on both the front and the rear wheels

62. In a perfectly inelastic collision, the two bodies
(1) strike and explode (2) explode without striking
(3) implode and explode (4) combine and move together

63. Under the action of a constant force, a particle is experiencing a constant acceleration, then the power is
(1) zero (2) positive
(3) negative (4) increasing uniformly with time

Set Code : T2
Booklet Code : A

64. Consider the following two statements:

A : Linear momentum of a system of particles is zero.

B : Kinetic energy of a system of particles is zero.

Then

(1) A implies B & B implies A
(2) A does not imply B & B does not imply A
(3) A implies B but B does not imply A
(4) A does not imply B but B implies A

65. An engine develops 10 kW of power. How much time will it take to lift a mass of 200 kg to a height of 40 m? (Given g = 10 ms^{-2})

(1) 4s (2) 5s (3) 8s (4) 10s

66. If a spring has time period T, and is cut into *n* equal parts, then the time period will be

(1) $T\sqrt{n}$ (2) $\frac{T}{\sqrt{n}}$ (3) nT (4) T

67. When temperature increases, the frequency of a tuning fork

(1) increases
(2) decreases
(3) remains same
(4) increases or decreases depending on the materials

68. If a simple harmonic motion is represented by $\frac{d^2x}{dy^2}+\alpha x=0$, its time period is

(1) $2\pi\sqrt{\alpha}$ (2) $2\pi\alpha$ (3) $\frac{2\pi}{\sqrt{\alpha}}$ (4) $\frac{2\pi}{\alpha}$

69. A cinema hall has volume of 7500 m^3. It is required to have reverberation time of 1.5 seconds. The total absorption in the hall should be

(1) 850 w-m^2 (2) 82.50 w-m^2 (3) 8.250 w-m^2 (4) 0.825 w-m^2

Set Code : T2
Booklet Code : A

70. To absorb the sound in a hall which of the following are used
(1) Glasses, stores (2) Carpets, curtains
(3) Polished surfaces (4) Platforms

71. If N represents avagadro's number, then the number of molecules in 6 gm of hydrogen at NTP is
(1) 2N (2) 3N (3) N (4) N/6

72. The mean translational kinetic energy of a perfect gas molecule at the temperature T K is
(1) $\frac{1}{2}kT$ (2) kT (3) $\frac{3}{2}kT$ (4) $2kT$

73. The amount of heat given to a body which raises its temperature by 1°C
(1) water equivalent (2) thermal heat capacity
(3) specific heat (4) temperature gradient

74. During an adiabatic process, the pressure of a gas is found to be proportional to the cube of its absolute temperature. The ratio *Cp/Cv* for gas is
(1) $\frac{3}{2}$ (2) $\frac{4}{3}$ (3) 2 (4) $\frac{5}{3}$

75. Cladding in the optical fiber is mainly used to
(1) to protect the fiber from mechanical stresses
(2) to protect the fiber from corrosion
(3) to protect the fiber from mechanical strength
(4) to protect the fiber from electromagnetic guidance

Set Code : T2
Booklet Code : A

CHEMISTRY

76. The valency electronic configuration of Phosphorous atom (At.No. 15) is
(1) $3s^2\ 3p^3$ (2) $3s^1\ 3p^3\ 3d^1$ (3) $3s^2\ 3p^2\ 3d^1$ (4) $3s^1\ 3p^2\ 3d^2$

77. An element 'A' of At.No.12 combines with an element 'B' of At.No.17. The compound formed is
(1) covalent AB (2) ionic AB_2 (3) covalent AB_2 (4) ionic AB

78. The number of neutrons present in the atom of $_{56}Ba^{137}$ is
(1) 56 (2) 137 (3) 193 (4) 81

79. Hydrogen bonding in water molecule is responsible for
(1) decrease in its freezing point (2) increase in its degree of ionization
(3) increase in its boiling point (4) decrease in its boiling point

80. In the HCl molecule, the bonding between hydrogen and chlorine is
(1) purely covalent (2) purely ionic (3) polar covalent (4) complex coordinate

81. Potassium metal and potassium ions
(1) both react with water (2) have the same number of protons
(3) both react with chlorine gas (4) have the same electronic configuration

82. 5.85 gms of sodium chloride were dissolved in water and the solution made upto 100 ml in a standard flask. 10 ml of this solution were pipetted out into another flask and made up with distilled water into 100 ml of solution. The concentration of the sodium chloride solution now is
(1) 0.1 M (2) 1.0 M (3) 0.5 M (4) 0.25 M

83. Concentration of a 1.0 M solution of phosphoric acid in water is
(1) 0.33 N (2) 1.0 N (3) 2.0 N (4) 3.0 N

84. Which of the following is a Lewis acid?
(1) Ammonia (2) Berylium chloride
(3) Boron trifluoride (4) Magnesium oxide

Set Code : T2
Booklet Code : A

85. Which of the following constitutes the components of a buffer solution?
(1) Potassium chloride and potassium hydroxide
(2) Sodium acetate and acetic acid
(3) Magnesium sulphate and sulphuric acid
(4) Calcium chloride and calcium acetate

86. Which of the following is an electrolyte?
(1) Acetic acid (2) Glucose (3) Urea (4) Pyridine

87. Calculate the Standard emf of the cell, $Cd/Cd^{+2}//Cu^{+2}/Cu$ given that $E^0\ Cd/Cd^{+2} = 0.44V$ and $E^0\ Cu/Cu^{+2} = (-)\ 0.34\ V$.
(1) (–) 1.0 V (2) 1.0 V (3) (–) 0.78 V (4) 0.78 V

88. A solution of nickel chloride was electrolysed using Platinum electrodes. After electrolysis,
(1) nickel will be deposited on the anode (2) Cl_2 gas will be liberated at the cathode
(3) H_2 gas will be liberated at the anode (4) nickel will be deposited on the cathode

89. Which of the following metals will undergo oxidation fastest?
(1) Cu (2) Li (3) Zinc (4) Iron

90. Which of the following cannot be used for the sterilization of drinking water?
(1) Ozone (2) Calcium Oxychloride
(3) Potassium Chloride (4) Chlorine water

91. A water sample showed it to contain 1.20 mg/litre of magnesium sulphate. Then, its hardness in terms of calcium carbonate equivalent is
(1) 1.0 ppm (2) 1.20 ppm (3) 0.60 ppm (4) 2.40 ppm

92. Soda used in the L-S process for softening of water is, Chemically.
(1) sodium bicarbonate (2) sodium carbonate decahydrate
(3) sodium carbonate (4) sodium hydroxide (40%)

93. The process of cementation with zinc powder is known as
(1) sherardizing (2) zincing (3) metal cladding (4) electroplating

Set Code : T2
Booklet Code : A

94. Carrosion of a metal is fastest in
(1) rain-water (2) acidulated water (3) distilled water (4) de-ionised water

95. Which of the following is a thermoset polymer?
(1) Polystyrene (2) PVC
(3) Polythene (4) Urea-formaldehyde resin

96. Chemically, neoprene is
(1) polyvinyl benzene (2) polyacetylene
(3) polychloroprene (4) poly-1,3-butadiene

97. Vulcanization involves heating of raw rubber with
(1) selenium element (2) elemental sulphur
(3) a mixture of Se and elemental sulphur (4) a mixture of selenium and sulphur dioxide

98. Petrol largely contains
(1) a mixture of unsaturated hydrocarbons C_5 - C_8
(2) a mixture of benzene, toluene and xylene
(3) a mixture of saturated hydrocarbons C_{12} - C_{14}
(4) a mixture of saturated hydrocarbons C_6 - C_8

99. Which of the following gases is largely responsible for acid-rain?
(1) SO_2 & NO_2 (2) CO_2 & water vapour
(3) CO_2 & N_2 (4) N_2 & CO_2

100. BOD stands for
(1) Biogenetic Oxygen Demand (2) Biometric Oxygen Demand
(3) Biological Oxygen Demand (4) Biospecific Oxygen Demand

Set Code : T2
Booklet Code : A

CERAMIC TECHNOLOGY

101. Which of the following is not a member of 'Beach Sand Minerals'?
(1) Zircon (2) Sillimanite
(3) Andalusite (4) Rutile

102. The presence of Wallastonite in a ceramic composition leads to:
(1) Low moisture expansion (2) Reduced drying and firing shrinkage
(3) High Green and fired strength (4) All of the above

103. The crystal structure of Baddeleyite is:
(1) Monoclinic (2) Cubic
(3) Tetragonal (4) Orthorhombic

104. The Fuller's earth is
(1) Kaolinite (2) Montmorrilonite
(3) Mica (4) Diatomaceous earth

105. Lime stone is used in the manufacture of
(1) cement (2) Silica Refractory
(3) Soda-Lime-Silica Glass (4) All of the above

106. Which of the following raw material is Toxic?
(1) Pyrophillite (2) Asbestos (3) Vermiculite (4) Chlorite

107. Muskovite is also known as
(1) White Mica (2) Black Mica (3) Red Mica (4) Brown Mica

Set Code : T2
Booklet Code : A

108. What is the position of Andhra Pradesh in mineral wealth?
(1) 1 (2) 3 (3) 2 (4) 10

109. Rajmahal is associated with which mineral?
(1) China Clay (2) Ball Clay (3) Pyrophillite (4) Vermiculite

110. Potash Feldspar is also known as
(1) Orthoclase (2) Plagioclase (3) Pegmatite (4) Soda Feldspar

111. Chemical formula of Fluorspar is
(1) CaF_2 (2) $Ca SiF_2$ (3) $CaCl_2$ (4) SiO_2

112. Largest Bauxite deposits are available in which District of A.P.
(1) Visakhapatnam (2) Krishna (3) Nellore (4) Chittoor

113. Which of the following is used as a Binder?
(1) Dextrin (2) Colex
(3) Starch (4) All of the above

114. Which of the following statements is wrong?
(1) Formula of Talc is $3MgO_4SiO_2H_2O$
(2) Hardness of talc is 1 in Moh's scale of hardness
(3) Talc is largely used for making Cordierite ceramics
(4) None of the above

115. Molecular formula of Kaolinite is
(1) $Al_2O_3.2SiO_2.2H_2O$ (2) $Al_2O_3.4SiO_2.H_2O$
(3) $Al_2O_3.SiO_2$. (4) $3Al_2O_3.2SiO_2$

Set Code : T2
Booklet Code : A

116. Button test is used to determine
(1) MOR
(2) Compressive strength
(3) Fusibility
(4) Porosity

117. Monoporossa is a
(1) Single fired floor tile
(2) Double fired floor tile
(3) Single fired wall tile
(4) Double fired wall tile

118. Glass content of porcelain bodies is in the range of
(1) 20-40%
(2) 50-80%
(3) 80-90%
(4) 10-20%

119. Floor tile is a class of
(1) Earthen ware
(2) Stone ware
(3) Hard Porcelain
(4) Soft Porcelain

120. The addition of which Oxide in glaze composition creates a matt surface?
(1) ZnO (2) ZrO_2 (3) SnO_2 (4) PbO

121. Stoneware is a
(1) Crude salt glazed Porcelain made from cheaper grade raw material
(2) Thoroughly vitrified translucent ware with hard glaze
(3) Porous semi vitreous ware with soft glaze
(4) Vitrified translucent ware with soft glaze

122. Soft porcelain is fired below
(1) 1000°C (2) 1250°C (3) 1100°C (4) 1350°C

Set Code : T2
Booklet Code : A

123. Filter press is mainly used in the manufacture of

(1) Ceramic Insulator Manufacture
(2) Cement Manufacture
(3) Glass Manufacture
(4) Refractory Manufacture

124. Which of the following is the dunting of whiteware bodies?

(1) Deformation after firing
(2) Cracking due to thermally induced stress
(3) Rolling out of glaze after firing
(4) None of the above

125. While making powder for the manufacture of ceramic tiles by spray drying process, which of the following is used as deflocculant for slip preparation?

(1) Sodium Silicate
(2) Sodium Tannate
(3) Tri-Sodium Phosphate
(4) All of the above

126. Which of the following is an advantage for Lead compounds in Glaze:

(1) It gives higher brilliance due to higher refractive index
(2) It lowers the coefficient of expansion as compared to alkalies
(3) It lowers the modulus of elasticity
(4) All of the above

127. Consistometer is used

(1) To determine specific gravity of slip
(2) To determine viscosity of slip
(3) To determine flow of slip per minute
(4) None of the above

Set Code : T2
Booklet Code : A

128. The kiln furniture to fire HT Porcelain insulators is made of
(1) Mullite
(2) Alumina-SiC
(3) Clay bonded SiC
(4) Cordierite

129. Which of the following is a glaze defect
(1) Hanging in higher altitude furnace vertically
(2) Laying down on a longer furnace horizontally
(3) In a normal chamber furnace by a burner
(4) None of the above

130. For coloured glazes, which of the following factor affect the color:
(1) Colouring Agent
(2) Kiln Atmosphere
(3) Firing temperature
(4) All the above

131. In order to keep the glaze in suspension a small portion ranging from 4 to 12% which is added to the ball mill
(1) Borax
(2) $CaCO_3$
(3) Alum
(4) Clay

132. Of the following, which is not used as a raw material in Engobe?
(1) China Clay
(2) Quartz
(3) Rutile
(4) Feldspar

133. Percentage of Silica in a Silica brick is
(1) 85-90%
(2) 90-92%
(3) 93-98%
(4) 80-85%

134. Maximum temperature attainable for continuous heating for SiC heating element is
(1) 1200°C
(2) 1450°C
(3) 1600°C
(4) 1700°C

Set Code : T2
Booklet Code : A

135. The Aluminous Fire brick contains
(1) 30-35% of Al_2O_3 (2) 38-45% of Al_2O_3
(3) 45-50% of Al_2O_3 (4) 50-60% of Al_2O_3

136. Melting point of Corundum is
(1) 1723°C (2) 2050°C (3) 2300°C (4) 1810°C

137. Silica bricks show good thermal shock resistance above
(1) 600°C (2) 800°C (3) 400°C (4) 900°C

138. The breaking or cracking of refractory brick in service, to such an extent that pieces are separated, leaving new surfaces of the bricks exposed. This definition applies to
(1) Erosion (2) Abrasion (3) Corrosion (4) Spalling

139. The GROG is a
(1) Pre-Calcined raw material (2) Rejected raw material
(3) Rejected alumina brick (4) Rejected Magnesite brick

140. A course brick having an inclined face from which an arc is sprung. This definition applies to
(1) Key brick (2) Soldier course
(3) Skew Brick (4) Skull

141. Which of the following Refractory Oxides volatilizes in presence of water?
(1) BaO (2) BeO (3) Cr_2O_3 (4) ThO_2

142. For dry ramming masses for ling of Induction Furnaces, the bonding agent is
(1) Ceramic bonding (2) Plastic bonding
(3) Both Ceramic and Plastic bonding (4) None of the above

Set Code : T2
Booklet Code : A

143. A good quality Mullite brick should contain, Mullite on an average
(1) 85% (2) 80% (3) 60% (4) 70%

144. Plumbago crucible is
(1) Lead crucible
(2) Alumina crucible
(3) Silicon Carbide crucible
(4) Graphite crucible

145. Which of the following is not a neutral refractory?
(1) Chrome refractory
(2) Carbon refractory
(3) Silicon carbide refractory
(4) Zircon refractory

146. Which type of refractory do you recommend for Refractory lining of 'Coke oven'?
(1) 55%fire clay bricks
(2) Magnesite bricks
(3) Silica Bricks
(4) Carbon blocks

147. Which one of the following do you use as a binder (2%) in Silica brick manufacture
(1) Titania
(2) Zirconia
(3) Lime
(4) Magnesia

148. Blast furnace hearth is made of
(1) Fire Clay bricks (40% alumina)
(2) Carbon bricks
(3) Zircon bricks
(4) Vermiculite bricks

149. Dead Burning of Magnesite is achieved at (°C) temperature
(1) 1200-1350 (2) 800-950 (3) 1600-1750 (4) 1300-1450

150. A bridge wall is observed in
(1) Blast furnace
(2) Glass Tank furnace
(3) Annealing Furnace
(4) Reheating furnace

Set Code : T2
Booklet Code : A

151. Which of the following is not a common type of De-vitrification stone?
(1) Tridymite (2) Quartz
(3) Cristoballite (4) Wallastonite

152. Chalcogenide glasses are used as:
(1) Radiation shield glass (2) I.R.Transmitting Glass
(3) Photo chromatic Glass (4) Laser Glass

153. Which of the following is not used in photosensitive glasses?
(1) Cu (2) Pb (3) Ag (4) Au

154. Which of the following oxide is not a glass former?
(1) B_2O_3 (2) SiO_2 (3) GeO_2 (4) Cr_2O_3

155. Which of the following is a nucleating agent in a Glass system?
(1) TiO_2 (2) CaF_2 (3) ZrO_2 (4) All of them

156. Pyrex Glass contain
(1) Boron Trioxide (2) Aluminium oxide
(3) Lead oxide (4) Zinc oxide

157. Gold-Ruby and Copper-Ruby glasses are
(1) Colloidal color glasses (2) Photo sensitive Glasses
(3) Photochromic Glasses (4) None of these

158. Which of the following system is called Crystal Glass?
(1) K_2O-PbO-SiO_2 (2) Na_2O-PbO-SiO_2
(3) K_2O-BaO-SiO_2 (4) Na_2O-CaO-SiO_2

Set Code : T2
Booklet Code : A

159. Optical Glass containing no Lead oxide is called
(1) Flint Glass (2) Opal Glass
(3) Crown Glass (4) Crystal Glass

160. To remove green tint in the molten glass is due to the presence of
(1) MnO_2 (2) Chromic Oxide
(3) Ferric Oxide (4) CoO

161. A criteria for Glass formation is
(1) A low nucleation rate
(2) High Viscosity at or near the melting point
(3) The absence of nucleating heterogeneities that can act as nucleating agents
(4) All of the above

162. Which of the following is not a refining agent?
(1) As_2O_3 (2) Sb_2O_3 (3) $NaNO_3$ (4) TiO_2

163. Which of the following do you use to impart yellow color in Glass?
(1) CdS (2) FeS (3) CuS (4) ZnS

164. Which glass in the list below given is not made by pressing?
(1) Dishes (2) Tumblers (3) Lamp shell (4) T.V. Picture tube

165. The E-Glass, S-Glass and Z-Glass are
(1) Fibre Glass (2) Optical Glass (3) Sheet Glass (4) Toughened Glass

166. The average temperature that is maintained in a Glass Tank Furnace is
(1) 1500-1550°C (2) 1400-1450°C (3) 1300-1350°C (4) 1600-1650°C

Set Code : T2
Booklet Code : A

167. Which of the following is not used in refining of Glass?
(1) KNO_3 (2) Na_2SO_4
(3) As_2O_3 (4) Bi_2O_3

168. Which of the following is used to control the setting of the cement?
(1) Lime (2) Gypsum
(3) Sodium Chloride (4) Silica

169. The soundness of cement is measured by
(1) Vicat Apparatus (2) Blain's apparatus
(3) Autoclave expansion (4) None of these

170. Which of the following phase occurs in maximum amount in Portland cement?
(1) C_3S (2) C_2S (3) C_3A (4) C_4AF

171. Which of the following is Pozzolona?
(1) Calcined Clay (2) Rice Husk
(3) Fly Ash (4) All of the above

172. What is the % of CaO in Portland cement?
(1) 40-45% (2) 60-65% (3) 50-55% (4) 70-75%

173. How much quantity of Gypsum is added to the clinker during grinding as a set additive as percentage of clinker?
(1) 10-12% (2) 4-6% (3) 1-2% (4) 15-20%

174. What is the percent of water of consistency of Portland cement?
(1) 40% (2) 44% (3) 30% (4) 34%

Set Code : T2
Booklet Code : A

175. Which of the following phases is the cause for Flash set of cement?
(1) C_3S (2) C_2S (3) C_3A (4) C_4AF

176. Major phase in high Alumina cement is
(1) Calcium Aluminate (2) Tri Calcium Aluminate
(3) Tetra Calcium Alumino Ferrite (4) None of these

177. Which Electrical ceramics has a high coefficient of thermal expansion?
(1) Zircon Porcelain (2) Cordierite
(3) Low Loss Steatite (4) Magnesium Titanate

178. The Fullerene can be used as
(1) Semi conductor (2) Bio-Ceramics
(3) Super conductor (4) Optical ceramics

179. Where is availability of Fullerene discovered in A.P.?
(1) Kadapa Dist (2) Mahaboobnagar Dist
(3) Nellore Dist (4) Prakasam Dist

180. Which of the following material can be used as a Varistor?
(1) Si_3N_4 (2) SiC (3) BN (4) TiC

181. The cubic Zircon has
(1) Flourite structure (2) Perovskite structure
(3) Wurtzite structure (4) Ilmenite structure

182. Which of the following carbide has the highest melting point?
(1) WC (2) ZrC (3) HfC (4) TiC

Set Code : T2
Booklet Code : A

183. Which of the following is not a Low Loss ceramic:
(1) Steatite (2) Forsterite (3) Wallastonite (4) Rutile

184. Which of the following is not a type of ceramic - Metal seal:
(1) Compression seal (2) Butt seal
(3) Pin seal (4) Rod seal

185. Which of the following material is known as ceramic steel?
(1) ZrO_2 (2) Al_2O_3
(3) MgO (4) Cr_2O_3

186. Which of the following Ferrite is a permanent magnet?
(1) Ni-Zn Ferrite (2) Mg-Mn Ferrite
(3) Barium Hexa Ferrite (4) Co-Zn Ferrite

187. The Pyrometric cones actually does
(1) Pyrometric means measurement of heat in the kiln
(2) do really measure the amount of heat
(3) measure how much heat-energy the ceramic materials in the kiln have absorbed
(4) none is right

188. Feldspar is used extensively in enamels as:
(1) An Opacifier (2) A colorant
(3) A raw material (4) An agent which increases refractive index

189. The ground coat enamel for steel are melted at a temperature ranges of
(1) 500-550°C (2) 700-750°C
(3) 900-950°C (4) 1200-1250°C

Set Code : T2
Booklet Code : A

190. The adhesion of fired enamel to metal base is tested by
(1) Scratch test (2) Tensile test
(3) Impact test (4) Compression test

191. The enameling iron is
(1) Low carbon steel (2) Cold rolled steel
(3) Both (a and b) (4) None of (a and b)

192. Which of the following is used as an Opacifier for Silicate Glass Media?
(1) SnO_2 (2) $ZrSiO_4$
(3) TiO_2 (4) All of these

193. Acid resistance of enamel is tested with
(1) Hydrochloric acid (2) Citric acid
(3) Sulfuric acid (4) Tartaric acid

194. Which is not adopted to improve the chemical resistance of enamel:
(1) SiO_2 content is increased (2) TiO_2 content is decreased
(3) ZrO_2 is introduced (4) B_2O_3 content is increased

195. The pouring of molten enamel in to water to disintegrate in to smaller particles is known as
(1) Quenching (2) Fritting
(3) Granulation (4) None of these

196. Cobalt Oxide is used in ground coat of enamel, because
(1) gives Blue color (2) adherence to metal is excellent
(3) a and b are wrong (4) a and b are right

Set Code : T2
Booklet Code : A

197. The calories or thermal units contained in one unit of a substance and released when the substance is burnt is

(1) Thermal unit
(2) Calorific Value
(3) Gross calorific value
(4) None of these

198. Which pyrometer do you use to measure a temperature of 1200°C

(1) Optical Pyrometer
(2) Radiation Pyrometer
(3) Thermo couple
(4) Buller's rings

199. Where do we have largest deposits of lignite in India?

(1) Ranigunj, Jharkhand
(2) Neyveli, Tamilnadu
(3) Ramagundam, Andhra Pradesh
(4) None is right

200. Which kiln do you use to fire floor tiles in fast firing technology?

(1) Tank furnace
(2) Roller Kiln
(3) Rotary Kiln
(4) Blast furnace