Booklet Serial No. : 268

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TEST BOOKLET

LECT (ASH) MATH–2016

Time Allowed : 2 Hours] [Maximum Marks : 100

All questions carry equal marks.

INSTRUCTIONS

1. Immediately after the commencement of the examination, you should check that test booklet does not have any unprinted or torn or missing pages or items, etc. If so, get it replaced by a complete test booklet.
2. Write your Roll Number only in the box provided alongside. Do not write anything else on the Test Booklet.
3. This Test Booklet contains **100** items (questions). Each item comprises four responses (answers). Choose only one response for each item which you consider the best.
4. After the candidate has read each item in the Test Booklet and decided which of the given responses is correct or the best, he has to mark the circle containing the letter of the selected response by blackening it completely with Black or Blue ball pen. In the following example, response "C" is so marked :

   (A) (B) ● (D)

5. Do the encoding carefully as given in the illustrations. While encoding your particulars or marking the answers on answer sheet, you should blacken the circle corresponding to the choice in full and no part of the circle should be left unfilled. After the response has been marked in the ANSWER SHEET, no erasing/fluid is allowed.
6. You have to mark all your responses ONLY on the ANSWER SHEET separately given according to 'INSTRUCTIONS FOR CANDIDATES' already supplied to you. *Responses marked on the Test Booklet or in any paper other than the answer sheet shall not be examined.*
7. All items carry equal marks. Attempt all items. Your total marks will depend only on the number of correct responses marked by you in the Answer Sheet. There will be no negative marking.
8. Before you proceed to mark responses in the Answer Sheet fill in the particulars in the front portion of the Answer Sheet as per the instructions sent to you.
9. If a candidate give more than one answer, it will be treated as a wrong answer even if one of the given answers happens to be correct.
10. After you have completed the test, hand over the Answer Sheet only, to the Invigilator.

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1. A set that is not convex in **C** is the set :

   (A) $\{z \in \mathbf{C} \mid |z| < 1\}$

   (B) $\{z \in \mathbf{C} \mid 0 < |z| < 1\}$

   (C) $\{z \in \mathbf{C} \mid z = x + iy, 0 \le x \le 1, 0 \le y \le 1\}$

   (D) $\{z \in \mathbf{C} \mid z = x + iy, 0 \le y \le 1\}$

2. Which one of the following statements about a compact subset of a metric space is *false* ?

   (A) Compact subsets of a metric space are closed

   (B) Closed subsets of compact sets are compact

   (C) Intersection of a closed set and a compact sets is compact

   (D) Intersection of a bounded set and a compact set is compact

3. The function that does *not* define a metric on **R** is :

   (A) $d(x, y) = |x^2 - y^2|$

   (B) $d(x, y) = \dfrac{|x-y|}{1+|x-y|}$

   (C) $d(x, y) = \max(1, |x-y|)$

   (D) $d(x, y) = 2|x-y|$

4. The limit $\lim_{n\to\infty} x^n / n!$ exits if and only if :

(A) $x = 0$

(B) $|x| < 1$

(C) $0 < x < \infty$

(D) $-\infty < x < \infty$

5. Suppose $<a_n>$ is a monotonically decreasing sequence of non-negative real numbers. Suppose $\sum_{k=0}^{\infty} 2^k a_2 k$ converges. Then :

(A) $\sum_{n=1}^{\infty} a_n$ may diverge for some choices of $<a_n>$ and converge for some other choices of $<a_n>$

(B) $\sum_{n=1}^{\infty} a_n$ converges always

(C) $\sum_{n=1}^{\infty} a_n$ diverges always

(D) $\sum_{n=1}^{\infty} a_n$ converges to 0

6. The number e is :

(A) rational

(B) algebraic

(C) square root of a rational number

(D) trancendental

7. The radius of convergence of the series $\sum \frac{z^n}{n^2}$ is :

(A) 0 (B) 1

(C) 2 (D) ∞

8. Let S be the series $\sum_{n=0}^{\infty} \frac{(-1)^n}{\sqrt{n+1}}$ and T be product of S with itself. Then :

(A) S converges, T diverges (B) S diverges, T converges

(C) S, T both diverges (D) S, T both converges

9. Let

$$f_{2n-1} = \chi[0,1] \text{ and } f_{2n} = \chi[1,2]$$

for $n = 1, 2, ...$ where χ_A denotes the characteristic function of the set A. Then :

(A) $\int \liminf f_n dx < \liminf \int f_n dx$

(B) $\int \liminf f_n dx > \liminf \int f_n dx$

(C) $\int \liminf f_n dx = \liminf \int f_n dx$

(D) $\liminf \int f_n dx$ does not exist

10. A bounded function f defined on a finite interval $[a, b]$ is not necessarily Riemann integrable if :

(A) f is continuous at all irrational numbers in $[a, b]$

(B) f is continuous only at rational numbers in $[a, b]$

(C) f is uniformly continuous on (a, b)

(D) f is continuous on (a, b)

11. The function $f : \mathbf{R} \to \mathbf{R}$ defined by $f(x) = \sin x / x$ for $x \neq 0$ and $f(0) = 1$ is :

(A) Riemann integrable on **R** but not Lesbesgue integrable

(B) Lebesgue integrable on **R** but not Riemann integrable

(C) Neither Lebesgue integrable nor Riemann integrable

(D) Both Lebesgue integrable and Riemann integrable

12. If $f : \mathbf{R} \to \mathbf{R}$ is a function, then :

(A) $\{x \mid f(x) \geq \alpha\} = \bigcap_{n=1}^{\infty} \{x \mid f(x) > \alpha - 1/n\}$

(B) $\{x \mid f(x) \leq \alpha\} = \bigcup_{n=1}^{\infty} \{x \mid f(x) < \alpha + 1/n\}$

(C) $\{x \mid f(x) \geq \alpha\} = \bigcup_{n=1}^{\infty} \{x \mid f(x) > \alpha - 1/n\}$

(D) $\{x \mid f(x) \leq \alpha\} = \bigcap_{n=1}^{\infty} \{x \mid f(x) < \alpha - 1/n\}$

13. The function $\log z$ is analytic in the region :

(A) $\{z \in \mathbf{C} \mid |z| < 1\}$

(B) $\mathbf{C}$

(C) $\{z \in \mathbf{C} \mid \text{Im } z > 0\}$

(D) $\{z \in \mathbf{C} \mid |z - 1| < 2\}$

14. The fixed points of the bilinear transformation $w = \frac{1}{z-2}$ are :

(A) $1+\sqrt{2}, 1-\sqrt{2}$

(B) $\sqrt{2}+1, \sqrt{2}-1$

(C) $1+\sqrt{2}, -1+\sqrt{2}$

(D) $1-\sqrt{2}, -1+\sqrt{2}$

15. If $f(z) = u + iv$ is analytic in some domain G, which one of the following is *not* the same as the other three ?

(A) $\frac{\partial f}{\partial x}$

(B) $u_x - iu_y$

(C) $\frac{1}{i}\frac{\partial f}{\partial y}$

(D) $v_x + iu_y$

16. If the Möbius transformation $(az+b)/(cz+d)$ has three fixed points, then :

(A) $b \neq 0$

(B) $c \neq 0$

(C) $a \neq d$

(D) $\max\{|b|, |c|, |a-d|\} = 0$

17. The equation that does not represent a straight line is :

(A) $|z| = |z-1|$

(B) $|z+1| = |z-1|$

(C) $\text{Re } z = |z-1|$

(D) $|\arg z| = \pi/2$

18. The value of the contour integral $\int_{|z|=1} \bar{z}\, dz$ is :

(A) 0

(B) $2\pi i$

(C) $-2\pi i$

(D) 1

19. If $\gamma_1(t) = 1 + e^{it}$, $-\pi \le t \le \pi$, $\gamma_2(t) = 2 + 2e^{-it}$, $-\pi \le t \le \pi$, and $\gamma = \gamma_1 + \gamma_2$, then the winding number $n(\gamma, 1)$ is :

(A) 0

(B) 1

(C) 2

(D) –1

20. If $f(z) = u(z) + iv(z)$ is analytic in $\mathbf{D} = \{z : |z| < 1\}$. Then f is not necessarily a constant if :

(A) $|f(z)| \le |f(0)|$ for all $z \in \mathbf{D}$

(B) $|f(0)| \le |f(z)|$ for all $z \in \mathbf{D}$

(C) $u(0) \le u(z)$ for all $z \in \mathbf{D}$

(D) $u(z) \le u(0)$ for all $z \in \mathbf{D}$

21. Let $f : \mathbf{C} \to \mathbf{C}$ be a non-constant analytic function. If there is a constant M, an R > 0 and an integer $n \geq 1$ such that $|f(z)| \leq M|z|^n$ for $|z| > R$, then :

(A) f has a pole at ∞

(B) f has n zeros in $\mathbf{C}$

(C) f is a polynomial of degree n

(D) f is not a polynomial

22. Let G be a region and f be analytic on G and $f' \neq 0$. Then :

(A) f is one-to-one in G

(B) f is an open map in G

(C) interior of $f(G)$ is a proper subset of $f(G)$

(D) interior of $f(G)$ is empty

23. The residue of the function $(z-1)\, e^{(z-1)^{-2}}$ at the essential singularity $z = 1$ is :

(A) 0

(B) 1

(C) 2

(D) 1/2

24. Let the function f be analytic in the annulus $1 < |z| < 10$. Then $f(z)$ can be represented as a series $\sum_{n=0}^{\infty} a_n(z-5)^n$ whose radius of convergence is at least :

(A) 4

(B) 5

(C) 9

(D) 10

25. The value of the integral

$$\int_{|z|=\pi/4} \frac{1-\cos z}{z^3}\, dz$$

is :

(A) 0

(B) πi

(C) $-\pi i$

(D) $2\pi i$

26. Liouville's theorem states that :

(A) every bounded polynomial is constant

(B) every bounded analytic function in **C** is constant

(C) every analytic function vanishes at some point

(D) every bounded analytic function vanishes at some point

27. The Laurent series expansion of the function $1/(z-1)$ valid in $|z|>1$ is :

(A) $\sum_{n=1}^{\infty} z^{-n}$

(B) $\sum_{n=0}^{\infty} z^{n}$

(C) $\sum_{n=-1}^{\infty} z^{n}$

(D) $-\sum_{n=-1}^{\infty} z^{n}$

28. One of the values of $|2^i|$ is :

(A) 1

(B) 2

(C) log 2

(D) 0

29. A set A with an order relation < is well-ordered if :

(A) for any $a, b, c \in A, a < b, b < c$ implies $a < c$

(B) any non-empty subset of A has a smallest element

(C) any non-empty subset of A has a largest element

(D) any non-empty subset of A has both largest and smallest elements

30. Let Y = [0, 1] subspace of **R** in the subspace topology. A set that is not open in Y is :

(A) (1/2, 3/4)

(B) [0, 1/2)

(C) (1/2, 1]

(D) [1/2, 3/4]

31. The space [0, 1] × [0, 1] in the dictionary order topology is :

(A) connected as well as path connected

(B) connected but not path connected

(C) path connected but not connected

(D) neither connected nor path connected

32. The space that need not be compact is :

(A) the arbitrary product of compact spaces in the product topology

(B) the arbitrary union of compact spaces

(C) closed subspace of a compact space

(D) image of compact space under homeomorphism

33. Let $\mathbf{R}$ and $\mathbf{R}_l$ be the real with usual and lower limit topology respectively. Sorgenfrey plane is the space :

(A) $\mathbf{R} \times \mathbf{R}_l$

(B) $\mathbf{R}_l \times \mathbf{R}$

(C) $\mathbf{R}_l \times \mathbf{R}_l$

(D) $\mathbf{R} \times \mathbf{R}$

34. Which one of the following is *true* ?

(A) Product of two normal spaces is normal

(B) Subspace of a normal space is normal

(C) Closed subspace of a normal space is normal

(D) Arbitrary product of normal space is normal

35. Tychonoff theorem is the statement that :

(A) countable product of compact space is compact

(B) finite product of compact space is compact

(C) arbitrary product of compact space is compact in box topology

(D) Arbitrary product of compact spaces is compact in product topology

36. If d_1, d_2 are two metric on a space X, which one is *not* a metric ?

(A) $2d_1$

(B) d_1d_2

(C) $d_1 + 2d_2$

(D) $\frac{d_1}{1+d_1}$

37. Let $X \subset \mathbf{R}$ be a metric space with $d(x,y) = |x-y|$. Then X is not complete if :

(A) $X = \mathbf{R}$

(B) $X = \mathbf{Q}$

(C) $X = \mathbf{Z}$

(D) $X = \mathbf{N}$

38. A normed linear space in which the closed unit ball is not compact is :

(A) $\mathbf{R}^n$

(B) $\mathbf{C}^n$

(C) l^2

(D) $\mathbf{R} \times \mathbf{C}$

39. Let X be a finite-dimensional normed linear space. Then X is not necessarily a :

(A) Banach space (B) Vector space

(C) Hilbert space (D) Complete space

40. The space l^p is :

(A) not a Hilbert space for $p = 2$

(B) an inner product space for $p = 2$

(C) an inner product space for $p \neq 2$

(D) not a Banach space for $p \neq 2$

41. The space C[a, b] of all continuous functions with

$$\| x \| = \max \{ | x(t) | : a \leq x \leq b \}$$

is :

(A) an inner product space

(B) a Hilbert space

(C) a normed space but not a Banach space

(D) a Banach space

42. Let X be a complex vector space and f be a complex-valued linear functional on X and $f(x) = f_1(x) + if_2(x)$ where f_1, f_2 are real-valued. Which one of the following is *false* ?

(A) $f(x) = f_1(x) + if_1(ix)$

(B) $f(x) = f_1(x) - if_1(ix)$

(C) $f(x) = f_2(ix) + if_2(x)$

(D) $f(x) = f_2(ix) - if_1(ix)$

43. The matrix not in reduced row-echelon form is :

(A) $\begin{bmatrix} 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 0 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & 0 & 1 & 3 \\ 0 & 1 & 1 & 2 \\ 0 & 0 & 1 & 1 \end{bmatrix}$

44. The exact number of all solutions to the linear system $Ax = b$ of m equations in n variables cannot be :

(A) 0

(B) 1

(C) 2

(D) ∞

45. The inverse of the matrix

$$A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}.$$

is (1/2)B where B is the matrix :

(A) $\begin{bmatrix} -1 & 1 & 1 \\ 1 & -1 & 1 \\ 1 & 1 & -1 \end{bmatrix}$

(B) $\begin{bmatrix} 0 & -1 & -1 \\ -1 & 0 & -1 \\ -1 & -1 & 0 \end{bmatrix}$

(C) $\begin{bmatrix} 0 & 1 & -1 \\ -1 & 0 & -1 \\ -1 & 1 & 0 \end{bmatrix}$

(D) $\begin{bmatrix} -1 & -1 & 1 \\ -1 & 1 & -1 \\ 1 & -1 & -1 \end{bmatrix}$

46. The standard matrix of the orthogonal projection on the xz-plane is :

(A) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(C) $\begin{bmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(D) $\begin{bmatrix} \sin\theta & \cos\theta & 0 \\ 0 & 0 & 0 \\ -\cos\theta & \sin\theta & 1 \end{bmatrix}$

47. Let S be a subset of $\mathbf{R}^n$ consisting of m vectors. Then S is linearly dependent if :

(A) $m = n$

(B) $m < n$

(C) $m > n$

(D) $m \leq n$

48. If A is an invertible square matrix of order n, which one of the following is *false* ?

(A) The reduced row-echelon form of A is I_n

(B) The rank of A is n

(C) The nullity of A is n

(D) The row vectors of A spans $\mathbf{R}^n$

49. The eigenvalues of the square of the matrix

$$\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$$

are :

(A) 2, 2, 8 (B) 2, 4, 64

(C) 4, 4, 64 (D) 0, 2, 8

50. Let $\mathbf{R}^3 \to \mathbf{R}^3$ be defined by :

$$T(x, y, z) = (2x + 3y - 2z, 5y + 4z, x - z)$$

The characteristic polynomial of T is :

(A) $\lambda^3 - 6\lambda^2 + 5\lambda + 12$ (B) $\lambda^3 - 6\lambda^2 + 5\lambda - 12$

(C) $\lambda^3 + 6\lambda^2 + 5\lambda + 12$ (D) $\lambda^3 - 6\lambda^2 - 5\lambda - 12$

51. An example of a linear transformation is :

(A) $T : \mathbf{R}^2 \to \mathbf{R}^2$ defined by $T(x, y) = (x^2, y^2)$

(B) $T : \mathbf{R}^3 \to \mathbf{R}^2$ defined by $T(x, y, z) = (x + 1, y + z)$

(C) $T : \mathbf{R}^2 \to \mathbf{R}$ defined by $T(x, y) = |x + y|$

(D) $T : \mathbf{R}^2 \to \mathbf{R}^2$ defined by $T(x, y) = (x + y, x)$

52. Euclid's lemma states that, if p prime, then :

(A) $p \mid a$ or $p \mid b$ implies $p \mid ab$

(B) $p \mid a$ and $p \mid b$ implies $p \mid ab$

(C) $p \mid ab$ implies $p \mid a$ or $p \mid b$

(D) $p \mid ab$ implies $p \mid a$ and $p \mid b$

53. A valid Universal Product Code (UPC) is :

(A) 978-81-315-2074-1 (B) 978-81-315-2074-2

(C) 978-81-315-2074-4 (D) 978-81-315-2074-6

54. A prize for mathematicians considered equivalent of Nobel prize is :

(A) Abel prize
(B) Euler prize
(C) Gauss prize
(D) Nevanlinna prize

55. The number of elements of order 8 in $\mathbf{Z}_8$ is :

(A) 1
(B) 2
(C) 3
(D) 4

56. Let G be the group under multiplication modulo 10 of all positive integers less than 10 and relatively prime to 10. Which one of the following is *false* ?

(A) G is of order 4
(B) G is cyclic
(C) Order of the cyclic subgroup generated by 3 is 4
(D) G is non-abelian

57. The generators of the subgroup of order 9 of the group $\mathbf{Z}_{36}$ are :

(A) 1, 4, 8, 16, 32
(B) 4, 8, 16, 32
(C) 4, 8, 16, 20, 28, 32
(D) 2, 4, 8, 32

58. The number of elements of order 3 in the symmetric group of degree 7 is :

(A) 70 (B) 280

(C) 350 (D) 18

59. The permutation (12345) is *not* equal to :

(A) (15) (14) (13) (12)

(B) (15) (14) (13) (12) (23)

(C) (54) (53) (52) (51)

(D) (54) (52) (21) (25) (23) (13)

60. The ring $\mathbf{Z}_n$ of all integers modulo n is not an integral domain if n equals :

(A) 2 (B) 3

(C) 4 (D) 5

61. Every subgroup of a cyclic group is :

(A) cyclic and normal (B) cyclic but not normal

(C) normal but not cyclic (D) neither cyclic nor normal

62. The set of all square matrices of order 2 with integer entries is :

(A) a commutative ring
(B) an integral domain
(C) a ring with unity
(D) a field

63. Let R be a commutative ring with unity. Let A be an ideal of R. Then :

(A) R/A is a field if and only if A is prime

(B) R/A is a field if and only if A is maximal

(C) R/A is a field if A is prime

(D) R/A is an integral domain if and only if A is maximal

64. The first approximate root of the equation $x^3 - 3x - 5 = 0$ by Newton-Raphson method with $x_0 = 3$ is :

(A) 0.6471
(B) 0.5417
(C) 2.4583
(D) 1.8653

65. The value of $\int_0^6 (1+x^2)^{-1}\,dx$ by Simpson's 3/8-rule is :

(A) 1.3662

(B) 1.4056

(C) 1.3571

(D) 1.4108

66. The third divided difference of $1/x$ based on the points x_0, x_1, x_2, x_3 is :

(A) $-\frac{1}{x_0 x_1 x_2 x_3}$

(B) $\frac{1}{x_0 x_1 x_2 x_3}$

(C) $-\frac{1}{x_0 x_1 x_2}$

(D) $\frac{1}{x_0 x_1 x_2}$

67. If the matrix A is diagonally dominant matrix, the Jacobian iteration scheme :

(A) converges for any initial starting vector

(B) converges for non-negative initial starting vector

(C) converges for certain initial starting vectors

(D) never converges

68. For cubic polynomial $y(x)$ which takes the following values $y(0) = 1$, $y(1) = 0$, $y(2) = 1$ and $y(3) = 10$, the value of $y(4)$ is :

(A) 24

(B) 33

(C) 36

(D) 42

69. The second order partial differential equation $u_{xx} + xu_{yy} = 0$ is :

(A) elliptic for $x > 0$

(B) hyperbolic for $x > 0$

(C) parabolic for $x < 0$

(D) elliptic for $x < 0$

70. The general integral of the equation $u_{xx} + u_{yy} = 0$ is of the form :

(A) $u(x,y) = f(x+iy) + g(x-iy)$

(B) $u(x,y) = f(x+iy) + g(x+iy)$

(C) $u(\dot{x},y) = f(x-iy) + g(x-iy)$

(D) $u(x,y) = f(x+iy) + g(ix-y)$

71. The partial differential equation obtained by elimination of the arbitrary constants a, b from $z = (x + a)(y + b)$ is :

(A) $x\frac{\partial z}{\partial x}+\frac{\partial z}{\partial y}=0$

(B) $z=\frac{\partial z}{\partial x}+\frac{\partial z}{\partial y}$

(C) $z=\frac{\partial z}{\partial x}\frac{\partial z}{\partial y}$

(D) $\frac{\partial z}{\partial x}+y\frac{\partial z}{\partial y}=0$

72. The complete integral of the equation

$$z=x\frac{\partial z}{\partial x}+y\frac{\partial z}{\partial y}+\ln\left(\frac{\partial z}{\partial x}\frac{\partial z}{\partial y}\right)$$

is :

(A) $z=ax+by+\ln(a+b)$

(B) $z=ax-by-\ln(a-b)$

(C) $z=ax+by+\ln a/b$

(D) $z=ax+by+\ln ab$

73. D'Alembert solution of the wave equation is :

(A) $u(x,t)=\phi(x+ct)-\psi(x+ct)$

(B) $u(x,t)=\phi(x+ct)+\psi(x-ct)$

(C) $u(x,t)=\phi(x-ct)-\psi(x-ct)$

(D) $u(x,t)=\phi(c(x+t))+\psi(c(x-t))$

74. The initial value problem $y' = \sqrt{|y|}$ for $0 < y < 10, y(0) = 10$ has :

(A) no solution

(B) two independent solutions

(C) unique solution

(D) infinitely many solutions

75. The differential equation whose linearly independent solutions are $\cos 2x$, $\sin 2x$ and e^x is :

(A) $y''' + y'' + 4y' = 0$

(B) $y''' - y'' + 4y' - 4y = 0$

(C) $y''' + y'' - 4y' - 4y = 0$

(D) $y''' - y'' - 4y' + 4y = 0$

76. The particular integral of $y'' - 2y' + 4y = e^x \cos x$ is :

(A) $\cos x$

(B) $\sin x$

(C) $e^x \cos x / 2$

(D) $e^x \sin x / 2$

77. The value of the Wronskian $W(x, x^2, x^3)$ is :

(A) $2x$

(B) $2x^2$

(C) $2x^3$

(D) $2x^4$

78. The p-discriminant does *not* contain :

(A) the envelope

(B) the tac-locus

(C) the cusp-locus

(D) the node-locus

79. The particular integral of $y''' - y' = e^x + e^{-x}$ is :

(A) $\frac{e^x + e^{-x}}{2}$

(B) $\frac{x(e^x + e^{-x})}{2}$

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

(D) $\frac{x^2(e^x - e^{-x})}{2}$

80. The particular solution of $x^2y'' + 2xy' + y/4 = 1/\sqrt{x}$ is :

(A) $\frac{1}{2\sqrt{x}}$

(B) $\frac{\log x}{2\sqrt{x}}$

(C) $\frac{(\log x)^2}{2\sqrt{x}}$

(D) $\frac{\sqrt{x}\log x}{2}$

81. What was the per capita income in H.P. during 2013-14 ?

(A) ₹ 55,472

(B) ₹ 75,380

(C) ₹ 85,792

(D) ₹ 95,582

82. What was the total vegetable production in H.P. during 2013-14 ? (in lakh tons) :

(A) 14.30 (B) 15.47

(C) 16.66 (D) 17.09

83. What is the appoximate number of foreign tourists who visited H.P. during 2014 (in lakhs) ?

(A) 4.84 (B) 4.14

(C) 3.95 (D) 3.90

84. What was the title of the message aimed at financial literacy among school children in Jhandutta Block of Bilaspur District, H.P. ?

(A) Bachat Ki Baat (B) Bachat Ki Jankari

(C) Bachat Ki Zarurat (D) Bachat Ki Pathshala

85. Who was the first Chairman of H.P. Administrative Tribunal ?

(A) Justice J. N. Banerjee

(B) Justice Hamidullah

(C) Justice Hira Singh Thakur

(D) Justice T.V.R. Tatachari

86. Which raja of Nurpur princely state declined the Jagir that was offered to him by Maharaja Ranjit Singh after the forfeiture of his state ?

(A) Bir Singh
(B) Jagat Singh
(C) Basu
(D) Suraj Mal

87. Through whom did the British Government exercise control over the princely states in India ?

(A) Political Agent
(B) Resident
(C) Superintendent of States
(D) All of these

88. Between which two valleys is Losar village near which Kunjam Devi temple is located ?

(A) Bandla and Danwin
(B) Kunihar and Arki
(C) Spiti and Lahaul
(D) Balh and Gutkar

89. In which tehsil of Kinnaur is Taranda Devi temple ?

(A) Nichar
(B) Sangla
(C) Moorang
(D) Kalpa

90. Who is the author of *Kuloot Desh Ki Kahani* ?

(A) Lal Chand Prarthi
(B) G. D. Khosla
(C) T. S. Negi
(D) K. L. Joshi

91. Persons of which age-group are eligible under the Pradhan Mantri Jeevan Jyoti Beema Yojna ?

(A) 16-50 years
(B) 16-60 years
(C) 18-50 years
(D) 18-60 years

92. Who is the President of All India Jamiat Ulema-i-Hind ?

(A) Maulana Obessi
(B) Maulana Masood Ali
(C) Maulana Abdul Bukhari
(D) Maulana Arshad Madni

93. When was the Ministry of Minority Affairs created in India ?

(A) 2004 AD
(B) 2006 AD
(C) 2008 AD
(D) 2010 AD

94. Which bank was given permission to be set up in private sector in India in 2014 AD ?

(A) IDBI

(B) HDFC

(C) Bandhan Financial Services

(D) Reliance Industries Private Limited

95. Which is the rarest blood group ?

(A) 'AB Positive' (B) 'AB Negative'

(C) 'A' (D) 'B'

96. On which date of Gregorian calendar in a leap year does the first day of Chaitra of the Saka calendar fall ?

(A) February 29 (B) March 21

(C) April 13 (D) April 22

97. Which country's currency is Kyat ?

(A) Malta (B) Myanmar

(C) Israel (D) Combodia

98. What is the function of catalytic converter in the car exhaust ?

(A) to reduce pollution

(B) to reduce sound

(C) to convert water into steam

(D) to reduce the rusting of exhaust

99. Which are the working languages of the United Nations Secretariat ?

(A) English and Russian

(B) English and German

(C) English and French

(D) English and Spanish

100. In which year was the first newspaper (Oxford Gazette) published in English ?

(A) 1665 AD

(B) 1732 AD

(C) 1815 AD

(D) 1909 AD