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Roll No. _____

O.M.R. Serial No. :

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Question Booklet Number

3759279

BCA IV Semester (NEP) Examination, 2025-26

MATHEMATICS-III

Paper Code

B	C	A	4	0	0	5
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Question Booklet
Series

C

Time : 1 : 30 Hours]

[Maximum Marks : 75

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.
2. The booklet contains 100 questions. Examinee is required to answer 75 questions in the OMR Answer-Sheet provided and not in the question booklet. **All** questions carry equal marks.
3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.
4. Four alternative answers are mentioned for each question as – A, B, C & D in the booklet. The candidate has to choose the correct answer and mark the same in the OMR Answer-Sheet as per the direction :

(Remaining instructions on the last page)

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।
2. प्रश्न-पुस्तिका में 100 प्रश्न हैं। परीक्षार्थी को 75 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। सभी प्रश्नों के अंक समान हैं।
3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गये हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, तो उसे तुरन्त बदल लें।
4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर- A, B, C तथा D हैं। परीक्षार्थी को उन चारों विकल्पों में से सही उत्तर छाँटना है। उत्तर को OMR उत्तर-पत्रक में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

(शेष निर्देश अन्तिम पृष्ठ पर)

SECURE
SEA

1. Solution of $(2xy^2 - 2y)dx + (3x^2y - 4x)dy = 0$ is
 - (A) $x^2y^3 - 2y^2x = c$
 - (B) $x^2y^3 = c$
 - (C) $2y^2x = c$
 - (D) None
2. The integrating factor of the differential equation $(1 - x^2)\frac{dy}{dx} - xy = 1$ is
 - (A) $-x$
 - (B) $\frac{x}{1 - x^2}$
 - (C) $\sqrt{1 - x^2}$
 - (D) $\frac{1}{2}\log(1 - x^2)$
3. Which of the following equations is not a second order linear differential equation with constant coefficients?
 - (A) $y'' - y = 0$
 - (B) $y'' + 3xy' + 2y = 0$
 - (C) $y'' + y' + y = 0$
 - (D) None
4. Which of the following equations is non-homogeneous?
 - (A) $y'' + \sin(x)y' + y = 0$
 - (B) $y'' - 3y' + 2y = 0$
 - (C) $y'' + xy' + y = 0$
 - (D) $y'' + e^x y = x$
5. Solution of $x\frac{dy}{dx} + y = y^2 \log x$ is:
 - (A) $\frac{1}{xy} = \frac{\log x}{x} + \frac{1}{x} + c$
 - (B) $\frac{1}{xy} = \frac{\log x}{x} + c$
 - (C) $\frac{1}{xy} = \frac{1}{x} + c$
 - (D) None
6. Reduced linear differential equation of $x\frac{dy}{dx} + 3y = x^3 y^2$ is:
 - (A) $\frac{dv}{dx} - \frac{3}{x}v = -x^2$
 - (B) $\frac{dv}{dx} - \frac{3}{x}v = x^2$
 - (C) $\frac{dv}{dx} + \frac{3}{x}v = -x^2$
 - (D) None
7. P.I. of $(4D^2 - 12D + 9)y = 144e^{3x/2}$ is:
 - (A) $18e^{3x/2}$
 - (B) $18xe^{3x/2}$
 - (C) $8e^{3x/2}$
 - (D) $18x^2e^{3x/2}$
8. Solution of $(D^2 + 2D + 5)y = 0$ is:
 - (A) $A \cos x + B \sin x$
 - (B) $e^x(A \cos x + B \sin x)$
 - (C) $e^{-x}(A \cos 2x + B \sin 2x)$
 - (D) None

9. Solution of $\log\left(\frac{dy}{dx}\right) = ax + by$ is:

- (A) $\frac{e^{-by}}{b} = \frac{e^{ax}}{a} + c$
- (B) $\frac{e^{-by}}{b} = -\frac{e^{ax}}{a} + c$
- (C) $-\frac{e^{-by}}{b} = \frac{e^{ax}}{a} + c$
- (D) None

10. Solution of $(x+y)(dx-dy)=dx+dy$ is:

- (A) $\frac{1}{2}(x+y) + \frac{1}{2}\log(x+y) = x + c$
- (B) $\frac{1}{2}(x+y) = x + c$
- (C) $\frac{1}{2}\log(x+y) = x + c$
- (D) None

11. The differential equation

$$(1 + e^{x/y})dx + e^{x/y}\{1 - (x/y)\}dy = 0 \text{ is:}$$

- (A) Exact
- (B) Not Exact
- (C) Not possible to check
- (D) None

12. The equation $\frac{dy}{dx} + x \sin^2 y = x^3 \cos^3 y$ is reduced to a linear form by using the substitution:

- (A) $x^2 = 4ay$
- (B) $y^2 = 4ax$
- (C) $y = 4ax^2$
- (D) None

13. $\frac{1}{x^3}$ is given as an integrating factor of $(x^3 - 3xy + 2y^2)dx + x(3x - 2y)dy = 0$. Its general solution is:

- (A) $3\log x + \frac{3y}{x} - \frac{y^2}{x^2} = C$
- (B) $x + \frac{3y}{x} - \frac{y^2}{x^2} = C$
- (C) $x + \frac{3y}{x} + \frac{y^2}{x^2} = C$
- (D) None

14. $y = c_1 e^{3x} + c_2 e^{-3x}$ where c_1 and c_2 are constants is the general solution of the differential equation $\frac{d^2 y}{dx^2} + Ky = 0$ where K is equal to

- (A) 9
- (B) -9
- (C) 3
- (D) None

15. If c is eliminated from the equation $y = 2cx + c^2$ then the order of differential equation is:

- (A) 2
- (B) 1
- (C) 3
- (D) None

16. The differential equation satisfying the relation $y = A \cos(mt - \alpha)$ is:

- (A) $\frac{d^2 y}{dt^2} = -\alpha^2 y$
- (B) $\frac{dy}{dt} = -m^2 y$
- (C) $\frac{d^2 y}{dt^2} = -m^2 y$
- (D) None

17. A particle executing simple harmonic motion of amplitude 5 cms has a speed of 8 cms/sec when at a distance of 3 cms from the centre of the path. The period of the motion of the particle will be:
- (A) 2π sec
(B) π sec
(C) 4π sec
(D) None
18. $e^{-x}(c_1 \cos \sqrt{3}x + c_2 \sin \sqrt{3}x) + c_3 e^{2x}$ is the general solution of:
- (A) $\frac{d^3y}{dx^3} + 8y = 0$
(B) $\frac{d^3y}{dx^3} - 8y = 0$
(C) $\frac{d^3y}{dx^3} - y = 0$
(D) None
19. Solution of $(1-x^2)\frac{dy}{dx} + xy = xy^2$ is:
- (A) $cy = \sqrt{1-x^2}$
(B) $cy = y\sqrt{1-x^2}$
(C) $cy = (1-y)\sqrt{1-x^2}$
(D) None
20. C.F. of $(D^2-2D+2)y=e^x \tan x$ is
- (A) $A \cos x + B \sin x$
(B) $e^x(A \cos x + B \sin x)$
(C) $e^{2x}(A \cos x + B \sin x)$
(D) None
21. Solution of $(2ax+by)ydx+(ax+2by)xdy=0$ is:
- (A) $xy(ax+by)=c$
(B) $x(ax+by)=c$
(C) $y(ax+by)=c$
(D) None
22. Solution of $Dy+(3/x)y=1/x^4$ is:
- (A) $yx=\log x+c$
(B) $yx^2=\log x+c$
(C) $yx^3=\log x+c$
(D) None
23. Value of arbitrary constant in the solution of $3e^x \tan y dx+(1+e^x) \sec^2 y dy=0$; given $y(0)=\pi/4$, is:
- (A) 2
(B) 4
(C) 6
(D) 8
24. Solution of $3e^x \tan y dx+(1+e^x) \sec^2 y dy=0$ is:
- (A) $(1+e^x) \tan y=c$
(B) $(1+e^x)^2 \tan y=c$
(C) $(1+e^x)^3 \tan y=c$
(D) None
25. Solution of $\frac{d^2y}{dx^2}-4\frac{dy}{dx}-12y=3e^{5x}$ is:
- (A) $-\frac{3}{7}e^{5x} + Ae^{-6x} + Be^{2x}$
(B) $-\frac{3}{7}e^{5x} + Ae^{6x} + Be^{-2x}$
(C) $\frac{3}{7}e^{-5x} + Ae^{6x} + Be^{2x}$
(D) None

26. P.I. of $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} - 12y = 3e^{5x}$ is:

(A) $-\frac{3}{7}e^{5x}$

(B) $\frac{3}{7}e^{5x}$

(C) $\frac{3}{7}e^{-5x}$

(D) None

27. C.F. of $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} - 12y = 3e^{5x}$ is:

(A) $Ae^{6x} + Be^{2x}$

(B) $Ae^{-6x} + Be^{2x}$

(C) $Ae^{6x} + Be^{-2x}$

(D) None

28. If $y = \frac{\log x}{x}$, then $\frac{d^2y}{dx^2} =$

(A) $\frac{2\log x - 3}{x^3}$

(B) $\frac{2\log x + 3}{x^3}$

(C) $\frac{\log x - 3}{x^3}$

(D) None

29. Number of arbitrary constants in the solution of second order differential equation is:

(A) 0

(B) 1

(C) 2

(D) 3

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30. P.I. of $(D^2 + D)y = x^2 + 2x + 4$ is:

(A) $x^3 + 2x$

(B) $x^3 + 4x$

(C) $(1/3)x^3 + 4x$

(D) None

31. Solution of differential equation $(D^2 - 3D + 2)y = e^{3x}$ is:

(A) $ae^x + be^{2x} + (1/2)e^{3x}$

(B) $ae^x + be^{2x}$

(C) $ae^x + be^{2x} + e^{3x}$

(D) None

32. Solution of the differential equation $(D^2 - 2D + 5)y = 0$ is:

(A) $a \cos 2x + b \sin 2x$

(B) $e^{2x}(a \cos 2x + b \sin 2x)$

(C) $e^x(a \cos 2x + b \sin 2x)$

(D) $e^{3x}(a \cos 2x + b \sin 2x)$

33. The solution of the differential equation $(D^2 + 1)y = 0$ satisfying the conditions $y(0) = 1$, $y(\pi/2) = 2$ is:

(A) $2 \cos x + \sin x$

(B) $\cos x + 2 \sin x$

(C) $\cos x + \sin x$

(D) $2(\cos x + \sin x)$

34. The equation $Dy + py = Q$, where Q is the function of x ; is known as
- Bernoulli's equation
 - Clairaut's equation
 - Exact equation
 - Linear equation
35. Solve $Dy + (3/x)y = 1/x^4$
- $yx^3 = \log x + c$
 - $y = \log x + c$
 - $x^3 = \log x + c$
 - None
36. If $3e^x \tan y \, dx + (1+e^x) \sec^2 y \, dy = 0$; given $y(0) = \pi/4$, then C equal to:
- 2
 - 4
 - 6
 - 8
37. The P.I. of $(D^2 - 4)y = \sin 2x$
- $(1/8) \sin 2x$
 - $(1/8) \cos 2x$
 - $-(1/8) \sin 2x$
 - None
38. The integrating factor of $Dy - y/x + 1 = (x+1)e^{3x}$
- $1/x + 1$
 - $1/x - 1$
 - $1/1 - x$
 - None
39. PI of $(D^2 + D)y = 4 + 2x + x^2$
- $4x + x/3$
 - $4x + x^2/3$
 - $4x + x^3/3$
 - None
40. The family of straight lines passing through the origin is represented by the differential equation:
- $ydx - xdy = 0$
 - $ydx + xdy = 0$
 - $ydy - xdx = 0$
 - None
41. If $f(x)$ is odd, then the value of $\int_{-a}^a f(x)dx$ is:
- 0
 - a
 - $2a$
 - None

42. If $f(x) = x^4$ is defined in $[-1,1]$, then Fourier coefficient b_n is:
- (A) 4
(B) -1
(C) 0
(D) 1
43. Period of constant function is:
- (A) 0
(B) 1
(C) -1
(D) Not defined
44. If $f(x) = x \sin x$ in $(-\pi, \pi)$ then the value of b_n is equal to:
- (A) 0
(B) 1
(C) -1
(D) None
45. The period of $\sin nx$ is:
- (A) $\frac{\pi}{n}$
(B) 2π
(C) n
(D) $\frac{2\pi}{n}$
46. If $f(x) = x^2 \cos x$ is defined in $[-1,1]$, then Fourier coefficient b_n is:
- (A) 4
(B) -1
(C) 0
(D) 1
47. Any waveform can be expressed in Fourier series if it satisfied:
- (A) Sampling conditions
(B) Maxwell conditions
(C) Leibnitz conditions
(D) Dirichlet conditions
48. Function $f(x) = x - x^2$ in $-\pi < x < \pi$ is:
- (A) An even function
(B) An odd function
(C) Neither even nor odd function
(D) Logarithmic function
49. Find the Fourier coefficient a_0 for $f(x) = 1$ on $[-\pi, \pi]$:
- (A) 0
(B) 1
(C) 2
(D) π
50. Fourier series for $f(x) = |\sin x|$ in $(-\pi, \pi)$ contains:
- (A) Sine terms
(B) Cosine terms
(C) Both of them
(D) None of them

51. If $f(t)$ is even, then the Fourier series has only:
- (A) Cosine terms
 - (B) Sine terms
 - (C) Both
 - (D) None
52. A Fourier series represents a function as:
- (A) Polynomial
 - (B) Exponential
 - (C) Trigonometric sum
 - (D) Logarithmic series
53. If $f(x)$ is periodic with period $T=2l$ then fourier coefficient $a_0 =$
- (A) $\frac{1}{2l} \int_a^b f(x) dx$
 - (B) $\frac{1}{l} \int_a^b f(x) dx$
 - (C) $\frac{2}{l} \int_a^b f(x) dx$
 - (D) None of them
54. Which are the Fourier coefficients in the following?
- (A) a_0, a_n and b_n
 - (B) a_n
 - (C) b_n
 - (D) a_n and b_n
55. If $f(x) = \cos 2x$, then time period of $f(x)$ is:
- (A) 2π
 - (B) $\pi/2$
 - (C) 4π
 - (D) π
56. The period of the function
- $$\begin{cases} 0, & 0 \leq x < 2 \\ 1, & 2 \leq x < 4 \\ 0, & 4 \leq x < 6 \end{cases}$$
- is ...
- (A) 2
 - (B) 4
 - (C) 6
 - (D) 0
57. Dirichlet Conditions for a function $f(x)$:
- (A) $f(x)$ is defined and single-valued except possibly at a finite number of points in $(-L, L)$
 - (B) $f(x)$ is periodic with period $2L$
 - (C) $f(x)$ and $f'(x)$ are piecewise continuous in $(-L, L)$
 - (D) All of the above
58. Which of the following is a condition for a function to have a Fourier series?
- (A) Dirichlet condition
 - (B) Bernoulli rule
 - (C) Taylor's theorem
 - (D) Lagrange condition

59. A "periodic function" is given by a function which :
- (A) has a period $T=2\pi$
 - (B) satisfies $f(t+T)=f(t)$
 - (C) Satisfies $f(t+T)=-f(t)$
 - (D) has a period $T=\pi$
60. Which of the following is an "even" function of t ?
- (A) t^2
 - (B) t^2-4t
 - (C) $\sin 2t+3t$
 - (D) t^3+6
61. If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$, then the value of $\nabla(\log r)$ is:
- (A) 0
 - (B) $\frac{\vec{r}}{r^2}$
 - (C) $\frac{\vec{r}}{r}$
 - (D) None
62. The magnitude of the gradient of the function $f=xyz^3$ at $(1,0,2)$ is:
- (A) 0
 - (B) 4
 - (C) 8
 - (D) None
63. Divergence of the vector $\vec{V} = 3y^4z^2\hat{i} + 4x^3z^2\hat{j} - 3x^2y^2\hat{k}$ is:
- (A) 0
 - (B) 1
 - (C) 2
 - (D) None
64. Directional derivative of $\phi=2x^2y+3xy^3$ in the direction of $3\hat{i} + 4\hat{j}$ at the point $(1,1)$ is:
- (A) 11
 - (B) 12
 - (C) 13
 - (D) 14
65. If $\vec{A} = 2x^2\hat{i} - 3yz\hat{j} + xz^2\hat{k}$ and $f=2z-x^3y$, then the value of $\vec{A} \cdot \nabla f$ at $(1, -1, 1)$ is:
- (A) 0
 - (B) 5
 - (C) 10
 - (D) 20
66. If $z_1=1-i$, $z_2=-2+4i$ then the value of $|2z_2-3z_1|^2$ is:
- (A) 140
 - (B) -140
 - (C) 170
 - (D) 180

67. The value of $3\left(\frac{1+i}{1-i}\right)^2 - 2\left(\frac{1-i}{1+i}\right)^3$ is:
- (A) $-3-i$
 (B) $-3-2i$
 (C) $4-i$
 (D) $4+i$
68. If $z_1=1-i$, $z_2=-2+4i$ then the value of $\left|\frac{z_1+z_2+1}{z_1-z_2+i}\right|$ is:
- (A) 4
 (B) -4
 (C) 3/5
 (D) 4/3
69. The value of $(3+2i)(2-i)$ is equal to:
- (A) $8+i$
 (B) $8-i$
 (C) $-8+i$
 (D) $-8-i$
70. If $w=f(z)=z^2$, then the value of W correspond to $z=1-3i$ is:
- (A) $8+6i$
 (B) $8-6i$
 (C) $-8+6i$
 (D) $-8-6i$
71. What is the value of $\vec{\nabla}\left(\frac{1}{r}\right)$ is:
- (A) $\frac{\vec{r}}{r^3}$
 (B) $-\frac{\vec{r}}{r^3}$
 (C) $\frac{\vec{r}}{r^2}$
 (D) $-\frac{\vec{r}}{r^2}$
72. If $\phi=xyz$ then $\nabla\phi$ is equal to:
- (A) $yz\hat{i} + xz\hat{j} + xy\hat{k}$
 (B) $xyz(\hat{i} + \hat{j} + \hat{k})$
 (C) $x+y+z$
 (D) 0
73. Curl $(\vec{a} \times \vec{r})$ is:
- (A) $2\vec{a}$
 (B) $\vec{a}$
 (C) 0
 (D) 3
74. If vector $\vec{V} = (x+3y)\hat{i} + (2y-2z)\hat{j} + (x+az)\hat{k}$ is solenoidal. Then a is:
- (A) -2
 (B) 3
 (C) 1
 (D) -3
75. Which operator is used to find gradient?
- (A) Cross
 (B) Dot
 (C) Del (∇)
 (D) Laplace

76. Laplacian operator is:

- (A) ∇
- (B) ∇^2
- (C) $\nabla \times$
- (D) $\nabla \cdot$

77. Unit vector in the direction of vector

$$A = 6i + 8j \text{ is:}$$

- (A) $i+j$
- (B) $3i+4j$
- (C) $0.6i+0.8j$
- (D) $0.8i+0.6j$

78. If a vector field V is irrotational vector, then-

- (A) $\text{Grad } V=0$
- (B) $\text{Div } V=0$
- (C) $\text{Curl } V=0$
- (D) None

79. Divergence of constant vector is:

- (A) 0
- (B) 1
- (C) Vector
- (D) Undefined

80. $\Delta|r|^2$ is equal to-

- (A) $2r$
- (B) $2\vec{r}$
- (C) $\vec{r}$
- (D) 0

81. Curl r is :

- (A) 0
- (B) Zero Vector
- (C) 3
- (D) None

82. Which operator represents the curl of a vector field F ?

- (A) $\nabla \cdot F$
- (B) $\nabla \times F$
- (C) ∇f
- (D) $\nabla^2 F$

83. Divergence of $\vec{F} = x\hat{i} + y\hat{j} + z\hat{k}$

- (A) 1
- (B) 2
- (C) 3
- (D) 0

84. If $\phi = x^2 + y^2 + z^2$ then $\nabla\phi$
- (A) $2x\hat{i} + 2y\hat{j} + 2z\hat{k}$
- (B) $x\hat{i} + y\hat{j} + z\hat{k}$
- (C) $x^2\hat{i} + y^2\hat{j} + z^2\hat{k}$
- (D) 0
85. Curl of gradient is always:
- (A) 0
- (B) 1
- (C) Vector
- (D) Scalar
86. The imaginary part of $6-2i$ is:
- (A) -2
- (B) 2
- (C) 6
- (D) 5
87. The real part of $-7+9i$ is:
- (A) -7
- (B) 9
- (C) -9
- (D) 7
88. If $z = 2 - i$, then $|z|^2$ is:
- (A) 5
- (B) 3
- (C) $\sqrt{5}$
- (D) 2
89. A complex number can be written in the form:
- (A) $a-b$
- (B) $a+bi$
- (C) ab
- (D) $\sqrt{a} + \sqrt{b}$
90. Which of the following is equal to i^4 ?
- (A) 2
- (B) -1
- (C) 1
- (D) 0
91. If $(x+5)+i(y+3)=0$ then-
- (A) $x=5, y=3$
- (B) $x=-5, y=3$
- (C) $x=5, y=-3$
- (D) $x=-5, y=-3$

92. $\sqrt{-100}$ is:

- (A) 10
- (B) -10
- (C) 10i
- (D) -10i

93. Real part of $z=4+i$ is:

- (A) 1
- (B) 4
- (C) 4+i
- (D) i

94. Locus of the $|z| < 1$ is:

- (A) $x^2+y^2=1$
- (B) $x^2+y^2>1$
- (C) $x^2+y^2<1$
- (D) $x+y=1$

95. Argument of $z=1+i$ is:

- (A) $\frac{\pi}{2}$
- (B) $\frac{\pi}{4}$
- (C) 0
- (D) $-\frac{\pi}{4}$

96. Cube root of unity is:

- (A) 1, ω , ω^2
- (B) 1, -1, 0
- (C) 1, 1, 1
- (D) None

97. Arg(z) at $z=0$:

- (A) 0
- (B) Not defined
- (C) $\frac{\pi}{2}$
- (D) $-\frac{\pi}{2}$

98. The conjugate of $z=5-2i$ is:

- (A) 5+2i
- (B) -5+2i
- (C) 5-2i
- (D) -5-2i

99. If Arg $(-1 + 0i)$ is:

- (A) 0
- (B) π
- (C) $\pi/2$
- (D) $-\pi$

100. If $z = 3 + 4i$, then $|z|$ is:

- (A) 3
- (B) 4
- (C) 5
- (D) 7