1. The Jacobis Method is a Method to solving a matrix equation on a matrix that has no zero along.

(A) Leading diagonal

(B) Last column

(C) Last row

(D) None of these

2. The approximate value of $y(0.1)$ for $\frac{dy}{dx} = x^2y-1$ when, $y(0)=1$ is

(A) 0.900

(B) 1.001

(C) 0.802

(D) 0.994

(By Euler's method)

3. What is the degree of the differential equation $y = x\left(\frac{dy}{dx}\right)^2 + \left(\frac{dx}{dy}\right)$?

(A) 1

(B) 2

(C) 3

(D) 4

4. Newton-Raphson method is applicable to the solution of

(A) Algebraic equation only

(B) Transcendental equation only

(C) Both (A) and (B).

(D) None of the above

5. Trapezoidal rule gives exact value of the integrated when the integrand is a

(A) Linear function

(B) Quadratic function

(C) Cubic function

(D) Polynomial of any degree

6. The identify of the group of rational number with respect to addition is

(A) 0

(B) 1

(C) $\frac{1}{2}$

(D) ∞

7. Which of the following is not a group

(A) (N,+) N-The set of natural numbers,

(B) (Z,+) Z-The set of integers

(C) (IR,+), IR-The set of real numbers

(D) (ℂ,+)ℂ, The set of complex number

8. Which of the following is not a subgroup of the group of rational number with respect to addition

(A) $S=\{0,\pm2,\pm4,.....\}$, (S,+)

(B) $S=\{0,\pm1,\pm2,.....\}$, (S,+)

(C) $S=\{0,1,2,3,.....\}$, (S,+)

(D) $S=\{0,\pm3,\pm6,.....\}$, (S,+)

9. Let G be a group with binary operation *, then (G,*) is Abelian if

(A) $a*b=b*a \ \forall \ a,b\in G$

(B) $a*b=(a*b)*a \ \forall \ a,b\in G$

(C) $a*b=(b*a)*b \ \forall \ a,b\in G$

(D) None of these

10. Every group is isomorphic to a

(A) Abelian group

(B) Cyclic group

(C) Non-Abelian group

(D) Permutation group

11. Let G be a group of order 6 and H be the Sub group of group G such that O(H)=2. Then number of Co set of H in G is

(A) 12

(B) 3

(C) 2

(D) 6

12. Which of the following is not Abelian group.

(A) (G,+) where G={0,±1,±2,±3--}

(B) (G,X), where G={±1,±i}, $i^2=-1$

(C) (G,X) where G={±1,±i,±j,±k} $i^2-j^2=k^2=-1$

(D) (G,+) where G={0,±2,±4,±6--}

13. Which of the following is not a binary operation on the set of integers:

(A) Subtraction

(B) Division

(C) Multiplication

(D) Addition

14. Let S be a non empty set of a group (G,+), then S is a subgroup of G if,

(A) $a.b\in s \ \forall \ a,b\in s$

(B) $ab^{-1}\in s \ \forall \ a,b\in s$

(C) $a+b\in s \ \forall \ a,b\in s$

(D) None of these

15. If the Laplace Transform of function f(t) is given by $\frac{s+3}{(s+1)(s+2)}$ then f(0) is

(A) 3/2

(B) 1/2

(C) 0

(D) 1

16. The Laplace Transform of $f(t) = 2\sqrt{\frac{t}{\pi}}$ is $S^{-3/2}$. The Laplace Transform of $g(t) = \sqrt{\frac{1}{\pi t}}$ is

(A) $\frac{3s^{-5/2}}{2}$

(B) $s^{-1/2}$

(C) $s^{1/2}$

(D) $s^{3/2}$

17. The inverse Laplace transform of $\left(\frac{1}{s+1}\right)$ is

(A) e^{-t}

(B) e^{t}

(C) 1

(D) e^{1}

18. The Laplace transform of e^{tsint} is

(A) $\frac{a}{a^2+(s+1)^2}$

(B) $\frac{a}{a^2+(s-1)^2}$

(C) $\frac{s+1}{a^2+(s+1)^2}$

(D) $\frac{s+1}{a^2+(s-1)^2}$

19. Consider a function $X(s) = \frac{s+8}{s^2+6s+13}$ its inverse Laplace transform X(t) is

(A) $e^{-3t}(cos3t+sin5t)$

(B) $e^{-3t}(cos2t+sin2t)$

(C) $5e^{-3t}(cos2t+sin2t)$

(D) $e^{-3t}\left(cos2t+\frac{5}{2}sin2t\right)$

20. Forthefunction $f(x) = \begin{cases} -2 & -\pi < x < 0 \\ 2 & 0 < x < \pi \end{cases}$

The value of an in the Forier series expansion of f(x) is

(A) 2

(B) 4

(C) 0

(D) −2

21. Fourier sine integral of f(x) is

(A) $\int_0^\infty A(w).coswx\,dw$

(B) $\int_0^\infty B(w).sinwx\,dw$

(C) $\int_{-\infty}^\infty A(w).coswx\,dw$

(D) $\int_{-\infty}^\infty B(w).coswx\,dw$

22. Using Fourier cosine integral of the function $f(x)=e^{-3x}$, $x>0$ find the value of $\int_0^\infty \frac{\cos w}{9+w^2}dw$

(A) $\frac{\pi}{6}e^{-6}$

(B) $\frac{\pi}{2}e^{-3}$

(C) $\frac{\pi}{6}e^{-3}$

(D) 0

23. The Fourier cosine series for an even function $f(x)$ is given by $f(x) = a_0 + \sum_{n=1}^{\infty} a_n \cos(nx)$, the value of the coefficient a_2 for the function $f(x)=\cos^2(x)$ in $[0,\pi]$ is

(A) −0.5

(B) 0

(C) 0.5

(D) 1.0

24. Which of the following is not an iterative method

(A) Jacobi's Method

(B) Gauss Seidal Method

(C) Relaxation Method

(D) Gauss Jordan Method

25. Gauss-Seidal method is also termed as a method of

(A) False Position

(B) Elimination

(C) Successive displacement

(D) Iterations

26. Solve the following equations by Gauss-Seidal method up to two iterations and find the value of z.

$27x+6y-z=85$

$6x+15y+2z=72$

$x+y+54z=110$

(A) 0

(B) 1.92

(C) 1.88

(D) 1.22

27. Solve the following equations by Gauss Elimination method

$x+4y-z=-5$

$x+y-6z=-12$

$3x-y-z=4$

(A) x=1.64491 y=1.15085 z=2.09451

(B) x=1.64491 y=1.14095 z=2.08461

(C) x=1.65791 y=1.14185 z=2.08441

(D) x=1.64791 y=1.14085 z=2.08451

28. The root of the function $f(x)=x^3+x-1$ obtained after first iteration on application of Newton-Raphson Method using $x_0=1$ is

(A) 0.682

(B) 0.686

(C) 0.750

(D) 1.000

29. $f(x)=a+be^x+c\sin x+d\log x$ is an example of

(A) Algebraic Equation

(B) Polynomial Equation

(C) Transcendental Equation

(D) Linear Equation

30. Eigen values of $A=\begin{bmatrix}1 & 0 & 0\\ 2 & 3 & 1\\ 0 & 2 & 4\end{bmatrix}$ are

(A) 1, −2, 7

(B) 1, 2, 7

(C) 1, 2, 5

(D) −1, 2, 7

31. Find the Polynomial for the following data

x	4	6	8	10
f(x)	1	3	8	16

(A) $\frac{3x^2-22x+36}{8}$

(B) $\frac{3x^2+22x+36}{1}$

(C) $\frac{3x^2+22x+36}{2}$

(D) $\frac{3x^2-19x+36}{8}$

32. Match the following:

A.	Newton Raphson	1.	Integration
B.	Runge-Kutta	2.	Root finding
C.	Gauss-Seidal Equations	3.	Ordinary Differential
D.	Simpson's Rule	4.	Solution of system Equations of Linear equations

(A) A2-B3-C4-D1

(B) A3-B2-C1-D4

(C) A1-B4-C2-D3

(D) A4-B1-C2-D3

33. The value of f'(1) for $f(x)=\frac{1}{1+x^2}$ using following Table is

x :	f(x) :
1.0	0.5000
1.1	0.4524
1.2	0.4098
1.3	0.3717
1.4	0.3378

(A) −0.5031

(B) 0.5031

(C) 0.5000

(D) −1.000

34. The table shows the value of y for different values of x

x:	0	2	3	4	7	9
y:	4	26	58	112	466	922

The value of f'(5) & f"(5) is given by

(A) 133, 40

(B) 68, 34

(C) 34, 68

(D) 110, 20

(by divided difference method)

35. Runge-Kutta fourth order method is used to solve the differential equation $\frac{dy}{dx} = y-x$; if the initial value $y(0)=2$ and step size is 0.1 then the value of $y(0.1)$ up to three decimal places is

(A) 2.21

(B) 2.51

(C) 2.62

(D) 3.02

36. The value of $\int_0^6 \frac{dx}{1+x^2}$ by Simpson's $\frac{3}{8}$ rule is

(A) 1.3514

(B) 1.3569

(C) 1.3576

(D) 1.3571

37. The value of function f(x) at 5 discrete points are given below

x:	0	0.1	0.2	0.3	0.4
f(x):	0	10	40	90	160

using Trapezoidal rule and step size of 0.1, the value of $\int_0^{0.4} f(x)dx$ is

(A) 44

(B) 22

(C) 11

(D) 33

38. If $f(x)=x^2$ Then the second order divided difference for the points x_0, x_1, x_2 will be

(A) -1

(B) $\frac{-1}{x_1 = x_0}$

(C) 1

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

39. The number of generater's of the cyclic group 'G' of order 8 is

(A) 1

(B) 2

(C) 3

(D) 4

40. Any group of order 3 is

(A) Cyclic and abelian

(B) Cyclic but not abelian.

(C) Infinite cyclic group

(D) None of these

41. Which of the following statements about a class at a finite group is not correct.

(A) all elements of the class have same order

(B) characters of all elements in any representation are the same

(C) a class always forms a sub group

(D) traces of matrices forming a class are equal.

42. Using Fourier integral representation. The value of $\int_0^\infty \frac{\cos(\lambda x)}{(1+\lambda^2)} dx$ is

(A) $\frac{\pi}{2}e^{x}, (x > 0)$

(B) $\frac{\pi}{2}e^{-x}, (x > 0)$

(C) $\frac{\pi}{2}e^{2x}, (x > 0)$

(D) $\frac{\pi}{2}e^{-2x}, (x > 0)$

43. The value of $\int_{-\infty}^{\infty} \frac{\sin mx}{(x-b)^2 + a^2} dx$

(A) $\pi e^{-am} \sin bm$

(B) $\pi e^{bm} \sin am$

(C) $\pi/a\ e^{-am} \sin bm, (m>0)$

(D) $\pi/b\ e^{-bm} \sin am, (m>0)$

44. Find the Laplace transform

$$F(t) = \begin{cases} t & 0 < t < 2 \\ 2 & 2 > t \end{cases}$$

(A) $\frac{(1-e^{-2S})}{S}$

(B) $\frac{(1-e^{-2S})}{S^3}$

(C) $\frac{(1-e^{-2S})}{2S^2}$

(D) $\frac{(1-e^{-2S})}{S^2}$

45. Find $L^{-1}\left\{\ln\frac{S}{S+1}\right\}$

(A) $e^{-t}-1$

(B) $\frac{e^{-t}-1}{t}$

(C) $\frac{e^{-t}}{t}$

(D) None of these

46. Find $L^{-1}\left\{\ln\frac{S-2}{S+3}\right\}$

(A) $\frac{e^{-3t}}{t}$

(B) $\frac{e^{2t}}{t}$

(C) $\frac{(e^{-3t}+e^{-2t})}{t}$

(D) $\frac{(e^{-3t}-e^{-2t})}{t}$

47. If F[F(t)]=f(s), then what is F[F(t+a)]?

(A) f(a+s)

(B) e^{isa} f(s+a)

(C) e^{isa} f(s)

(D) e^{-isa} f(s)

48. Find the Eigen vector for value of $\lambda=-2$ for the given matrix

$A=\begin{bmatrix}3 & 5\\ 3 & 1\end{bmatrix}$

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

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

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

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

49. Find the Eigen vector for value of $\lambda=3$ for given matrix $A=\begin{bmatrix}3 & 10 & 5\\ -2 & -3 & -4\\ 3 & 5 & 7\end{bmatrix}$

(A) $\begin{bmatrix}-1\\-1\\2\end{bmatrix}$

(B) $\begin{bmatrix}-1\\1\\2\end{bmatrix}$

(C) $\begin{bmatrix}-1\\-1\\-2\end{bmatrix}$

(D) $\begin{bmatrix}-1\\-2\\-2\end{bmatrix}$

50. Which of the following is an assumption of Jacobi's method?

(A) The coefficient matrix has no zeros on its main diagonal

(B) The rate of convergence is quite slow compared with other method

(C) Iteration involved in Jacobi's method

(D) The coefficient matrix has zero's on its main diagonals

51. Find the values of x, y, z in the following system of equations by Gauss elimination method

$2x+y-3z=-10$

$-2y+z=-2$

$z=6$

(A) 2, 4, 6

(B) 2, 7, 6

(C) 3, 4, 6

(D) 2, 4, 5

52. The aim of elimination steps in Gauss elimination method is reduce the coefficient matrix to

(A) Diagonal

(B) Identity

(C) Lower Triangular

(D) Upper Triangular

53. Numerical techniques more commonly involve

(A) Elimination method

(B) Reduction method

(C) Iterative method

(D) Direct method

54. If $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$; $y(0)=1$ and $h=0.2$ then the value of K_1 by Fourth order Range-Kutta method is

(A) 0.2

(B) 0

(C) 0.1

(D) 0.4

55. The second degree Taylor Polynomial approximation of the given function $f(x,y)= \sin zx+\cos y$ near the point (0,0) is

(A) $1+2x+(y^2/2)$

(B) $1+2x-(y^2/2)$

(C) $1-2x-(y^2/2)$

(D) $1-2x+(y^2/2)$

56. The differential equation $\frac{dy}{dx} = 0.25y^2$ is to be solved using the backword Euler's method with the boundary condition $y=1$ at $x=0$ and with a step size of 1. What would be the value of y at $x=1$?

(A) 1

(B) 2

(C) 3

(D) 4

57. Consider the differential equation $\frac{dx}{dt} = \sin(x)$, with the initial condition $x(0)=0$. The solution of this ordinary differential equation is

(A) Zero

(B) One

(C) Two

(D) None of these

58. Parallax error is

(A) Systematic error

(B) Environmental error

(C) Observational error

(D) Random error

59. A meter reads 125V and the true value of the voltage is 125.5V find the static error of the instrument

(A) 125/0.5V

(B) 125V

(C) 0.5V

(D) 0.5/125V

60. If a group is defined as a*b= a+b−1 The inverse of the group is

(A) 2−b

(B) a

(C) a^{-1}

(D) 0

61. According to the mean value theorem $f'(x) = \frac{f(b)-f(a)}{b-a}$ then

(A) $a<x_t \leq b$

(B) $a \leq x_t < b$

(C) $a<x_t<b$

(D) $a \leq x_t \leq b$

62. Which of the following is the complex conjugate of (−2+3i). Then

(A) (3+2i)

(B) (−2−3i)

(C) (2+3i)

(D) (2−3i)

63. The Fourier series for $f(x)=\sin^2 x$ defined over the range $-\pi \leq x \leq \pi$ is.

(A) $\frac{1}{2}-\frac{\cos^2 x}{2}$

(B) 1+cos2x

(C) $\frac{1}{2}-\frac{\cos x}{2}$

(D) $\frac{\cos 2x}{2}+\frac{1}{2}$

64. In the Fourier series expansion of $f(x)=x-x^3$, the value of a_n will be

(A) Finite value

(B) Infinite, value

(C) Zero

(D) Cannot be found

65. In the Fourier series expansion of $f(x)=\sqrt{\frac{1-\cos x}{2}}$, the value of a_0 will be

(A) $\frac{4}{\pi}$

(B) $\frac{2}{\pi}$

(C) $\frac{\pi}{4}$

(D) $\frac{\pi}{2}$

66. If f(x) is pre presented by Fourier integral

$f(x)=\int_0^{\infty}[A(w)\cos wx+B(w)\sin wx]$ dw, then A(w) is defined as

(A) $\frac{1}{\pi}\int_{-\infty}^{\infty}f(v)\cos wudv$

(B) $\frac{1}{\pi}\int_{-\infty}^{\infty}f(v)\sin wvdv$

(C) $\int_{-\infty}^{\infty}f(w)\cos wvdv$

(D) $\int_{-\infty}^{\infty}f(w)\sin wvdv$

67. The Fourier transform of $e^{\frac{-x^2}{2}}$ is

(A) $\frac{1}{2}.e^{\frac{-w^2}{2}}$

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

(C) $\frac{\pi}{2}$

(D) $\sqrt{\pi}$

68. System of equations AX=B is inconsistent If.

(A) $|B|=0$

(B) $(adjA)B=0$

(C) $(adjA)B\neq0$

(D) $|A|\neq0$

69. For what value of μ, do the simultaneous equation $5x+7y=2$, $15x+21y=\mu$ have no solution.

(A) $\mu=0$

(B) $\mu\neq6$

(C) $\mu\neq0$

(D) $\mu=6$

70. Which of the following step in not involved in Gauss Elimination method?

(A) Elimination of unknowns

(B) Reduction to an upper triangular system

(C) Finding unknowns by back substitution

(D) Evaluation of cofactors

71. Apply Gauss Elimination method to solve the following equations:

$2x-y+3z=9$

$x+y+z=6$

$x-y+z=2$

(A) $x=5, y=14, z=5$

(B) $x=-13, y=4, z=15$

(C) $x=-13, y=1, z=-8$

(D) $x=13, y=1, z=-8$

72. If $u=xyz$, $v=xy+yz+zx$, $w=x+y+z$, then $\frac{\partial(u,v,w)}{\partial(x,y,z)}$ is

(A) $(x-y)(y-z)(z-x)$

(B) $(x-y)(z-y)(z-x)$

(C) $(y-x)(y-z)(z-x)$

(D) $(y-x)(z-y)(x-z)$

73. The Newton-Raphson method is said to have

(A) Linear convergence

(B) Super linear convergence

(C) Quadratic convergence

(D) Oscillatory convergence

74. Which one of the following is a nonprobability sampling method.

(A) Simple Random Sampling

(B) Stratified Sampling

(C) Cluster Sampling

(D) Quota Sampling

75. Set of all even integers from the group under the low of combination as:

(A) Ordinary multiplication

(B) Ordinary addition

(C) Addition modulo

(D) Multiplication modulo