ENT – 05

Total No. of Pages : 20

Seat No.	

P.G. Entrance Examination, June - 2022
M.Sc. MATHEMATICS
Sub. Code : 58716

Day and Date : Friday, 10 - 06 - 2022 **Total Marks : 100**

Time : 01.00 p.m. to 02.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Each question carries 1 mark.**
3) **Answers should be marked in the given OMR answer sheet by darkening the appropriate option.**
4) **Follow the instructions given on OMR sheet.**
5) **Rough work shall be done on the sheet provided at the end of question paper.**

1) Let R_1 and R_2 be two rings with 0_1 is zero of R_1 and 0_2 is zero of R_2. If $f : R_1 \to R_2$ be a homomorphism, then which of the following is the Kernel of f ?

A) $\{a \in R_1 \mid f(a) = 0_1\}$ B) $\{a \in R_2 \mid f(a) = 0_1\}$

C) $\{a \in R_2 \mid f(a) = 0_2\}$ D) $\{a \in R_1 \mid f(a) = 0_2\}$

2) Calculating cell evaluations (unit cost differences) d_{ij} for each empty cell (i, j) by using the formula $d_{ij} = c_{ij} - (u_i + v_j)$ is one of the steps of which method?

A) VAM B) Lowest cost entry method

C) MODI method D) Hungarian method

3) Let R be a commutative ring with unity. Consider the following statements :

I) M is maximal ideal of R.

II) $\frac{R}{M}$ is a field. Then

A) Only I) $\Rightarrow$ II) B) Neither I) $\Rightarrow$ II) nor II) $\Rightarrow$ I)

C) I) $\Leftrightarrow$ II) D) Only II) $\Rightarrow$ I)

P.T.O.

4) $\int_0^\infty e^{-3t}\cos^2 t\,dt = ...$

A) $\frac{11}{49}$ B) $\frac{10}{29}$

C) $\frac{11}{39}$ D) $\frac{12}{35}$

5) If L { $f(t)$ } = $f(s)$ Then $L\{f(at)\}=\frac{1}{a}f(s/a)$. This is ______.

A) change of scale property B) second shifting theorem

C) effect of division D) first shifting theorem

6) L $\{e^{at}\,t^n\}$ = ... $s > a$

A) $\frac{n!}{(s-a)^{n+1}}$ B) $\frac{n!}{(s+a)^{n+1}}$

C) $\frac{n}{(s-a)^{n+1}}$ D) $\frac{n!}{(s-a)^{n}}$

7) If $f(s)$ is Fourier transform of F(x) then Fourier transform of F(x).cosax is _______

A) ½ $[f(s-a) - f(s+a)]$ B) ½ $[f(s-a) + f(s+a)]$

C) ½ $[f(s) + f(s+a)]$ D) ½ $[f(s-a) + f(s)]$

8) If $f(t) = 1$ then Laplace transform of $f(t)$ is _____.

A) $\frac{1}{s}\ s<0$ B) $\frac{1}{s}\ s>0$

C) $\frac{1}{2s}\ s<0$ D) $\frac{1}{2s}\ s>0$

9) Infinite Fourier transform of $F(x) = 1 , \quad |x| < k$
$= 0 , \quad |x| > k$

where $F\{F(x)\} = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} F(x) e^{isx} dx$

A) $\sqrt{\frac{2}{\pi}} \frac{\cos sk}{s}$

B) $\sqrt{\frac{2}{\pi}} \frac{\tan sk}{s}$

C) $\sqrt{\frac{2}{\pi}} \frac{\sin sk}{s}$

D) $\sqrt{\frac{2}{\pi}} \frac{\sin sk}{k}$

10) Infinite Fourier transform of $F(x) = 1 , \quad |x| < k$
$= 0 , \quad |x| > k$

where $F\{F(x)\} = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} F(x) e^{isx} dx$

A) $\sqrt{\frac{2}{\pi}} \frac{\cos sk}{s}$

B) $\sqrt{\frac{2}{\pi}} \frac{\tan sk}{s}$

C) $\sqrt{\frac{2}{\pi}} \frac{\sin sk}{s}$

D) $\sqrt{\frac{2}{\pi}} \frac{\sin sk}{k}$

11) Infinite Fourier transform of $F(x) = 1 , \quad |x| < k$
$= 0 , \quad |x| > k$

where $F\{F(x)\} = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} F(x) e^{isx} dx$

A) $\sqrt{\frac{2}{\pi}} \frac{\cos sk}{s}$

B) $\sqrt{\frac{2}{\pi}} \frac{\tan sk}{s}$

C) $\sqrt{\frac{2}{\pi}} \frac{\sin sk}{s}$

D) $\sqrt{\frac{2}{\pi}} \frac{\sin sk}{k}$

12) If $f(x)$ is expanded in a Fourier series of $f(x)=\frac{a_0}{2}+\sum_{n=1}^{\infty} a_n \cos nx$, then $a_0 =$ __________.

A) $\frac{1}{\pi}\int_0^{\pi} f(x)dx$ B) $\frac{2}{\pi}\int_0^{\pi} f(x)dx$

C) $\frac{3}{\pi}\int_0^{\pi} f(x)dx$ D) $\frac{\pi}{2}\int_0^{\pi} f(x)dx$

13) Let R be a UFD. Consider the following statements :

I) Irreducible element in R is prime.

II) Product of any two primitive polynomials in $R[x]$ is primitive. Then

A) Both I) and II) are true B) Both I) and II) are false

C) Only I) is true D) Only II) is true

14) Fourier coefficient a_0 in the Fourier series expansion of $f(x) = x\sin(x)$; $0 \leq x \leq 2\pi$ and $f(x + 2\pi) = f(x)$ is ________.

A) 0 B) 2

C) –2 D) –4

15) For the function $f(x)=\frac{\pi - x}{2}$ in $(0, 2\pi)$, then Fourier coefficient $b_n =$ _____.

A) n B) $\frac{1}{n}$

C) $\frac{1}{n^2}$ D) n^2

16) If $P = \{a = t_0 < t_1 < t_2 < .... < t_n = b\}$ is a partition of $[a, b]$, then the mesh (P) = __________.

A) $\max\{t_k - t_{k-1} : k = 1, 2, ..., n\}$ B) $\min\{t_k - t_{k-1} : k = 1, 2, ..., n\}$

C) $\max\{t_k + t_{k-1} : k = 1, 2, ..., n\}$ D) $\min\{t_k + t_{k-1} : k = 1, 2, ..., n\}$

17) $\lim_{x \to 0} \frac{1}{x} \int_0^x e^{t^2} dt =$ ....

A) e^{x^2}

B) 0

C) 1

D) $2e^{x^2}$

18) Let $f(x) = x^2$ on [2, 4] and $P = \left\{2, \frac{5}{2}, 3, \frac{7}{2}, 4\right\}$ be a partition of [0, 1], then L(*f*, P) = ______.

A) 63/3

B) 63/4

C) 63/8

D) 126/4

19) If $F(x) = \int_x^{2x} t^3 dt$, then $F'(x)$ = ...

A) $17x^3$

B) $\frac{15}{4}x^3$

C) $\frac{15}{4}x^4$

D) $15x^3$

20) For integrability, condition of continuity is ________

A) Necessary

B) Sufficient

C) Necessary and sufficient

D) None of these

21) If T is a linear operator of V and α is eigenvalue of T also if $f(x) \in F[x]$ then

A) $f(\alpha)$ is eigenvalue of T

B) $f(\alpha)$ is eigenvalue of $f(T)$

C) α is eigenvalue of $f(T)$

D) $f(\alpha)$ is eigenvector of T

22) Let v and w be eigenvectors of T corresponding two distinct eigenvalues of operator T on V then

A) v and w are always linearly independent

B) v and w are always linearly dependent

C) v and w are zero vectors

D) v and w are non-negative

23) If $T(x, y) = (x + y, x + y)$ then eigenvector of T corresponding to eigenvalue 0 is

A) (0, 1)
B) (1, 1)
C) (1, –1)
D) (–1, –1)

24) Let R be a ring. An ideal $M \neq R$ of R is said to be ______ ideal of R if whenever A is an ideal of R such that $M \subseteq A \subseteq R$, then either $M = A$ or $R = A$.

A) trivial
B) maximal
C) prime
D) principal

25) If $T(x, y) = (x, 0)$ then eigenvector of T for eigen value c = 0 is _______.

A) (–1, 1)
B) (–1, 0)
C) (0, 1)
D) (0, 0)

26) Let V be a vector space over F and T be linear operator on V then c is called eigen value of T if ___________.

A) $\exists\, v \in V$ such that $T(v) = cv$ for all $c \in F$
B) $\forall\, v \in V$ such that $T(v) = cv$ for some $c \in F$
C) $\forall\, v \in V$ such that $T(v) = cv$ for all $c \in F$
D) $\exists\, v \in V$ such that $T(v) = cv$ for some $c \in F$

27) Let S be an orthogonal set of nonzero vectors in an inner product space V then _______.

A) S is linearly dependent
B) S is empty
C) S is linearly independent
D) S is orthonormal

28) Let V be the inner product space and u, v in V are linearly dependent then _______.

A) $|(u, v)| = \|u\|$
B) $|(u, v)| = \|v\|$
C) $|(u, v)| = \|u\|\,\|v\|$
D) $|(u, v)| = 0$

29) The maximum degree of any vertex in a simple graph with n vertices is

A) $n-1$ B) $n+1$

C) $2n-1$ D) $2n$

30) Let G be an undirected graph. Consider the two statements :

P : Number of odd degree vertices of G is even.

Q : Sum of degrees of all vertices of G is even.

Then

A) Only P is true B) Only Q is true

C) Both P and Q are true D) Neither P nor Q is true

31) By Kruskal's algorithm one can determine

A) longest path in a graph B) spanning tree in a graph

C) minimum spanning tree in a graph D) trail in a graph

32) A graph with n vertices will definitely have a parallel edge or a loop if the number of edges of the graph are

A) more than $n-1$ B) more than $\frac{n(n-1)}{2}$

C) more than $n+1$ D) more than $\frac{n+1}{2}$

33) Let G be a graph. Consider the two statements :

I) G is connected

II) G has a spanning tree

Then

A) Only (I) implies (II)

B) Only (II) implies (I)

C) Neither (I) implies (II) nor (II) implies (I)

D) (I) implies (II) and (II) implies (I)

34) Let G be a simple graph with n vertices. Then the degree of each vertex is

A) strictly less than $n - 1$

B) greater than $n - 1$

C) always equal to $n - 1$

D) less than or equal to $n - 1$

35) Consider the following statements :

I) $4x^3 + 6x + 1 \in Z[x]$ is primitive

II) $4x^3 + 6x + 2 \in Z[x]$ is primitive. Then

A) Both (I) and (II) are true

B) Both (I) and (II) are false

C) Only (I) is true

D) Only (II) is true

36) Laurent series expansion of $e^{1/z}$, $0 < |z| < \infty$ is _____.

A) $\sum_{n=0}^{\infty} \frac{z^n}{(n)!}$

B) $\sum_{n=0}^{\infty} \frac{1}{(n)!z^n}$

C) $\sum_{n=1}^{\infty} (-1)^n \frac{z^{2n}}{2n!}$

D) $\sum_{n=0}^{\infty} \frac{(-1)^n}{(n)!z^n}$

37) Taylor series expansion of $1/z + 1$, $|z| < 1$ is ______.

A) $1 - (z - 1) + (z - 1)^2 - \ldots$

B) $1 + (z - 1) + (z - 1)^2 + \ldots$

C) $1 - z + z^2 - \ldots$

D) $1 + z + z^2 - \ldots$

38) The function $f(z) = \frac{z - ib}{z^2 + b^2}$ is continuous at ______.

A) ib

B) –ib

C) i^3b

D) None

39) The function $w = \log z$ is not analytic at $z =$ ______.

A) 0

B) 1

C) 2

D) ½

40) Which of the following are not analytic?

A) z^3

B) $\dfrac{z}{z-1}$

C) e^z

D) $\sin z$

41) "Half open interval $\left[0, \frac{1}{2}\right)$ is not an open subset of R^1." Correct the statement.

A) Half open interval $\left[0, \frac{1}{2}\right)$ is open subset of R^1

B) True

C) Half open interval $\left[0, \frac{1}{2}\right)$ is closed subset of R^1

D) Half open interval $\left[0, \frac{1}{2}\right)$ is not an open subset of M

42) In any metric space $\langle M, \rho \rangle$

A) Both M and empty set are open sets

B) Only M is open set

C) Only Empty set is open set

D) Both are neither open nor closed sets

43) "Half open interval $\left[0, \frac{1}{2}\right)$ is not an open subset of metric space [0, 1]." Correct the statement.

A) Half open interval $\left[0, \frac{1}{2}\right)$ is open subset of metric space [0, 1]

B) True

C) Half open interval $\left[0, \frac{1}{2}\right)$ is closed subset of metric space M

D) Half open interval $\left[0, \frac{1}{2}\right)$ is an open subset of M

44) Let f be any function from metric space R_d into a metric space M, for any $a \in R_d$, the open ball $B[a\ ;\ 1]$ contains ______.

A) R
B) only d
C) only a
D) 1

45) If $a \in R^1$ then $\{a\}$ is ______.

A) $B[r\ ;\ 1]$
B) open set in R_d
C) not open set in R^1
D) $\{a\}$ contains interval

46) Let $f(x) = 2x + 1 \in Z_4[x]$. Consider the following statements :

I) $[f(x)]^2 = 1$

II) $f(x)$ is unit in $Z_4[x]$. Then

A) Both I) and II) are true
B) Both I) and II) are false
C) Only I) is true
D) Only II) is true

47) If f and g are continuous functions from a metric space M_1 into a metric space M_2 then which of the following statement is false?

A) $f + g$ is continuous on M_1
B) $f - g$ is continuous on M_1
C) $f.g$ is continuous on M_1
D) $\frac{f}{g}$ is continuous on M_1

48) The solution of $x\,p + y\,q = z$ is ....

A) $f\left(\frac{x}{y}, \frac{y}{z}\right) = 0$
B) $f(x, y) = 0$
C) $f(xy, yz) = 0$
D) $f(x^2, y^2) = 0$

49) $L\ \{\ (t + 1)^2\ \} = ...$

A) $\frac{3}{s^3} + \frac{1}{s^2} + \frac{1}{s}$
B) $\frac{2}{s^3} + \frac{3}{s^2} + \frac{2}{s}$
C) $\frac{2}{s^3} + \frac{2}{s^2} + \frac{1}{s}$
D) $\frac{3}{s^3} + \frac{3}{s^2} + \frac{1}{s}$

50) In a traveling salesman problem, the elements of diagonal from left-top to right bottom are

A) Zeros
B) All negative elements
C) All ones
D) All infinity

51) An assignment problem is considered as a particular case of a transportation problem because ______

A) The number of rows equals columns
B) All $x_{ij} = 0$ or 1
C) All rim conditions are 1
D) All of the above

52) 10 The series $\sum x^n / n!$ converges absolutely for _____

A) All values of x
B) $x \geq 0$
C) $x \leq 0$
D) $0 \leq x \leq 1$

53) The series 2 – 3/2 + 4/3 – 5/4 + ... is _______

A) Convergent
B) Divergent
C) Absolutely convergent
D) Conditionally convergent

54) If $\sum n^n / n!$ then $\lim\limits_{n\to\infty} u_{n+1} / u_n =$ _______

A) e
B) e^2
C) $1/e$
D) 1

55) For the Euler's function ϕ, ϕ (26) = _____

A) 11
B) 12
C) 13
D) 14

56) If o(G) = 20 then group G may have subgroup of order _____

A) 2
B) 3
C) 9
D) 7

57) Consider the field $Z_3 = \{0,1,2\}$ modulo 3. If $f(x) = 1 + x^2 + 2x^3$, $g(x) = 2 + x^3 \in Z_3[x]$ over Z_3, then $f(x) + g(x) =$ _______

A) x^2
B) $1 + x^2 + x^3$
C) $1 + x^3$
D) $1 + x^2$

58) If $G = \{\pm 1, \pm i\}$ is a multiplicative group then order of $-i$ is ....

A) 1
B) 0
C) 2
D) 4

59) Between any two real numbers there exists ____

A) Only one rational numbers
B) Finite number of rational numbers
C) Infinitely many rational numbers
D) Finite number of irrational numbers

60) If _____ then $|a + b| = |a| + |b|$, where $a, b \in R$,

A) $ab \geq 0$
B) $ab = 0$
C) $ab < 0$
D) $ab \leq 0$

61) If a and b are real numbers which of the following is always true?

A) $|a + b| = |a| + |b|$
B) $|a - b| \leq |a| + |b|$
C) $|a + b| \geq |a| + |b|$
D) $|a - b| < |a| - |b|$

62) Any nonempty subset of real numbers which is bounded below has ....

A) Supremum
B) Both infimum and supremum
C) Neither infimum nor supremum
D) Infimum

63) $L\{e^{-3t} \cdot t^3\} =$ ______

A) $\dfrac{4}{(s-3)^4}$
B) $\dfrac{3!}{(s-3)^4}$
C) $\dfrac{4!}{(s+3)^4}$
D) $\dfrac{3!}{(s+3)^4}$

64) If f(x) is an even function then for Fourier series in $(-\pi, \pi)$, b_n = ____

A) ∞
B) $(-1)^{n+1}$
C) 0
D) –1

65) For the function $f(x)=\begin{cases} x & 0<x<\pi \\ 2\pi-x & \pi<x<2\pi \end{cases}$ in $(0, 2\pi)$ then Fourier coefficient a_0 = _________.

A) $\frac{\pi}{2}$
B) $\frac{2}{\pi}$
C) $\frac{\pi}{4}$
D) π

66) Let T be a linear operator of a FDVS on V over F, if T is invertible then

A) 0 is the only eigenvalue of T
B) 0 is a eigenvalue of T
C) 0 is not eigenvalue of T
D) 0 may or may not be a eigenvalue of T

67) Let T be a linear operator of a FDVS on V over F, and there exists a non-zero vector v in V such the T(v)=cv then

(I) c is eigenvalue of T
(II) T-cI is singular

A) Only (I) is true
B) Only (II) is true
C) Both (I) and (II) are true
D) Both (I) and (II) are false

68) The L.P.P. Min $z = -x + 2y$ subject to $-x + 3y \leq 10$, $x + y \leq 6$, $x - y \leq 2$, $x \geq 0$, $y \geq 0$ which of the following coordinate is corner point of the region of the feasible solutions of above L.P.P.?

A) (0, 0)
B) (4, 2)
C) (2, 5)
D) (1, 2)

69) The series $f(z)=\sum_{n=0}^{\infty} a_n(z-z_0)^n$ where $a_n=\frac{1}{2\pi i}\oint\frac{f(z)dz}{(z-z_0)^{n+1}}$ represents ________.

A) Laurent series
B) Taylor
C) Maclaurin
D) None

70) The equation $pP + qQ = R$ is known as ________.

A) Charpit's equation
B) Clairaut's equation
C) Bernoulli's equation
D) Lagrange's equation

71) The locus of total differential equation $Pdx + Qdy + Rdz = 0$ is ________ to the locus of simultaneous differential equation $\frac{dx}{P}=\frac{dy}{Q}=\frac{dz}{R}$.

A) parallel
B) orthogonal
C) normal
D) tangent

72) The complete solution of the differential equation $\frac{dx}{x}=\frac{dy}{y}=\frac{dz}{z}$ is _______.

A) $y = C_1x,\ xz = C_2$
B) $xy = C_1,\ yz = C_2$
C) $y = C_1x,\ y = C_2z$
D) $xy = C_1,\ y = C_2z$

73) The series $f(z)=\sum_{n=0}^{\infty} a_n(z-z_0)^n, |z-z_0|<R$ where $a_n=\frac{f^n(z_0)}{n!}$ represent ______.

A) Laurent series
B) Taylor
C) Maclaurin
D) None

74) When $0<|z|<4$, the expansion of $\frac{1}{4z-z^2}$ is _________.

A) $\sum_{n=0}^{\infty}(-1)^n\frac{z^{n+1}}{4^{n+1}}$
B) $\sum_{n=0}^{\infty}\frac{z^{n+1}}{4^{n+1}}$
C) $\sum_{n=0}^{\infty}\frac{z^{n-1}}{4^{n+1}}$
D) $\sum_{n=0}^{\infty}\frac{z^{n}}{4^{n+1}}$

75) A point x $\in$ M is a limit point of E $\subset$ M if and only if there are points of E arbitrarily close to ______

A) M B) E

C) x D) Open ball B[x:a]

76) Let E be subset of the metric space M. Then the point x $\in$ M is a limit point of E if and only if every open ball B[x:r] about x contains _____ poin of E.

A) at most one B) at least one

C) all D) no

77) Let E be a subset of the metric space M. A point x $\in$ M is called ______of E if there is a sequence $\{x_n\}_{n=1}^{\infty}$ of points of E which converges to x.

A) limit point or cluster point B) closure

C) convergent point D) none of them

78) Let $<M_1,\rho_1>$ and $<M_2,\rho_2>$ be metric spaces and let $f : M_1 \Rightarrow M_2$. Then f is continuous on M_1 if and only if $f^{-1}(G)$ is open in _____, whenever G is open in M_2.

A) M_1 B) M_2

C) $f(M_1)$ D) $f(M_2)$

79) The method of finding an initial solution based upon opportunity costs is called ______.

A) the northwest corner rule B) Vogel's approximation

C) Flood's technique D) Hungarian method

80) The simplified form of $\dfrac{(\cos 2\theta + i\sin 2\theta)(\cos\theta - i\sin\theta)^3}{(\cos 3\theta + i\sin 3\theta)^2(\cos 5\theta - i\sin 5\theta)^4}$ is ______.

A) $\cos 21\theta - i \sin 21\theta$ B) $\cos 13\theta - i \sin 13\theta$

C) $\cos 21\theta + i \sin 21\theta$ D) $\cos 13\theta + i \sin 13\theta$

81) If the condition of integrability is satisfied then the solution of the equation $yz\,dx + zx\,dy + xy\,dz = 0$ is ______

A) $x + y + z = c$
B) $xyz = c$
C) $x^2 + y^2 + z^2 = c$
D) $x^2 + z = c$

82) The value of the following 2×2 game without saddle point using arithmetic method is ______.

		Player B	
		B_1	B_2
Player A	A_1	5	1
	A_2	3	4

A) 17/5
B) 5/17
C) 7/15
D) 7/5

83) The modified distribution (MODI) method is also known as _______.

A) U-V method or method of multipliers
B) Stepping stone method
C) Matrix minima method
D) Unit cost penalty method

84) While solving a LP model graphically, the area bounded by the constraints is called _____.

A) Feasible region
B) Infeasible region
C) Empty region
D) None of the above

85) The positive variable which is added to left hand side of the constraints, so as to bring them into equality are called as ________.

A) Slack variables
B) Surplus variables
C) Artificial variables
D) None of these

86) Let V be the inner product space and nonzero u,v in V are orthogonal then __________.

A) $\| x + y \|^2 = \| x \|^2 + \| y \|^2$
B) $\| x + y \|^2 > \| x \|^2 + \| y \|^2$
C) $\| x + y \|^2 < \| x \|^2 + \| y \|^2$
D) $\{u, v\}$ are linearly dependent

87) Let G be a graph with Euler circuit. Then the degree of every vertex is

A) even
B) odd
C) same
D) a prime number

88) The adjacency matrix of the graph G is always

A) symmetric matrix
B) diagonal matrix
C) invertible
D) triangular matrix

89) What is the maximum number of children that a binary tree node can have?

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

90) For the game with pay off matrix :

		Player B		
		B_1	B_2	B_3
Player A	A_1	–1	2	–2
	A_2	6	4	–6

The game is _____.

A) Fair game
B) Strictly determinable
C) Not strictly determinable
D) None of these

91) Let G be a simple graph with n vertices. Then the degree of each vertex is

A) strictly less than $n - 1$
B) greater than $n - 1$
C) always equal to $n - 1$
D) less than or equal to $n - 1$

92) Zeros and singular points of a function $\frac{z^3 - 1}{z^2 - 3z + 2}$ are _______.

A) $1, \omega, \omega^2; 2, 3$
B) $1, 2 ; 1, \omega, \omega^2$
C) $1, \omega, \omega^2; 1, 2$
D) $1, 0, \omega; 1, 2$

93) Laurent series expansion of 1/z+1, $1 < |z| < \infty$ is _________.

A) $1 - z + z^2 - ...$

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

C) $\sum_{n=0}^{\infty} \frac{(-1)^{n+1}}{z^n}$

D) $\sum_{n=0}^{\infty} \frac{(-1)^n}{z^n}$

94) The partial differential equation corresponding to the equation $z = ax + by + \sqrt{a^2 + b^2}$ is _______.

A) $z = px + qy + p^2 + q^2$

B) $z = py - qy - \sqrt{p^2 + q^2}$

C) $z = px + qy + \sqrt{p^2 + q^2}$

D) $z = px + qy + p + q$

95) The complete solution of $\frac{d^2y}{dx^2} - y = 2xe^x$ by method of variation of parameter is $y = Au + Bv$, then value, of u and v are ______.

A) e^x, e^{-x}

B) $x, -x$

C) $\sin x, \cos x$

D) $x, \frac{1}{x}$

96) If $y = e^{-x}$ is known solution of C. F. of the equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$ if ______.

A) $1 + P + Q = 0$

B) $a^2 + aP + Q = 0$

C) $P + xQ = 0$

D) $1 - P + Q = 0$

97) For the differential equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$, $y = x$ is a part of solution if ______.

A) $1 + P + Q = 0$

B) $P + xQ = 0$

C) $a^2 + aP + Q = 0$

D) $1 - P + Q = 0$

98) Consider the following statements for a ring Z of integers under usual addition and multiplication :

I) 2 is unit element of Z

II) $\{0\}$ is a maximal ideal in Z. Then

A) Both I) and II) are true

B) Only I) is true

C) Both I) and II) are false

D) Only II) is true

99) Let R and R' be rings and let R has unity 1. If $f : R \to R'$ be an onto homomorphism, then consider the following statements :

I) $\frac{R}{\ker f} \cong R'$.

II) $f(1)$ is not unity of R'. Then

A) Both I) and II) are true

B) Only I) is true

C) Both I) and II) are false

D) Only II) is true

100) Let I_1 and I_2 be ideals of a ring R. Consider the following statements :

I) $\frac{I_1+I_2}{I_1} \cong \frac{I_2}{I_1 \cap I_2}$.

II) $\frac{I_1+I_2}{I_2} \cong \frac{I_1}{I_1 \cap I_2}$ Then

A) Both I) and II) are true

B) Only I) is true

C) Both I) and II) are false

D) Only II) is true

Rough Work