ಈ ಪ್ರಶ್ನೆಪುಸ್ತಿಕೆಯನ್ನು ತೆರೆಯುವಂತೆ ನಿಮಗೆ ತಿಳಿಸುವವರೆಗೂ ಇದನ್ನು ತೆರೆಯಕೂಡದು

ವಿಷಯ ಸಂಕೇತ : 231

ಪ್ರಶ್ನೆ ಪುಸ್ತಿಕೆ ಶ್ರೇಣಿ

B

ಪ್ರಶ್ನೆ ಪುಸ್ತಿಕೆ
ನಿರ್ದಿಷ್ಟ ಪತ್ರಿಕೆ
(ಪತ್ರಿಕೆ II)

ಸಮಯ : 2 ಗಂಟೆಗಳು ***ಗರಿಷ್ಠ ಅಂಕಗಳು : 200***

ಸೂಚನೆಗಳು

1. ಪರೀಕ್ಷೆ ಪ್ರಾರಂಭಗೊಂಡ ತಕ್ಷಣವೇ ಒ.ಎಂ.ಆರ್. ಉತ್ತರಹಾಳೆಯಲ್ಲಿ ಪ್ರಶ್ನೆ ಪುಸ್ತಿಕೆ ಶ್ರೇಣಿಯನ್ನು ಗುರುತು ಮಾಡುವ ಮೊದಲು, ಈ ಪ್ರಶ್ನೆ ಪುಸ್ತಿಕೆಯಲ್ಲಿ ಮುದ್ರಿತವಾಗದ ಅಥವಾ ಹರಿದಿರುವ ಅಥವಾ ಯಾವುದೇ ಪುಟ ಇಲ್ಲದಿರುವ ಅಥವಾ ಮುದ್ರಿತವಾಗದ ಪ್ರಶ್ನೆಗಳು ಇತ್ಯಾದಿ ಒಳಗೊಂಡಿಲ್ಲವೆಂಬುದನ್ನು ನೀವು ಪರೀಕ್ಷಿಸತಕ್ಕದ್ದು. ಮೇಲಿನ ಯಾವುದೇ ದೋಷ ಕಂಡುಬಂದಲ್ಲಿ ಅದನ್ನು ಹಿಂತಿರುಗಿಸಿ ಲಭ್ಯವಿರುವ ಶ್ರೇಣಿಯ ಪರಿಪೂರ್ಣವಾದ ಬೇರೆ ಪ್ರಶ್ನೆ ಪುಸ್ತಿಕೆಯನ್ನು ಪಡೆಯತಕ್ಕದ್ದು.
2. **ಅಭ್ಯರ್ಥಿಯು ಪ್ರಶ್ನೆ ಪುಸ್ತಿಕೆಯ ಶ್ರೇಣಿ A, B, C ಅಥವಾ D ಅನ್ನು ವಿಷಯ ಸಂಕೇತ ಮತ್ತು ನೋಂದಣಿ ಸಂಖ್ಯೆಯನ್ನು OMR ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ ಅದಕ್ಕಾಗಿ ಒದಗಿಸಲಾಗಿರುವ ಸ್ಥಳದಲ್ಲಿ ಬರೆದು ಸಂಕೇತ (ಎನ್ ಕೋಡ್) ಗೊಳಿಸಬೇಕು. ಹಾಗೂ ನಿಗದಿತ ಸ್ಥಳದಲ್ಲಿ ತಾವು ಮತ್ತು ಸಂವೀಕ್ಷಕರು ಸಹಿ ಮಾಡಿರುವುದನ್ನು ಖಚಿತ ಪಡಿಸಿಕೊಳ್ಳಬೇಕು. ಒ.ಎಂ.ಆರ್. ಹಾಳೆಯಲ್ಲಿ ತಿಳಿಸಿರುವ ಯಾವುದೇ ಮಾಹಿತಿಯನ್ನು ಭರ್ತಿ ಮಾಡುವುದು/ಎನ್ ಕೋಡ್ ಮಾಡುವುದು ಅಭ್ಯರ್ಥಿಗಳ ಜವಾಬ್ದಾರಿಯಾಗಿರುತ್ತದೆ. ಒಂದು ವೇಳೆ ಭರ್ತಿ ಮಾಡದಿದ್ದಲ್ಲಿ/ತಪ್ಪಿದಲ್ಲಿ ಅಂತಹ ಒ.ಎಂ.ಆರ್. ಉತ್ತರ ಹಾಳೆಯನ್ನು ತಿರಸ್ಕರಿಸಲಾಗುವುದು.**

ನೋಂದಣಿ ಸಂಖ್ಯೆ

3. ಪಕ್ಕದಲ್ಲಿ ಒದಗಿಸಿರುವ ಚೌಕದಲ್ಲೇ ನಿಮ್ಮ ನೋಂದಣಿ ಸಂಖ್ಯೆಯನ್ನು ನಮೂದಿಸಬೇಕು. ಪ್ರಶ್ನೆ ಪುಸ್ತಿಕೆಯಲ್ಲಿ **ಬೇರೆ ಏನನ್ನೂ ಬರೆಯಬಾರದು**.
4. ಈ ಪ್ರಶ್ನೆ ಪುಸ್ತಿಕೆ **100** ಪ್ರಶ್ನೆಗಳನ್ನು ಒಳಗೊಂಡಿರುತ್ತದೆ. ಪ್ರತಿಯೊಂದು ಪ್ರಶ್ನೆಯು **4** ಪ್ರತಿಕ್ರಿಯೆಗಳನ್ನು (ಉತ್ತರಗಳನ್ನು) ಒಳಗೊಂಡಿರುತ್ತದೆ. ನೀವು ಉತ್ತರ ಹಾಳೆಯಲ್ಲಿ ಗುರುತು ಮಾಡಬೇಕೆನಿಸುವ ಉತ್ತರವನ್ನು ಆಯ್ಕೆ ಮಾಡಿಕೊಳ್ಳಿ. ಒಂದು ವೇಳೆ ಅಲ್ಲಿ ಒಂದಕ್ಕಿಂತ ಹೆಚ್ಚು ಸರಿಯಾದ ಉತ್ತರಗಳಿವೆಯೆಂದು ನೀವು ಭಾವಿಸಿದರೆ ನಿಮಗೆ ಅತ್ಯುತ್ತಮವೆನಿಸುವ ಉತ್ತರಕ್ಕೆ ಗುರುತು ಮಾಡಿ. ಏನೇ ಅದರೂ ಪ್ರತಿ ಪ್ರಶ್ನೆಗೆ ನೀವು ಕೇವಲ ಒಂದು ಉತ್ತರವನ್ನು ಮಾತ್ರ ಆಯ್ಕೆ ಮಾಡಬೇಕು.
5. ಎಲ್ಲಾ ಉತ್ತರಗಳನ್ನು ನಿಮಗೆ ಒದಗಿಸಲಾಗಿರುವ ಪ್ರತ್ಯೇಕ ಉತ್ತರ ಹಾಳೆಯ ಮೇಲೆ **ಕೇವಲ ಕಪ್ಪು ಅಥವಾ ನೀಲಿ ಶಾಯಿಯ ಬಾಲ್‌ಪಾಯಿಂಟ್ ಪೆನ್ನಿನಲ್ಲಿ ಮಾತ್ರ ಗುರುತು ಮಾಡಬೇಕು**. ಒ.ಎಂ.ಆರ್. ಉತ್ತರ ಪತ್ರಿಕೆ ಹಾಳೆಯಲ್ಲಿನ ವಿವರವಾದ ಸೂಚನೆಗಳನ್ನು ಗಮನಿಸುವುದು.
6. ಎಲ್ಲಾ ಪ್ರಶ್ನೆಗಳಿಗೆ ಸಮಾನ ಅಂಕಗಳು. **ಎಲ್ಲಾ ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸಿರಿ.** ಪ್ರತಿ ತಪ್ಪು ಉತ್ತರಕ್ಕೆ ಪ್ರಶ್ನೆಗೆ ನಿಗದಿಪಡಿಸಿದ ಅಂಕಗಳ ¼ (0·25) ರಷ್ಟು ಅಂಕಗಳನ್ನು ಕಳೆಯಲಾಗುವುದು.
7. ಚಿತ್ತು ಕೆಲಸಕ್ಕಾಗಿ ಹಾಳೆಗಳನ್ನು ಪ್ರಶ್ನೆ ಪುಸ್ತಿಕೆಯ ಕೊನೆಯಲ್ಲಿ ಸೇರಿಸಲಾಗಿದೆ. ಪ್ರಶ್ನೆ ಪುಸ್ತಿಕೆಯ ಇನ್ನುಳಿದ ಯಾವ ಭಾಗದಲ್ಲಿಯೂ ನೀವು ಯಾವ ರೀತಿಯ ಗುರುತನ್ನು ಮಾಡತಕ್ಕದ್ದಲ್ಲ.
8. ಪರೀಕ್ಷೆಯ ಮುಕ್ತಾಯವನ್ನು ಸೂಚಿಸುವ ಅಂತಿಮ ಗಂಟೆ ಬಾರಿಸಿದ ತಕ್ಷಣವೇ ಉತ್ತರ ಪತ್ರಿಕೆ ಹಾಳೆಯಲ್ಲಿ ಇನ್ನಾವುದೇ ಗುರುತು ಮಾಡುವುದನ್ನು ನಿಲ್ಲಿಸಬೇಕು. ಸಂವೀಕ್ಷಕರು ಬಂದು ನಿಮ್ಮಲ್ಲಿರುವ ಉತ್ತರ ಹಾಳೆಯನ್ನು ತಮ್ಮ ವಶಕ್ಕೆ ಪಡೆದುಕೊಂಡು ಲೆಕ್ಕಕ್ಕೆ ತೆಗೆದುಕೊಳ್ಳುವವರೆಗೂ ನಿಮ್ಮ ನಿಮ್ಮ ಆಸನದಲ್ಲಿಯೇ ಕುಳಿತಿರತಕ್ಕದ್ದು.
9. **ಪ್ರಶ್ನೆಗಳು ಕನ್ನಡ ಮತ್ತು ಆಂಗ್ಲ ಭಾಷೆಯಲ್ಲಿರುತ್ತವೆ. ಕನ್ನಡ ಪ್ರಶ್ನೆಗಳಲ್ಲಿ ಸಂದೇಹ ಉಂಟಾದರೆ, ದಯವಿಟ್ಟು ಆಂಗ್ಲ ಭಾಷೆಯ ಪ್ರಶ್ನೆಗಳನ್ನು ಗಮನಿಸುವುದು. ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ಪ್ರಶ್ನೆಗಳಲ್ಲಿ ಯಾವುದೇ ಗೊಂದಲಗಳಿದ್ದರೂ ಆಂಗ್ಲಭಾಷೆಯ ಪ್ರಶ್ನೆಗಳೇ ಅಂತಿಮವಾಗಿರುತ್ತದೆ.**

ಯಾವುದೇ ರೀತಿಯ ಮೊಬೈಲ್ ಫೋನ್, ಕ್ಯಾಲ್‌ಕ್ಯುಲೇಟರ್ ಮತ್ತು ಇತರೆ ರೀತಿಯ ಎಲೆಕ್ಟ್ರಾನಿಕ್/ಕಮ್ಯೂನಿಕೇಷನ್ ಸಾಧನಗಳು ಇತ್ಯಾದಿಗಳನ್ನು ಪರೀಕ್ಷಾ ಕೇಂದ್ರದ ಆವರಣದೊಳಗೆ ತರುವುದನ್ನು ನಿಷೇಧಿಸಿದೆ.

Note : *English version of the instructions is printed on the back cover of this booklet.*

1. Elimination of a function f from z = f(y/x) gives a partial differential equation

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

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

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

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

2. The value of the Ref(z) at z = 7 + 2i for f(z) = $\frac{1}{1-z}$

(1) $-\frac{3}{20}$

(2) $-\frac{1}{20}$

(3) $\frac{1}{20}$

(4) None of these

3. Newton iteration formula for finding $\sqrt[3]{c}$ where c > 0 is

(1) $x_{n+1} = \frac{2x_n^3 + \sqrt[3]{c}}{2x_n^2}$

(2) $x_{n+1} = \frac{3x_n^3 - \sqrt[3]{c}}{3x_n^2}$

(3) $x_{n+1} = \frac{2x_n^3 + c}{3x_n^2}$

(4) $x_{n+1} = \frac{2x_n^3 - c}{3x_n^2}$

4. By Simpson's 1/3 rule, the value of $\int_1^7 \frac{dx}{x}$ is

(1) 1.358

(2) 1.958

(3) 1.625

(4) 1.458

5. Total number of divisions and multiplications required for solving a system of 5 equations using Gauss elimination method are

(1) 113

(2) 208

(3) 65

(4) 45

6. Backward Euler method for solving differential equation $\frac{dy}{dx}$ = f(x, y) is

(1) $y_{n+1} = y_n + hf(x_n, y_n)$

(2) $y_{n+1} = y_n + hf(x_{n+1}, y_{n+1})$

(3) $y_{n+1} = y_{n-1} + 2hf(x_n, y_n)$

(4) $y_{n+1} = (1+h)f(x_{n+1}, y_{n+1})$

7. If $< E_i >$ is a sequence of Lebesgue measurable sets then

(1) Lebesgue measure $m(UE_i) \leq \sum mE_i$

(2) $m(UE_i) > \sum mE_i$

(3) $m(UE_i) = \sum mE_i$

(4) $m(UE_i) = 0$

8. If f and g are measurable functions and $f \leq g$ almost everywhere then

(1) $\int_E f = \int_E g$

(2) $\int_E f > \int_E g$

(3) $\int_E f \leq \int_E g$

(4) None of these

9. Bolzano-Wierstrass theorem states that EASY

(1) Every infinite and bounded set has at most one limit point

(2) Every infinite and bounded set has exactly one limit point

(3) Every infinite and bounded set has at least one limit point

(4) Every finite and bounded set has at least one limit point

10. If $\bar{E}$ is the closure of a set E in a metric space X, then

(1) $\dim(\bar{E}) = \dim(E)$

(2) $\dim(\bar{E}) \neq \dim(E)$

(3) $\dim(\bar{E}) < \dim(E)$

(4) $\dim(\bar{E}) > \dim(E)$

11. The function $f(x) = \begin{cases} 1 \; if \; x \; is \; rational \\ -1 \; if \; x \; is \; irrational \end{cases}$

(1) Bounded but not R-integrable

(2) Bounded and R-integrable

(3) Unbounded and R-integrable

(4) Unbounded and not R-integrable

12. A real continuous function on the real line which is nowhere differentiable is

(1) [x]

(2) |x|

(3) Polynomial function

(4) None of these

13. Every maximal ideal of R is prime ideal of R then

(1) R is a ring

(2) R is commutative ring

(3) R is a commutative ring with unity

(4) R is a ring with zero divisor

14. Which of the following statements is ***not*** true ?

(1) The ring of integers is a Euclidian ring

(2) The ring of polynomials over a field is a Euclidian ring

(3) Every field is not a Euclidian ring

(4) The ring of Guassian integers is a Euclidian ring

15. Let F, K, L are the fields, K containing F, L containing K. If K/F and L/K are algebraic extensions. Which of the following statements is true ?

(1) L/F is an algebraic extension

(2) L/F is not an algebraic extension

(3) F/L is an algebraic extension

(4) F/K is an algebraic extension

16. Normalise of the vector V = (12, -3, -4)

(1) $\left(\frac{-12}{13}, \frac{-3}{13}, \frac{-4}{13}\right)$

(2) $\left(\frac{12}{13}, \frac{-3}{13}, \frac{-4}{13}\right)$

(3) $\left(\frac{-12}{13}, \frac{-3}{13}, \frac{4}{13}\right)$

(4) $\left(\frac{-12}{13}, \frac{3}{13}, \frac{-4}{13}\right)$

17. If 'n' vectors spans a vector space V containing 'r' linearly independent vectors in V, then

(1) $n \geq r$

(2) $n \leq r$

(3) $n \neq r$

(4) None of these

18. A system of n-non homogeneous linear equations in 'n' unknowns has a unique solutions If and only if

(1) The associated matrix is non-singular

(2) The associated matrix is singular

(3) The Rank of co-efficient matrix is less than number of unknowns

(4) The Rank of co-efficient matrix is greater than number of unknowns

19. If f(x) = sin (2πx), g(x) = cos (2πx) and $< f, g > = \int_0^1 f(x).g(x)dx$

(1) f is not orthogonal to g

(2) f = g

(3) f is orthogonal to g

(4) None of these

20. A Topological space is said to be seperable if it contains

(1) Uncountable dense subsets

(2) Dense subsets

(3) Countable subsets

(4) Countable dense subsets

21. Two subsets A and B of topological space X are mutually separated if

(1) $\overline{A} \cap B = \Phi$ and $A \cap \overline{B} = \Phi$

(2) $\overline{A} \cap B = \Phi$ or $A \cap \overline{B} = \Phi$

(3) Only $\overline{A} \cap B = \Phi$

(4) Only $A \cap \overline{B} = \Phi$

22. For a toplogical space X, the following statements are given below :

a. X is regular.

b. For any $x \epsilon X$ and any open set G containing x there exist an open set H containing x such that $\overline{H} \subset G$.

c. The family of all closed neighbourhoods of any point of X forms a local base at that point.

Which of the following is correct?

(1) (a) $\Rightarrow$ (b) but (b) $\not\Rightarrow$ (c)

(2) (a) $\not\Rightarrow$ (b) but (b) $\Rightarrow$ (c)

(3) (a), (b), (c) are independent statements

(4) (a), (b), (c) are equivalent

23. Let B and B′ be two Banach spaces if T is a continuous linear transformation of B onto B′then

(1) T is open mapping

(2) T is closed mapping

(3) T is both open and closed mapping

(4) T is neither open nor closed mapping

24. In a Hilbert space H which of the following is not true ?

(1) $(\alpha x - \beta y, z) = \alpha (x, z) - \beta (y, z)$

(2) $(x, \beta y + \gamma z) = \beta (x, y) + \overline{\gamma}(x, z)$

(3) $(x, \beta y - \gamma z) = \overline{\beta}(x, y) - \overline{\gamma}(x,z)$

(4) $(x, 0) \neq 0 \; \forall \; x \epsilon H$

25. The solution of the differential equation $(2xy + x^2y + y^3/3)\, dx + (x^2 + y^2)\, dy = 0$

(1) $e^x(x^2 + \frac{y^3}{3}) = c$

(2) $e^{-x}(x^2y + \frac{y^3}{3}) = c$

(3) $e^x(x^2y + \frac{y^3}{3}) = e^x c$

(4) $(x^2y - \frac{y^3}{3}) = e^{-x} c$

26. $x^2 \frac{d^2y}{dx^2} - 4x \frac{dy}{dx} + 6y = x^5$ having the solution

(1) $(C_1x^2 + C_2x^3)$

(2) $(C_1 + C_2x)x^2$

(3) $C_1x^2 + C_2x^3 + \frac{1}{6}x^5$

(4) $C_1x^2 - C_2x^3 - \frac{1}{6}x^5$

27. The solution of the differential equation

$(5 + 2x)^2 \frac{d^2y}{dx^2} - 6(5 + 2x)\frac{dy}{dx} + 8y = 0$

(1) $C_1 (5 + 2x)^{2+\sqrt{2}} + C_2 (5 + 2x)^{2-\sqrt{2}}$

(2) $C_1 (2 + \sqrt{2}\, x)^5 + C_2 (2 - \sqrt{2}x)^5$

(3) $C_1(5 + 2x) + C_2 (2 + \sqrt{2}\, x)$

(4) $C_1(5 + 2x) + C_2 (2 - \sqrt{2}\, x)$

28. The solution of the differential equation $\left(\frac{dy}{dx} - xy\right)\left(\frac{dy}{dx} - x^2\right)\left(\frac{dy}{dx} - y^2\right) = 0$ is

(1) $(2\ \log(y) - x^2 - c)(3y - x^3 - c)\left(\frac{1}{y} + x - c\right) = 0$

(2) $(2\ \log(y) + x^2 - c)(3y - x^3 - c)\left(\frac{1}{y} + x - c\right) = 0$

(3) $(2\ \log(y) + x^2 - c)(3y + x^3 - c)\left(\frac{1}{y} + x - c\right) = 0$

(4) $(2\ \log(y) + x^2 - c)(3y + x^3 - c)\left(\frac{1}{y} - x + c\right) = 0$

29. Find the solution of $x^2y_2 + xy_1 - y = x^2e^x \quad x > 0$

(1) $C_1x + C_2(1/x) + e^x(1-1/x)$

(2) $C_1x + C_2(1/x) + e^{-x}(1-1/x)$

(3) $C_1x + C_2x^2 + e^{-x}(1+1/x)$

(4) $C_1x + C_2x^2 + \log(x)\ (1+1/x)$

30. Solution of partial differential equation $y^2zp = x^2(zq + y)$ is

(1) $\Phi(x^3+y^3, x^2- y^2) = 0$

(2) $\Phi(x^3- y^3, x^2+y^2) = 0$

(3) $\Phi(x^3+y^3, y^2+z^2) = 0$

(4) $\Phi(x^3+y^3, y^2- z^2) = 0$

31. $\left|\frac{z-1}{z+1} = 2\right|$ represents a circle then its radius and centre is

(1) $\left(\frac{10}{3}, 0\right), \frac{4}{3}$

(2) $\left(-\frac{10}{3}, 0\right), \frac{3}{4}$

(3) $\left(\frac{-5}{3}, 0\right), \frac{4}{3}$

(4) $\left(\frac{5}{3}, 0\right), \frac{3}{4}$

32. The function $f(z) = e^{\bar{z}}$

(1) Analytical everywhere

(2) Not Analytic anywhere

(3) It is analytic at some points of its domain

(4) None of these

33. The solution of differential equation $\frac{dy}{dx} = x^2 + y$ by Euler's modified method at y = 0.94 when x = 0 for x = 0.1

(1) 1.0395

(2) 1.040

(3) 1.0614

(4) 1.0525

34. If f and g are bounded measurable functions defined on a set E of finite measure and $A \le f(x) \le B$ then

(1) $A\,\mu(E) \le \int_E f(x)dx < B\mu(E)$

(2) $A\,\mu(E) > \int_E f(x)dx > B\mu(E)$

(3) $A\,\mu(E) \le \int_E f(x)dx \le B\mu(E)$

(4) None of these

35. A real valued function Q is simple if it is

(1) Measurable & assume only finite number of values

(2) Not measurable & assume only finite number of values

(3) Measurable

(4) Assume only finite values

36. Let f and g be two non-negative measurable functions if f is integrable over E and f(x) < g(x) on E then

(1) g is integrable & $\int_E f - g = \int_E f - \int_E g$

(2) g is integrable & $\int_E f - g < \int_E f - \int_E g$

(3) g is integrable & $\int_E f - g > \int_E f - \int_E g$

(4) None of these

37. The value of the product $\left(1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \cdots\right)\left(1 - \frac{1}{1!} + \frac{1}{2!} - \frac{1}{3!} + \cdots\right)$ is

(1) 1

(2) e^2

(3) 0

(4) $\log_e 2$

38. Which of the following subsets of R^2 is convex?

(1) $\{(x,y) : |x| \leq 5, |y| \leq 10\}$

(2) $\{(x,y) : x^2+y^2 = 1\}$

(3) $\{(x,y) : y \geq x^2\}$

(4) $\{(x,y) : y \leq x^2\}$

39. Let X be a connected subset of real numbers. If every element of X is irrational, then the cardinality of X is

(1) infinite

(2) countably infinite

(3) 2

(4) 1

40. Which of the following continuous functions $f: (0, \infty) \to R$ can be extended to a continuous function on $[0, \infty)$?

(1) $f(x) = sin\left(\frac{1}{x}\right)$

(2) $f(x) = \frac{1-cos\, x}{x^2}$

(3) $f(x) = cos\left(\frac{1}{x}\right)$

(4) $f(x) = \frac{1}{x}$

41. If R is a commutative ring, with unit element then

(1) Every maximal ideal is prime ideal

(2) Every prime ideal is maximal ideal

(3) Every ideal is prime ideal

(4) Every ideal is maximal ideal.

42. If K is an extension of field F and $a \epsilon K$ is algebraic over F if

(1) F(a) is an extension of F

(2) F(a) is a subfield of F

(3) F(a) is a finite extension of F

(4) F(a) is an infinite extension of F

43. The product of disjoint cycles of $\alpha \in S_9$, where

$\alpha = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 2 & 6 & 3 & 5 & 7 & 1 & 4 & 9 & 8 \end{pmatrix}$ are

(1) (l 2 6) (3) (4 5 7) (8 9)

(2) (l 2 6) (3) (4 5 8) (7 9)

(3) (l 2 6) (3) (4 7 5) (8 9)

(4) None of these

44. The set M of square matrices (of same order), with respect to matrix multiplication is

(1) Group

(2) Semi group

(3) Monoid

(4) Quasi group

45. Let $M = \begin{pmatrix} 1 & 1 & 0 \\ -1 & 1 & 2 \\ 2 & 2 & 0 \\ -1 & 0 & 1 \end{pmatrix}$, then the Rank of M is equal to,

(1) 3

(2) 4

(3) 2

(4) 1

46. Let T : V $\rightarrow$ W be a map from the vector space V to the vector space W over the same field F. Then, T $\in$ L(V, M) iff,

(1) T(x,y) = T(x) + T(y), $\forall\, x, y \in V \text{ and } \alpha \in F$

(2) $T(\alpha x) = \alpha T(x),\ \forall\, x, y \in V \text{ and } \alpha \in F$

(3) T(0) = 0

(4) None of these

47. Let T be a linear operator on $\mathbb{R}^2$ defined by, $T(x_1,x_2) = (x_1,0)$. Let β be the standard ordered basis for $\mathbb{R}^2$ and $\beta' = \{\alpha_1 = (1,1), \alpha_2 = (2,1)\}$ be an ordered basis for $\mathbb{R}^2$. Find a matrix P such that, $[T]_{\beta'} = P^{-1}[T]_{\beta}P$.

(1) $\begin{pmatrix} 1 & 2 \\ 1 & 1 \end{pmatrix}$

(2) $\begin{pmatrix} 1 & 1 \\ 2 & 1 \end{pmatrix}$

(3) $\begin{pmatrix} -1 & 2 \\ 1 & -1 \end{pmatrix}$

(4) $\begin{pmatrix} -1 & -2 \\ 1 & 2 \end{pmatrix}$

48. Let A be an $m \times n$ real matrix and $b \in R^m$b with $b \neq 0$.

(1) The set of all real solutions of $Ax = b$ is a vector space

(2) If $u \text{ and } v$ are two solutions of $Ax = b$, then $\lambda u + (1-\lambda)v$ is also a solution of $Ax = b$ for any $\lambda \in \mathbb{R}$.

(3) For any two solutions u and v of $Ax = b$, the linear combination $\lambda u + (1-\lambda)v$ is also a solution of $Ax = b$ only when $0 \leq \lambda \leq 1$

(4) If rank of A is n, then $Ax = b$ has at most one solution.

49. Let A = $\begin{pmatrix} 1 & 1 \\ 1 & 0 \end{pmatrix}$ and let $\alpha_n \text{ and } \beta_n$ denote the two eigen values of A^n such that $|\alpha_n| \geq |\beta_n|$. Then,

(1) $\alpha_n \rightarrow \infty \text{ as } n \rightarrow \infty$

(2) $\beta_n \rightarrow 0 \text{ as } n \rightarrow \infty$

(3) β_n is positive if n is even

(4) β_n is negative if n is odd

50. If $f : X \to Y$ be a bijective continuous function. If X is compact and Y is Hausdorff. Then mapping f is

(1) Isomorphism

(2) Closed

(3) Compact

(4) Homeomorphism

51. Which among the spaces with the given norm is Banach?

(1) $C[0,1]\ with\ \|.\|_1$

(2) $C^1[0,1]\ with\ \|.\|_\infty$

(3) $Q\ with\ usual\ norm\ |.|$

(4) $I_p[IN]\ with\ \|.\|_\infty$

52. Let V be an infinite dimensional Banach space and let $T : V \to V$ be a compact operator. Then,

(1) $\sigma(T) = \phi$

(2) Non-zero elements of the spectrum are all isolated.

(3) $0 \notin \sigma(T)$

(4) Every element of the spectrum is an eigen value of T with fininte geometric multiplicity

53. Which among the following spaces are ***not*** seperable?

(1) l_∞

(2) l_1

(3) $C[0,1]$

(4) R

54. Let C_0 denote the space of all real sequences which converges to zero, equipped with norm $\|.\|_\infty$. Then its dual C_0^* is

(1) C_0

(2) C_{00}

(3) l_1

(4) l_∞

55. Let T: C[0,l] → C[0,l] be defined by $y = Tx$ where $y(t) = \int_0^t x(u)du$. Then T^{-1} is

(1) Linear

(2) Bounded

(3) Not linear

(4) Unbounded

56. The solution of the differential equation $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = e^{3x}$ is given by

(1) $y = c_1e^x + c_1e^{2x} + \frac{e^{3x}}{2}$

(2) $y = c_1e^{-x} + c_2e^{-2x} + \frac{e^{3x}}{2}$

(3) $y = c_1e^{-x} + c_2e^{2x} + \frac{e^{3x}}{2}$

(4) $y = c_1e^{-x} + c_2e^{2x} + \frac{e^{-3x}}{2}$

57. The solution of $(2x^3y^2 + x^4)dx + (x^4y + y^4)dy = 0$ is

(1) $x^4y^2 + 2(x^5 + y^5) = k$

(2) $5x^4yz + (x^5 + y^5) = k$

(3) $x^4y^2 + 5(x^5 + y^5) = k$

(4) None of the above

58. For the Sturm- Liouville problem y" + λY = 0, y(0) = 0, y(l) = 0, the eigen functions are

(1) $y_n(x) = sin\frac{nnx}{l}, n = 0,1,2, \ldots \ldots$

(2) $y_n(x) = sin\frac{nnx}{2l}, n = 0,1,2, \ldots \ldots$

(3) $y_n(x) = cos\frac{nnx}{l}, n = 0,1,2, \ldots \ldots$

(4) None of the above

59. The differential equation $\frac{dy}{dx} = 60(y^2)^{\frac{1}{5}}$; $x > 0; y(0) = 0$ has

(1) No solution

(2) An unique solution

(3) Infinitely many solutions

(4) Two solutions

60. The differential equation $(y^2e^{xy^2} + 6x)dx + (2xye^{xy^2} - 4y) = 0$ is

(1) Linear, homogeneous and exact

(2) Non-linear, homogeneous and exact

(3) Non-linear, non-homogeneous and exact

(4) Non-linear, non-homogeneous and inexact

61. The solution of $\frac{\partial^2 z}{\partial y^2} - \frac{\partial^2 z}{\partial x\,\partial y} = cos\,x\,cos\,2y$ is

(1) $Z = f(x) + g(x + y) + \frac{1}{2}\cos(x + 2y) + \frac{1}{6}\cos(x - 2y)$

(2) $Z = f(y) + g(x + y) + \frac{1}{2}\cos(x + 2y) - \frac{1}{6}\cos(x - 2y)$

(3) $Z = f(x) + g(x - y) + \frac{1}{2}\cos(x + 2y) + \frac{1}{6}\cos(x - 2y)$

(4) $Z = f(y) + g(x - y) + \frac{1}{2}\cos(x + 2y) + \frac{1}{6}\cos(x - 2y)$

62. The solution of $x(y^2 - z^2)p + y(z^2 - x^2)q - z(x^2 - y^2) = 0$ where $p = \frac{\partial z}{\partial x},\ q = \frac{\partial z}{\partial y}$ by Lagrange's method is

(1) $\varphi(xyz, x^2 + y^2 + z^2) = 0$

(2) $xyz = f(x^2 + y^2 + z^2)$

(3) $x^2 + y^2 + z^2 = g(xyz)$

(4) All of the above

63. The solution of the heat equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial t^2}$ with boundary conditions $u(x,0) = 3sin\,n\pi x$, $u(o,t) = u(1,t) = 0$, where $0 < x < 1$, $t > 0$ is

(1) $u(x,t) = 3\sum_{n=1}^{\infty} e^{-n^2\pi^2 t} sin\,n\pi x$

(2) $u(x,t) = 3\sum_{n=1}^{\infty} e^{n^2\pi^2 t} sin\,n\pi x$

(3) $u(x,t) = 3\sum_{n=1}^{\infty} e^{-n\pi t} sin\,n\pi x$

(4) $u(x,t) = 3\sum_{n=1}^{\infty} e^{-nt} sin\,n\pi x$

64. The Charpit's equations for the PDE $up^2+q^2+x+y = 0$, $p = \frac{\partial u}{\partial x}, q = \frac{\partial u}{\partial y}$ is given by

(1) $\frac{dx}{-1-p^3} = \frac{dy}{-1-qp^2} = \frac{du}{2p^2u+2q^2} = \frac{dp}{2pu} = \frac{dq}{2q}$

(2) $\frac{dx}{2pu} = \frac{dy}{2q} = \frac{du}{2p^2u+2q^2} = \frac{dp}{-1-p^3} = \frac{dq}{-1-qp^2}$

(3) $\frac{dx}{p^2u} = \frac{dy}{q^2} = \frac{du}{0} = \frac{dp}{x} = \frac{dq}{y}$

(4) $\frac{dx}{2q} = \frac{dy}{2pu} = \frac{du}{x+y} = \frac{dp}{p^3} = \frac{dq}{qp^2}$

65. The partial differential equation $x^2\frac{\partial^2 u}{\partial x^2} + (1 - y^2)\frac{\partial^2 u}{\partial y^2} = 0$ is elliptic in nature if

(1) $-\infty < x < \infty,\ y > 1$

(2) $-\infty < x < \infty,\ y \le 1$

(3) $-\infty < x < \infty,\ -1 < y < 1$

(4) $x \in (-\infty, \infty),\ y \in [-1,\ 1]$

66. If z = x + iy and $w = 1 - \frac{iz}{z-i}$, then |w| = 1 implies that, in the complex plane

(1) z lies on the imaginary axis

(2) z lies on the real axis

(3) z lies on the unit circle

(4) None of these.

67. The bilinear transformation which maps the points 1, *i*, -1 into 0,1,∞ is,

(1) w(z - l) = i(z +1)

(2) w(z + l) = i(-z -1)

(3) w(-z + l) = i(z -1)

(4) None of these

68. The solution of $\oint_c \frac{2z+1}{z^2+3iz} dz$ where c : |z+3i| = 2 is,

(1) $\left(-\frac{2}{3} + 4i\right)\pi$

(2) $\left(-\frac{2}{3} - 4i\right)\pi$

(3) $\left(\frac{2}{3} + 4i\right)\pi$

(4) None of these

69. The residues of the function $f(z) = \frac{z^2}{(z-1)^2(z+2)}$ for c : |z| = 3.5 are

(1) $\frac{4}{9}, \frac{7}{9}$

(2) $\frac{4}{7}, \frac{5}{9}$

(3) $\frac{4}{9}, \frac{5}{9}$

(4) None of these

70. If $w = \phi + 1\psi$ represents the complex potential for an electric field and $\psi = x^2 - y^2 + \frac{x}{x^2+y^2}$, then the function ϕ is

(1) $-2xy - \frac{x}{x^2+y^2} + c$

(2) $-2xy - \frac{y}{x^2+y^2} + c$

(3) $-2xy + \frac{y}{x^2+y^2} + c$

(4) None of these

71. The solution of $\int_0^{\pi} \frac{d\theta}{1-2r\cos\theta+r^2}$ using contour integration is

(1) $\frac{2\pi}{1-r^2}$

(2) $\frac{\pi}{1-r^2}$

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

(4) None of these

72. If $y = a2^x + bx2^x$ and $h = 1$, then $(\Delta^2 - 2\Delta + 1)$y equals,

(1) 0

(2) 1

(3) 2

(4) None of these

73. Let $f: \mathbb{R} \to \mathbb{R}$ be a smooth function with non-vanishing derivative. The Newtons's methods for finding a root of $f(x) = 0$ is same as,

(1) Fixed point iteration for the map $g(x) = x - \frac{f(x)}{f'(x)}$

(2) Forward Euler method with unit step length for the differential equation $\frac{dy}{dx} + \frac{f(y)}{f'(y)} = 0$

(3) Fixed point iteration for $g(x) = x + f(x)$

(4) Fixed point iteration for $g(x) = x - f(x)$

74. Let p be the unique polynomial of suitable degree such that $p(1) = 2, p'(1) = 3, p(2) = 6, p'(2) = 7$ and $p''(2) = 8$ the the $p(0)$ is,

(1) -8

(2) 0

(3) 16

(4) None of these

75. The quadrature formulae

$\int_{-1}^{1} f(x)dx = \frac{1}{9}\left[5f\left(-\sqrt{\frac{3}{5}}\right) + 8f(0) + 5f\left(\sqrt{\frac{3}{5}}\right)\right]$

is exact for polynomials of degree less than or equal to,

(1) 3

(2) 4

(3) 5

(4) 6

76. The pressure P of wind corresponding to velocity V is given by following data,

V	10	20	30	40
P	1.1	2.0	4.4	7.9

Value of P when V = 25 is,

(1) 3

(2) 3.0375

(3) 3.3075

(4) 3.5

77. Following is the Littlewoods's Three Principles,

I. Every measurable set is nearly a finite union of intervals.

II. Every measurable set is nearly continuous.

III. Every convergent sequence of measurable functions is nearly uniformly convergent.

Which of the above given statements is/are correct?

(1) Only I

(2) Only II

(3) I and III only

(4) None of these

78. A non-negative measurable function f is integrable over the measurable set E if,

(1) $\int_E f = \infty$

(2) $\int_E f > \infty$

(3) $\int_E f < \infty$

(4) None of these

79. Let $\Omega = \{a, b, c, d\}$. Consider the classes

$F_1 = \{\Omega, \phi, \{a\}\}$ and

$F_2 = \{\Omega, \phi, \{a\}, \{b, c, d\}\}$.

Which one of the following statements is true?

(1) Both F_1 and F_2 are not σ–algebra.

(2) F_1 σ–algebra, but F_2 is not σ–algebra.

(3) Both F_1 and F_2 are σ–algebra.

(4) None of these

80. $\lim_{n\to\infty} \frac{1}{n}\left(1+\frac{1}{2}+\frac{1}{3}+\cdots+\frac{1}{n}\right)^n$ is equal to

(1) 1

(2) 0

(3) e

(4) -1

81. The series is $\sum \frac{n!2^n}{n^n}$

(1) Convergent

(2) Divergent

(3) Conditional convergent

(4) None of the these

82. If f(x) = $\begin{cases} kx^2 \ for \ x \le 2 \\ 3 \ for \ x > 2 \end{cases}$ is continuous at x = 2. Then value of k is

(1) $-\frac{3}{4}$

(2) $\frac{3}{2}$

(3) $\frac{4}{3}$

(4) $\frac{3}{4}$

83. If $\int_a^\infty f(x)$ dx converges and $\Phi(x)$ is bounded and monotonic for x > a, then $\int_a^\infty f(x)\,\Phi(x)$ dx is convergent. This test is called

(1) Cauchy's test

(2) Dirichlets test

(3) Leibnitz's test

(4) Abel's test

84. "Every finite group G is isomorphic to a permutation group." This statement is

(1) Cayley's theorem

(2) Lagrange's theorem

(3) Liouville's theorem

(4) None of these

85. If H and K are two sub-groups of G of orders 6 and 8 then order of HK is 16 if

(1) $O(H \cap K) = 4$

(2) $O(H \cap K) = 3$

(3) $O(H \cap K) = 5$

(4) None of these

86. If in a ring with unity $(xy)^2 = x^2y^2 \ \forall \ x, y \in R$ then

(1) R is a commutative ring

(2) R is field

(3) R is an integral domain

(4) None of the above

87. Given matrix [A] = $\begin{bmatrix} 4 & 2 & 1 & 3 \\ 6 & 3 & 4 & 7 \\ 2 & 1 & 0 & 1 \end{bmatrix}$ then the rank of the matrix is

(1) 4

(2) 3

(3) 2

(4) 1

88. The eigen values of the matrix $\begin{bmatrix} -1 & 3 & 5 \\ -3 & -1 & 6 \\ 0 & 0 & 3 \end{bmatrix}$ are

(1) 3, 3+5i, 6 - i

(2) -6+5i, 3+i, 3 - i

(3) 3+i, 3 - i, 5+i

(4) 3, -1+3i, -1 - 3i

89. Consider the vector space V over the field of real numbers spanned by the set

S = {(0,1,0,0)(1,1,0,0)(1,0,1,0)(0,0,1,0) (1,1,1,0)(1,0,0,0)}

What is the dimension of V?

(1) 3

(2) 2

(3) 1

(4) 4

90. It is given that $X_1, X_2, ... X_n$ are N non-zero orthogonal vectors. The dimension of the vector space spanned by 2N vectors $X_1, X_2, ... X_n$, $-X_1, -X_2, ... -X_n$ is

(1) 2N

(2) N + 1

(3) N

(4) Dependent on the choice

91. Let T be a linear transformation from a 3-dimensional vector space V into 2-dimensional vector space W then T

(1) Can be both injective and surjective

(2) Can be neither injective nor surjective

(3) Can be surjective but cannot be injective

(4) Can be injective but cannot be surjective

92. Let A = (XZ) where X = { Φ , X} then

(1) A is not compact

(2) A is disconnected

(3) A is connected but not compact

(4) A is compact and connected both

93. If X = {a,b,c} and τ = { Φ , X, {ac},{b}} then toplogical space (Xτ) is

(1) Not a connected space

(2) Connected space

(3) Not compact space

(4) Not a Hausdroff space

94. A toplogical space X that has a countable basis at each of its points is said to satisfy

(1) The first countability axiom

(2) The second countability axiom

(3) The third countability axiom

(4) The fourth countability axiom

95. A topological space X is has a countable basis at each of its points is said to satisfy

(1) If every countable open covering of X contains a infinite subcollection covering X

(2) If every countable open covering of X contains a finite subcollection X

(3) If every countable open covering of X contains no subcollection covering X

(4) None of the above

96. A normed linear space which is complete with respect to its norm is called

(1) Factor Space

(2) Bunch space

(3) Hilbert Space

(4) None of the above

97. What is the order and degree of differential equation $\frac{d^2y}{dx^2} + \sqrt{1 + \left(\frac{dy}{dx}\right)^3} = 0$?

(1) First order, second degree

(2) First order, first degree

(3) Second degree, first order

(4) Second order, first degree

98. $\frac{d^2y}{dx^2} + \frac{dy}{dx} - 2y = 0$, has the solution

(1) $y = c_1 e^{-2} + c_2 e^{x}$

(2) $y = ce^{-2}$

(3) $y = c_1 e^{-2} + c_2 e^{-x} + c_3$

(4) None of the above

99. The differential equation $(D^2+3D+2)\, y = e^{2x}$ have particular integral

(1) $\frac{e^{2x}}{10}$

(2) $\frac{e^{2x}}{14}$

(3) $\frac{e^{2x}}{12}$

(4) $\frac{e^{2x}}{8}$

100. $\frac{\partial^2 z}{\partial x^2} - \frac{\partial^2 z}{\partial y^2} + \frac{\partial z}{\partial x} - \frac{\partial z}{\partial y} = 0$ has the solution

(1) $Z = f_1(y - x) + e^{-x} f_2(y - x)$

(2) $Z = f_1(y + x) + f_2(y - x)$

(3) $Z = e^{-x} f(y - x)$

(4) $Z = f_1(y + x) + e^{-x} f_2(y - x)$

SPACE FOR ROUGH WORK