



The ICFAI University, Dehradun
Ph.D. Entrance Examination, 2025
IUDRET-2025
Question Booklet

MATHEMATICS

BOOKLET NO.:

Name and Signature of Invigilators

1. (Signature): _____
(Name): _____

OMR Sheet No.:
(To be filled by the Candidate)

2. (Signature): _____
(Name): _____

Application No. :
(To be filled by the Candidate)

Time: 2 Hours

Maximum Marks: 50

Number of Pages in this Booklet: 07

Number of Questions in this Booklet: 50

General Instructions: -

1. Write the application number in the space provided.
2. This question booklet consists of fifty multiple-choice types of questions.
3. At the commencement of the examination, the question booklet will be given to you. In the first five minutes, you are required to open the question booklet and compulsorily examine it as below:
 - (i) To have access to the question booklet, tear off the paper seal on the edge of this cover page. Do not accept a question booklet without a sticker seal and do not accept an open question booklet.
 - (ii) Tally the number of pages and a number of questions in the booklet with the information printed on the cover page. A faulty question booklet due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be replaced immediately by a correct booklet from the invigilators within five minutes. Afterward, neither the question booklet will be replaced nor any extra time will be given.
 - (iii) After this verification is over, the OMR Sheet Number should be entered into this question booklet.
4. Each item has four alternative responses marked (A), (B), (C), and (D). You have to darken the circle as indicated below on the correct response against each item.
Example: (A) (B) ● (D) where (C) is the correct response.
5. Your responses to the items are to be indicated in the **OMR Sheet**. It will not be evaluated if you mark at any place other than in the circle in the OMR Sheet.
6. Rough Work is to be done in the space provided in the question booklet.
7. Before leaving the examination hall, candidate is required to return the question booklet and OMR sheet to the invigilators at the end of the examination compulsorily.
8. Use only Blue/Black Ball point pen.
9. Use of any calculator or log table etc., is prohibited.
10. There is no negative marking for incorrect answer.

IUDRET-2025

MATHEMATICS



Note: This question booklet contains **fifty (50)** objective-type questions, each carrying one (01) mark.

1. Which of the following is the primary objective of research?
 - (A) To develop new theories
 - (B) To evaluate existing systems
 - (C) To find solutions to problems
 - (D) All of the above
2. The first step in the research process is
 - (A) Data collection
 - (B) Formulating hypothesis
 - (C) Identifying a research problem
 - (D) Literature Review
3. Which of the following is commonly used as a measure of a journal's quality based on citation frequency?
 - (A) h-index
 - (B) Altmetric Score
 - (C) Impact factor
 - (D) i10-index
4. The term "empirical" in research refers to
 - (A) Theoretical reasoning
 - (B) Use of statistical tools
 - (C) Data based on observation or experiment
 - (D) Use of abstract concepts
5. Which of the following can best be described as a Nominal variable?
 - (A) Gender
 - (B) Rank
 - (C) Height
 - (D) Satisfaction Score
6. In a simple linear regression equation, the slope represents
 - (A) The value of the independent variable
 - (B) The change in the dependent variable for a one-unit change in the independent variable
 - (C) The average of the residuals
 - (D) The mean of the dependent variable
7. Plagiarism refers to
 - (A) Publishing in a reputed journal
 - (B) Using others' ideas or words without proper attribution
 - (C) Repeating your own research
 - (D) Reviewing others' papers
8. Which organization in India manages the Shodhganga repository?
 - (A) ICSSR
 - (B) AICTE
 - (C) UGC-INFLIBNET
 - (D) NAAC



9. Match the following:

List – I (Research Concept)	List – II (Characteristics)
a. Shodhganga	1. Repository of research proposals
b. Shodhgangotri	2. Anti-plagiarism software platform
c. ShodhShuddhi	3. Repository of Indian Ph.D. theses
d. DrillBit	4. Plagiarism detection tool used in India

Choose the correct answer from the options given below:

- (A) a - 3, b - 1, c - 2, d - 4
(B) a - 1, b - 3, c - 4, d - 2
(C) a - 3, b - 4, c - 1, d - 2
(D) a - 2, b - 1, c - 3, d - 4
10. The null hypothesis generally represents
- (A) The researcher's assumption
(B) The expected outcome
(C) No effect or no difference
(D) A proven theory
11. A researcher selects every 10th name from a list of 1,000 students. This is an example of
- (A) Cluster sampling
(B) Systematic sampling
(C) Convenience sampling
(D) Stratified sampling

12. Which platform is officially promoted by the Government of India for online higher education courses?

- (A) Coursera
(B) edX
(C) SWAYAM
(D) Udemy

13. A person saves ₹500 per month from his salary of ₹6,000. What is his annual expenditure?

- (A) ₹66,000
(B) ₹60,000
(C) ₹63,000
(D) ₹63,500

14. If 'BOARD' is coded as 'OABRD', what will be the code for 'LEMON'?

- (A) EMOLN
(B) ELMON
(C) ELMNO
(D) EOMLN

15. Which indexing service is considered essential for measuring journal quality in scientific and technical research?

- (A) Google Scholar
(B) DOAJ
(C) Scopus
(D) Academia.edu



Directions 16-20: Study the following table carefully and answer questions 16–20. It consists of data on the number of research papers published by faculty members in five departments (A to E) of a university over two years: 2023 and 2024.

Department	Publications	
	2023	2024
A	50	65
B	80	70
C	45	60
D	60	90
E	55	75

16. Which department had the highest increase in publications from 2023 to 2024?
- (A) A
(B) D
(C) C
(D) E
17. What is the total number of publications made by all departments in 2024?
- (A) 340
(B) 360
(C) 370
(D) 380
18. What is the average number of publications in 2023 across all departments?
- (A) 58
(B) 56
(C) 57
(D) 55
19. What is the ratio of total publications in Department B to Department C for both years combined?
- (A) 150:105
(B) 160:115
(C) 150:110
(D) 145:105
20. Publications from Department A in 2024 are approximately what percent more than those in 2023?
- (A) 30%
(B) 28%
(C) 32%
(D) 35%
21. The orthogonality can be defined in
- (A) Metric Space
(B) Banach Space
(C) Hilbert Space
(D) Normed Space
22. In Operations Research, feasible region is the region which
- (A) doesn't contain the solution
(B) is always unbounded
(C) contains the solution
(D) None of these
23. Vogel's Approximation method is associated with
- (A) Transportation
(B) Assignment
(C) Game Theory
(D) None of these
24. In an integral equation, if Kernel can be expressed as the sum of finite number of terms then it is called
- (A) Separable kernel
(B) Iterated Kernel
(C) Resolvent Kernel
(D) None



25. The number of constants appearing in the solution of an ordinary differential equation with constant coefficient, of degree m and order n are
- (A) $m+n$
 (B) $m-n$
 (C) m
 (D) n
26. A sequence $\langle x_n \rangle = \langle 1, -1, 1, -1, \dots \rangle$ is call
- (A) Monotonic Sequence
 (B) Alternative Sequence
 (C) Constant Sequence
 (D) Convergent
27. If F_1 and F_2 are the two closed subsets of a topological space X then $F_1 \cap F_2$ is a
- (A) closed set
 (B) Open set
 (C) semi closed set
 (D) semi open set
28. In graphical method for LPP the restriction on number of constraints is
- (A) 2
 (B) 3
 (C) 4
 (D) None of these
29. A linear integral equation of the form $u(x) = \lambda \int_a^b k(x, t)u(t)dt$ is called
- (A) Homog. Fredholm I kind
 (B) Volterra Ist
 (C) Homog. Fredholm II kind
 (D) None of these
30. The rate of convergence of Newton Raphson Method is
- (A) 1.618
 (B) 2
 (C) 1
 (D) 0.5
31. $T: U \rightarrow V$ is a linear transformation with $\dim U = n$, $\dim V = m$ then $\text{rank } T + \text{nullity } T$ is
- (A) N
 (B) m
 (C) $n+m$
 (D) $n-m$
32. A Linear transformation T is isomorphism if it is
- (A) one-one
 (B) onto
 (C) one-one and onto
 (D) None of these
33. The dimension of zero vector space is
- (A) 1
 (B) 0
 (C) not define
 (D) n
34. In lattice, $\text{Sup } \{a, b\} = a \vee b$ is also called
- (A) a and b
 (B) a meet b
 (C) a joint b
 (D) a or b



35. A game is said to be zero sum game if value of game (v) satisfy
- (A) $\sum_{i=1}^n v \neq 0$
 (B) $\sum_{i=1}^n v = 0$
 (C) $\sum_{i=1}^n v \neq 1$
 (D) $\sum_{i=1}^n v = 1$
36. The solution to a transportation problem with 'm' rows (supplies) & 'n' columns (destination) is feasible if number of positive allocations are
- (A) $m + n$
 (B) mn
 (C) $m + n - 1$
 (D) $m - n$
37. The dual of the dual of given primal problem is
- (A) Dual
 (B) Special dual
 (C) Primal
 (D) None
38. A proposition which is always true is called
- (A) Contradiction
 (B) Tautology
 (C) Contingency
 (D) None of these
39. If p is true and q is false then conditional statement $p \rightarrow q$ is
- (A) false
 (B) true
 (C) can't say
 (D) none of these
40. A matrix of a symmetric relation is always
- (A) square matrix
 (B) symmetric matrix
 (C) diagonal matrix
 (D) triangular matrix
41. A partial order relation is a relation which is
- (A) reflexive, symmetric and transitive
 (B) irreflexive, anti-symmetric and transitive
 (C) irreflexive, symmetric and transitive
 (D) reflexive, anti-symmetric and transitive
42. The partial differential equation
- $$\frac{\partial^2 z}{\partial x^2} - 5 \frac{\partial^2 z}{\partial y^2} = 0$$
- is classified as
- (A) hyperbolic
 (B) parabolic
 (C) elliptic
 (D) None of these
43. The negation of a statement $(\exists x)p$ is equal to
- (A) $\forall x (p)$
 (B) $\forall x (\sim p)$
 (C) $\sim \forall x (\sim p)$
 (D) $(\sim \exists x p)$
44. Let A be any matrix. Then
- (A) $\text{rank}(A) \neq \text{rank}(A^T)$
 (B) $\text{rank}(A) < \text{rank}(A^T)$
 (C) $\text{rank}(A) > \text{rank}(A^T)$
 (D) $\text{rank}(A) = \text{rank}(A^T)$



45. A Tensor A^{ij} is said symmetric if
- (A) $A^{ij} = A^{ji}$
 - (B) $A^{ij} = -A^{ji}$
 - (C) $A^{ij} = -A^{ij}$
 - (D) $A_{ij} = A^{ji}$
46. A necessary condition that the integral $\int_{x_1}^{x_2} F(x, y, y') dx$ will be stationary is
- (A) it's last variation vanishes
 - (B) it's first variable vanishes
 - (C) it's first variation vanishes
 - (D) it's first variation never be vanished
47. In Simpson's 1/3 Rule of integration, the number of subintervals should be
- (A) multiple of 2
 - (B) multiple of 5
 - (C) multiple of 3
 - (D) None of these
48. Interpolation with divided difference is used for
- (A) unequal number of intervals
 - (B) equal number of intervals
 - (C) interval of any length
 - (D) None of these
49. The relation between shift operator E and forward difference operator Δ is
- (A) $E = 1 - \Delta$
 - (B) $E = 1 + \Delta$
 - (C) $E = 1 / \Delta$
 - (D) $\Delta = 1 + E$
50. For a pseudo metric d , $x = y$ implies
- (A) $d(x, y) \neq 0$
 - (B) $d(x, y) = 0$
 - (C) $d(x, y) = 1$
 - (D) $d(x, y) \neq 1$

