D–8067

Sub. Code
11A/13711/ 0111/0311A

DISTANCE EDUCATION

Common for B.A./B.Sc./B.B.A./B.B.A. (Banking)/B.C.A/M.B.A. (5 Year Integrated) DEGREE EXAMINATION, MAY 2025.

First Semester

Part I — TAMIL PAPER — I

(CBCS 2018 – 2019 Academic Year Onwards/2021 Calender Year Onwards)

Time : Three hours Maximum : 75 marks

பகுதி அ — ($10 \times 2 = 20$ மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் விடையளி.

1. கண்ணதாசன் எழுதிய நூல்கள் யாவை?

2. பட்டுக்கோட்டை கல்யாண சுந்தரம்-குறிப்பு வரைக.

3. பாரத மாதா திருப்பள்ளி எழுச்சி கவிதையின் கரு யாது?

4. ‘நோயற்ற வாழ்வு’ கவிதையின் நோக்கம் என்ன?

5. சர்ப்பயாகம் கவிதையை எழுதியவர் யார்?

6. சிலப்பதிகாரம் உணர்த்தும் மூன்று உண்மைகள் யாது?

7. சிலப்பதிகாரத்தின் முதன்மைக் கதை மாந்தர் யாவர்?

8. கம்பராமாயணம்-நூல் குறிப்பு வரைக.

9. சீறாப்புராணம்-நூல் சிறப்பு யாது?

10. தேம்பாவணி-விளக்கம் தருக.

பகுதி ஆ — ($5 \times 5 = 25$ மதிப்பெண்கள்)

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) கண்ணனின் சிறப்புகளை கண்ணதாசனின் பாடல் வழி விளக்குக.

(அல்லது)

(ஆ) தொழிலின் மேன்மையினைப் பட்டுக்கோட்டையார் பாடல் உணர்த்தும் கருத்தினை எழுதுக.

12. (அ) உலகப்பன் பாடல் உணர்த்தும் கருத்தினை விளக்குக.

(அல்லது)

(ஆ) தோழர் மோசிகீரனார் கவிதை வழி அறியப்படும் கருத்தினை எழுதுக.

13. (அ) சிலப்பதிகாரம்-நூலின் சிறப்புகள் யாவை?

(அல்லது)

(ஆ) கம்பராமாயணம்-நூல் குறிப்பு வரைக.

14. (அ) சீறாப்புராணம்-நூலின் மேன்மையினை எழுதுக.

(அல்லது)

(ஆ) கண்ணகியின் வழக்குத்திறனை எழுதுக.

15. (அ) வீரமாமுனிவரின் தமிழ்ப்பணி யாது?

(அல்லது)

(ஆ) நபிகள் நாயகத்தின் மேன்மைகளைச் சுட்டுக.

பகுதி இ — ($3 \times 10 = 30$ மதிப்பெண்கள்)

எவையேனும் மூன்றனுக்கு கட்டுரை வடிவில் விடையளி.

16. பாரதமாதா திருப்பள்ளி எழுச்சி பாடல் உணர்த்தும் கருத்தினை தொகுத்துரைக்க.

17. வல்லிக் கண்ணனின் ‘வெறும் புகழ்’ கவிதை வழி அறியலாகும் செய்திகளைக் கட்டுரைக்க.

18. வழக்குரை காதை வழி அறியப்படும் கருத்தினை விவரி.

19. ஈத்தங்குலை வரவழைத்த படலம் கூறும் நபிகளின் மாண்பினைப் புலப்படுத்துக.

20. தேம்பாவணி காட்சிப் படலம் உணர்த்தும் செய்திகளை கட்டுரை வடிவில் தருக.

D–8068

Sub. Code
11B/0311B

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.B.A./
B.B.A.(Banking)/B.C.A./M.B.A.(5 Years Integrated) DEGREE
EXAMINATION, MAY 2025.

First Semester

Part – I : COMMUNICATION SKILLS - I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Define communication.

2. State any two principles of effective communication.

3. Explain interpersonal communication.

4. Give an example for rising intonation.

5. Give two examples for a compound sentence.

6. Define "Topic sentence".

7. Mention different types of report.

8. Give some examples for written communication.

9. Explain the importance of body language.

10. What is the objective of GD?

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) What are the advantages of group discussion?

Or

(b) Explain the procedure involved in preparing a report.

12. (a) Mention some characteristics of an effective sentence.

Or

(b) Write a paragraph on "My Dream".

13. (a) Discuss different forms of oral communication.

Or

(b) Prepare a report on the inauguration of library in your locality.

14. (a) Mention the steps involved in writing an essay.

Or

(b) How will you participate in a group discussion?

15. (a) Explain the purpose of meetings.

Or

(b) Explain the steps involved in preparing curriculum vitae.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Prepare an application for the post of Assistant Professor of English in a reputed college. Attach your curriculum vitae.

17. Prepare a GD on the topic “Merits and Demerits of cashless economy”.

18. Draft an essay on “Impact of Social Networking sites”.

19. Describe non-verbal communication with examples.

20. Discuss the various steps involved in preparing a speech.

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D–8069

Sub. Code
12/13712/ 0112/0312

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.B.A./B.B.A. (Banking)/ B.C.A./M.B.A. (5 Year Integrated) DEGREE EXAMINATION, MAY 2025.

First Semester

Part II — ENGLISH PAPER - I

(CBCS 2018 – 2019 Academic Year Onwards/ 2021 Calendar Years Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. How does water help in the formation of fertile lands?

2. Why did Mrs. Packletide wish to kill a tiger?

3. Write a short note on “The Cats” being a persuasive essay.

4. Brief a note on the concept of “Survival of the fittest”.

5. Which period was considered the most fruitful years of Mahatma’s life in Africa?

6. List some of the cheapest energy sources as pointed out by J.B.S. Haldane.

7. What is an indefinite article?

8. What is an exclamatory sentence?

9. What is meant by developing hints?

10. Name the different elements of a paragraph.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) How does C.V. Raman show that water is the real elixir of life?

Or

(b) What are some of the character traits of Mrs. Packletide?

12. (a) What did Gandhi do in his probation year in India?

Or

(b) "Haldane agrees and disagrees with the proposition that man is a machine" - Discuss briefly.

13. (a) Why are people often not able to see the harmful effects of drugs?

Or

(b) Briefly discuss the defects of modern civilization as per Joad.

14. (a) Briefly discuss "Modals".

Or

(b) What are the rules applied to transformation of sentences when a change in the degree is required?

15. (a) Enumerate on the different types of paragraph.

Or

(b) Explain the brevity in letter writing.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Bring out the significance of water according to Sir. C.V. Raman.

17. Explain the social and cultural values of the time in Saki's "Mrs. Packletide's Tiger".

18. Evolution is a process. Do you agree? Give reasons.

19. Explain the uses of different types of prepositions with examples.

20. Discuss the paragraph writing process in detail.

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D–8160

Sub. Code
11313

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION, MAY 2025.

First Semester

CLASSICAL ALGEBRA

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Write the $(r+1)^{\text{th}}$ term in the expansion of $(1+x)^n$.

2. If α, β, γ are the roots of the equation $x^3 + ax + b = 0$ find the value of $\Sigma\alpha^3$.

3. What is meant by double root and triple root?

4. Define reciprocal equation of first type and second type.

5. Discuss the nature of roots of $x^3 - 6x - 4 = 0$.

6. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, then find AI.

7. Define singular and non singular matrices.

8. Define consistent and inconsistent system.

9. Define eigen vectors of a square matrix A.

10. Find the eigen values of $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Find numerically greatest term in the expansion of $(1+x)^{21/2}$ when $x = 2/3$.

Or

(b) Show that the equation $x^3 + qx + r = 0$ will have one root twice another if $343r^2 + 36q^3 = 0$.

12. (a) Show that the sum of the 6th powers of the roots of $x^7 - x^4 + 1 = 0$ is 3.

Or

(b) Find the multiple root of $4x^3 - 12x^2 - 15x - 4 = 0$ and solve.

13. (a) If a, b, c are any three distinct positive real numbers prove that $a^2 + b^2 + c^2 > ab + bc + ca$. Deduce that $a^3 + b^3 + c^3 > 3abc$.

Or

(b) Prove that $n^n (n+1)^{2n} > 4^n (n!)^3$ when $n \in \mathbb{N}$.

14. (a) Find the determinant value of $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$.

Or

(b) Find the rank of thee matrix $A = \begin{bmatrix} 3 & 4 & -6 \\ 2 & -1 & 7 \\ 1 & -2 & 8 \end{bmatrix}$.

15. (a) Find non-trivial solution (if possible) for $2x - y + 3z = 0$, $x + y - z = 0$, $4x + y - z = 0$.

Or

(b) Find the eigen values of $A = \begin{bmatrix} 3 & -4 & 4 \\ 1 & -2 & 4 \\ 1 & -1 & 3 \end{bmatrix}$.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Sum the series $\sum_{n=0}^{\infty} \frac{(n+1)^2}{n!} x^n$.

17. Find the multiple root of $4x^3 - 12x^2 - 15x - 4 = 0$ and solve completely.

18. Transform the equation $x^4 - 4x^3 - 18x^2 - 3x + 2 = 0$ into one which does not contain the third term.

19. Find the inverse of the matrix $A = \begin{bmatrix} -3 & -2 & 2 \\ 6 & 5 & -2 \\ -6 & -2 & 5 \end{bmatrix}$.

20. Find the eigen values and eigen vectors of $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.

D–8161

Sub. Code
11314

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION, MAY 2025.

First Semester

CALCULUS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Find $\frac{dy}{dx}$ if $y = x^{\sin x}$.

2. If $x = a(\theta + \sin\theta)$ and $y = a(1 - \cos\theta)$, show that $\frac{dy}{dx} = \tan\left(\frac{1}{2}\theta\right)$.

3. Find the first order partial derivative of $u = e^x \sin y$.

4. Show that the radius of curvature of $y = c\cosh(x/c)$ is y^2/c.

5. Define evolute.

6. Evaluate $\int_0^a \int_0^b (x^2 + y^2)\,dx\,dy$.

7. Define Beta function.

8. Solve $(D^2 - 2D + 1)y = 0$.

9. Find the Laplace transform of e^{at}.

10. Form the partial differential equation by eliminating the arbitrary function from $z = f(x - y)$.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) If $x = t^2 + 3t$ and $y = t^3 + 2t$ find the value of t for which $\frac{dy}{dx} = 1$.

Or

(b) If $y = x^2 e^{ax}$, find y_n.

12. (a) Verify Euler's theorem for the function $f = x^3 - 2x^2 y + 3xy^2 + y^3$.

Or

(b) Find the $p - r$ equation of $r = a \sin\theta$.

13. (a) Derive the radius of curvature $\rho = \frac{(1 + y_1^2)^{3/2}}{y_2}$.

Or

(b) Evaluate $I = \int_0^{4a} \int_{x^2/4a}^{2\sqrt{ax}} xy \, dy dx$.

14. (a) Show that $\Gamma(n) = 2\int_0^\infty e^{-y^2} y^{2n-1} dy$.

Or

(b) Solve $(D^3 - 3D^2 + 4D - 2)y = e^x$.

15. (a) Solve $(2x+3)^2 \frac{d^2y}{dx^2} - (2x+3)\frac{dy}{dx} - 12y = 6x$.

Or

(b) Solve $(x-y)p + (y-x-z)q = z$.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Examine thee maximum and minimum values of the function $f(x) = x^3 - 9x^2 + 15x$.

17. Find the evolute of the parabola $y^2 = 4ax$.

18. Change the order of integration $\int_0^a \int_x^a (x^2 + y^2)\, dydx$ and hence solve it.

19. Prove that $\beta(m,n) = \frac{\Gamma(m)\ \Gamma(n)}{\Gamma(m+n)}$.

20. Solve $y'' - 4y' + 8y = e^{2t}$, $y(0) = 2$ and $y'(0) = -2$ by using Laplace transform.

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D–8070

Sub. Code
21A/0321A

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.B.A./B.B.A. (Banking)/B.C.A./M.B.A. (5 Year Integrated) DEGREE EXAMINATION, MAY 2025.

Second Semester

Part I — TAMIL PAPER – II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

பகுதி அ — (10 × 2 = 20 மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் ஓரிரு வரிகளில் விடையளி.

1. தேம்பாவணி – குறிப்பு வரைக.
2. வீரமாமுனிவர் இயற்பெயர் என்ன?
3. சிறுகதை என்றால் என்ன?
4. 'கம்பன் புறத்திணை' நூலின் ஆசிரியர் யார்?
5. முதலெழுத்துகள் யாவை?
6. மொழிக்கு முதலில் வரும் மெய்யெழுத்துகள் யாவை?
7. அஃறிணைக்குரிய பால்களின் பெயரினை எழுதுக.
8. வினா வகைகள் யாவை?
9. தமிழில் தோன்றிய முதல் சிறுகதை யாது?
10. திருமுறை என்றால் என்ன? அவை எத்தனை?

பகுதி ஆ — ($5 \times 5 = 25$ மதிப்பெண்கள்)

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) தேம்பாவணி காட்சிப் படலம் உணர்த்தும் கருத்தினைச் சுட்டுக.

(அல்லது)

(ஆ) தேம்பாவணி நூலின் சிறப்புகளைப் பட்டியலிடுக.

12. (அ) 'வானவீதியில்' கதையின் போக்கினை எழுதுக.

(அல்லது)

(ஆ) மொழி முதலெழுத்துகள் பற்றி விளக்குக.

13. (அ) விடை என்றால் என்ன? அதன் வகைகளை விளக்குக.

(அல்லது)

(ஆ) திணை குறித்தும் அதன் வகைகள் பற்றியும் எழுதுக.

14. (அ) ஆகுபெயர் குறித்து எழுதுக.

(அல்லது)

(ஆ) மரபு கவிதை கவிஞர்களின் பணிகள் குறித்து எழுதுக.

15. (அ) புதினம் என்றால் என்ன? அதன் வகைகள் குறித்து எழுதுக.

(அல்லது)

(ஆ) பெரியபுராணம் நூலின் சிறப்புகளை எழுதுக.

பகுதி இ — ($3 \times 10 = 30$ மதிப்பெண்கள்)

எவையேனும் மூன்று வினாக்களுக்கு கட்டுரை வடிவில் விடை தருக.

16. தேம்பாணி பாடல்கள் வழி அறியலாகும் கருத்துக்களை தொகுத்துரைக்க.

17. கம்பன் புறத்திணை நூல் உணர்த்தும் செய்தியினை கட்டுரைக்க.

18. ஒற்றெழுத்து மிகலும் மிகாமையும் குறித்து வரைக.

19. புதுக்கவிதையின் தோற்றம் வளர்ச்சி குறித்து கட்டுரை வரைக.

20. கிறித்துவர்கள் தமிழுக்கு ஆற்றிய தொண்டினை தொகுத்துரைக்க.

D–8071

Sub. Code
21B/0321B

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.B.A./ B.B.A. (Banking)/ B.C.A./M.B.A. (5 Years Integrated) DEGREE EXAMINATION, MAY 2025.

Second Semester

Part I — COMMUNICATION SKILLS - II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours   Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Why is feedback an important part of communication?

2. Name the various methods used for communication.

3. Why is focus on target group important in communication?

4. Write a short note on word power.

5. What are the different types of soft skills?

6. Write a short note on idioms and phrases.

7. What are business presentations?

8. What is publishing?

9. Mention the essentials of a good resume.

10. Write a short note on newsletters.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) List the skills required in oral and written communication.

Or

(b) Analyze the effectiveness of oral communication.

12. (a) What are the essential guidelines for effective speaking?

Or

(b) Explain the two approaches used for teaching pronunciation with examples.

13. (a) Analyze the significance of language.

Or

(b) What are the guidelines for effective presentation?

14. (a) Describe technical writing process.

Or

(b) Explain the guidelines for conducting effective interviews.

15. (a) Discuss self-evaluation of creative writing.

Or

(b) Discuss the advantages and disadvantages of press releases.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Explain the stimulus and response mechanism in communication with examples.

17. Discuss various stages involved in the process of making presentations.

18. Discuss the advantages of written communication over oral communication.

19. Describe the format, characteristics and types of proposals.

20. Analyze the significance of phonetics and pronunciation in professional communication.

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D–8072

Sub. Code
22/13722/0122/0322

DISTANCE EDUCATION

COMMON FOR
B.A./B.Sc./B.B.A./B.B.A.(Banking)/B.C.A./M.B.A.(5 Year Integrated) DEGREE EXAMINATION, MAY 2025.

Second Semester

Part II — ENGLISH PAPER - II

(CBCS 2018 – 2019 Academic Year Onwards/
2021 Calendar Year onwards)

Time : Three hours　　　　　　Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. How does Wordsworth look upon the sun in 'Upon Westminister Bridge'?

2. What does the speaker refer to the urn?

3. What do the two roads represent in 'The Road not Taken'?

4. Who are the persons between whom the strange meeting takes place?

5. In what sense are the fishermen 'The sons of the sea'?

6. Where does the train reach at night?

7. Why did Shylock hate Antonio?

8. What was the condition in the will of Portia's father?

9. What happens to the property of shylock at the end?

10. Mention the characteristics of good notes.

PART B — (5 × 5 = 25 marks)

Answer ALL the questions, choosing either (a) or (b).

11. (a) Describe the mood and tone of Shakespeare's 'Sonnet XVIII'.

Or

(b) How does Wordsworth describe London's beauty from 'Upon Westminister Bridge'?

12. (a) Draft the character of Andrea del Santo.

Or

(b) How does Robert Frost feel about his decision at the end in 'The Road not Taken'?

13. (a) Bring out the significance of the title of the poem, 'Where the Mind is Without Fear'.

Or

(b) How does Sarojini Naidu bring out the adventurous spirit of the fishermen's lives?

14. (a) Write a note on Antonio's friendship.

Or

(b) Write a note on The Prince of Morocco.

15. (a) Write a paragraph on the following topic : Pleasure of writing.

Or

(b) Write a report for The School Magazine.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Write a critical appreciation of the poem, 'Ode on a Grecian Urn'.

17. Discuss - how does Owen portray death in his poem 'Strange meeting'.

18. Provide a critical analysis of Stephen Spender's 'The Express'.

19. Justify 'The Merchant of Venice' as a romantic comedy.

20. Read the passages and answer the questions given below:

To avoid the various foolish opinions to which mankind is prone, no superhuman genius is required.

A few simple rules will keep you out from silly error. If the matter is one that can be selected by observation, make the observation yourself. Aristotle could have avoided the mistake of thinking that women have fewer teeth than men, by the simple device of asking Mrs. Aristotle to keep her mouth open while he counted. He did not do so because he thought he knew. Thinking that you know when in fact you don't is a fatal mistake, to which we are all prone. I believe myself that hedgehogs eat black beetles, because I have been told that they do; but if were writing a book on the habits of hedgehogs, I should not commit myself until I had seen one enjoying this unappetizing diet. Aristotle, however, was less cautions. Ancient and medieval authors knew all about unicorns and salamanders; not one of them thought it necessary to avoid dogmatic statements about them because he had never seen one of them.

Questions :

(a) What was the foolish opinion Aristotle had regarding women?

(b) What could he have done to avoid this foolish opinion?

(c) Why didn't Aristotle try to do that?

(d) What were the mistakes committed by Ancient writers while they wrote about unicorns?

(e) What would the writer do if he were to write a book on Hedgehogs? Why does he say so?

D–8162

Sub. Code
11323

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION, MAY 2025.

Second Semester

ANALYTICAL GEOMETRY AND VECTOR CALCULUS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours | Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Write the equation of the tangent to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ at (x_1, y_1).

2. Define radical centre.

3. Show that the points $P(3/2, 0°)$, $Q\left(-\sqrt{2}, 45°\right)$ and $R(-3/2, 90°)$ are collinear.

4. Define angle between planes.

5. Find the angle between the planes $2x - y + +z = 6$ and $x + y + 2z = 7$.

6. Show that the lines through the origin having direction ratios –1, 2, 5; 2, 3, –4; 0, 7, 6 lie in a plane.

7. Show that all the three planes $ax + hy + gz = 0$; $hx + by + fz = 0$; $gx + fy + cz = 0$ pass through a line if $abc + 2fgh - af^2 - bg^2 - ch^2 = 0$.

8. Write the general equation of a sphere.

9. Define harmonic vector.

10. Define Solenoidal vector.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Prove that the distance between the points $P(r_1, \theta_1)$ and $Q(r_2, \theta_2)$ is $PQ = \sqrt{r_1^2 + r_2^2 - 2r_1 r_2 \cos(\theta_2 - \theta_1)}$.

Or

(b) Find the direction ratios and direction cosines of the line joining the points (1, 2, –1) to (2, 1, 3).

12. (a) Prove that the equation of the plane having intercepts a, b, c with the co-ordinate axes is $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$.

Or

(b) Show that the line $\frac{x-3}{2} = \frac{y-2}{-5} = \frac{z-1}{3}$ and $\frac{x-1}{-4} = \frac{y+2}{1} = \frac{z-6}{2}$ are coplanar and find the equation of the plane determined by the lines.

13. (a) Show that all the three planes $ax + hy + gz = 0$; $hx + by + fz = 0$; $gx + fy + cz = 0$ pass through a line if $abc + 2fgh - af^2 - bg^2 - ch^2 = 0$.

Or

(b) Obtain the equation of the tangent plane at the origin to the sphere $x^2 + y^2 + z^2 + 8x - 6y + 4z = 0$.

14. (a) Define gradiant, divergent and curl.

Or

(b) Prove that $curl(\phi f) = grad \phi x f + \phi curl f$.

15. (a) Evaluate $\int_c \bar{f} . d\bar{r}$ where $\bar{f} = (x^2 + y^2)\bar{i} + (x^2 - y^2)\bar{j}$ and c is the curve $y = x^2$ joining (0, 0) and (1, 1).

Or

(b) Prove that $\nabla f(r) = \left(\frac{f'(r)}{r}\right)\bar{r}$.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Prove that the equation of the normal at α on the conic $\frac{l}{r} = 1 + e\cos\theta$ is $\left(\frac{e\sin\alpha}{1+e\cos\alpha}\right)\left(\frac{l}{r}\right) = e\sin\theta + \sin(\theta - \alpha)$.

17. Find the shortest distance between the lines $2x - 2y + 3z - 12 = 0 = 2x + 2y + z$ and $2x - z = 0 = 5x - 2y + 9$.

18. Obtain the equation of the sphere having the circle $S = x^2 + y^2 + z^2 - 3x + 4y - 2z - 5 = 0$ and $\pi = 5x - 2y + 4z + 7 = 0$ as a great circle.

19. If $\nabla\phi = 2xyz^3\bar{i} + x^2z^3\bar{j} + 3x^2yz^2\bar{k}$ then find $\phi(x, y, z)$ if $\phi(1, -2, 2) = 4$.

20. Verify Gauss divergence theorem for $\bar{f} = y\bar{i} + x\bar{j} + z^2\bar{k}$ for the cylindrical region S given by $x^2 + y^2 = a^2$; $z = 0$ and $z = h$.

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D–8163

Sub. Code
11324

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2025.

Second Semester

SEQUENCES AND SERIES

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours — Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Define a sequence. Give an example.

2. Define monotonic sequence. Give an example.

3. Find $\lim_{n\to\infty} \frac{\sin n}{n}$.

4. Find the upper and lower limit of the sequence $(a_n) = 0,1,0,1,0,...$

5. Is any bounded sequence is convergent? Justify your answer.

6. Show that the series $1+1+1+\cdots$ diverges to ∞.

7. If Σd_n diverges and $\lim(a_n / d_n)$ exists and is greater than zero, then show that Σa_n diverges.

8. Test the convergence of $\Sigma \frac{n^n}{n!}$.

9. Show that the convergence of Σa_n implies the convergent of $\Sigma \frac{a_n}{n}$.

10. Define multiplication of a series. Give an example.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) If $(a_n) \to a$ and $a_n \geq 0$ for all n and $a \neq 0$, then prove that $\left(\sqrt{a_n}\right) \to \sqrt{a}$.

Or

(b) Show that $\lim_{n\to\infty} \frac{3n^2 + 2n + 5}{6n^2 + 4n + 7} = \frac{1}{2}$.

12. (a) Show that $(a_n) \to 0$ and (b_n) is bounded then $(a_n b_n) \to 0$.

Or

(b) Let $a_n = 1 + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{n}$. Show that (a_n) diverges to ∞.

13. (a) Show that $\lim_{n\to\infty} \frac{x^n}{n!} = 0$.

Or

(b) Prove that every bounded sequence has a convergent subsequence.

14. (a) Apply Cauchy's general principle of convergence to show that the series $\Sigma\left(\frac{1}{n}\right)$ is not convergent.

Or

(b) Test the convergence of the series $\Sigma\sqrt{\frac{n}{n+1}}\,x^n$ where x is any positive real number.

15. (a) Prove that the exponential series e^x converges absolutely for all $x \in R$.

Or

(b) Prove that the Cauchy product of two convergent series is convergent.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Discuss the behaviour of the geometric sequence (r^n).

17. State and prove Cauchy's first limit theorem.

18. State and prove D'Alembert's ratio test.

19. If the series Σa_n and Σb_n converges to the sums a and b respectively and if one of the series, say Σa_n is absolutely convergent, then prove that the Cauchy product Σc_n converges to the sum ab.

20. State and prove Cauchy's root test.

D–8073

Sub. Code
31A/13731/ 0131

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION, MAY 2025.

Third Semester

Part I : TAMIL PAPER – III

(CBCS 2018 – 2019 Academic Year Onwards/2021 Calendar Year Onwards)

Time : Three hours   Maximum : 75 marks

பகுதி அ — ($10 \times 2 = 20$ மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் விடையளிக்க.

1. பத்துப்பாட்டிலுள்ள புற இலக்கியங்களைச் சுட்டுக.

2. வாய்ப்புள் - பொருள் தருக.

3. ஐங்குறுநூற்றின் பாலைத்திணைப் பாடல்களைப் பாடியவர்?

4. மஞ்ஞைப் பத்து - சிறு குறிப்பு வரைக.

5. குறுந்தொகையில் எத்தனைப் பாடல்கள் உள்ளன?

6. நற்றிணையின் கடவுள் வாழ்த்தைப் பாடியவர்?

7. பாடாண்திணை என்றால் என்ன?

8. ‘நெடுந்தொகை’ என்று கூறப்படும் சங்க நூல்?

9. பழமொழிநானூற்றின் ஆசிரியர் யார்?

10. இராசராசனின் தமக்கை பெயரைக் கூறுக.

பகுதி ஆ — ($5 \times 5 = 25$ மதிப்பெண்கள்)

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) ஐங்குறுநூற்றின் அமைப்பு முறையை உணர்த்துக.

(அல்லது)

(ஆ) பரணரின் புலமைத்திறத்தைச் சான்றுகள் தந்து விவரிக்க.

12. (அ) குறிஞ்சித்திணைக்குரிய முப்பொருட்களைப் பட்டியலிடுக.

(அல்லது)

(ஆ) வரைவு நீடித்த வழித் தலைவி தோழிக்குரைத்த குறுந்தொகைப் பாடலை விளக்குக.

13. (அ) பருவம் கண்டு வருந்திய தலைவியின் புலம்பலை நற்றிணை வழி விவரிக்க.

(அல்லது)

(ஆ) அகநானூற்றின் நூல் பகுப்பை விளக்கி வரைக.

14. (அ) அறிவுடைமை குறித்த வள்ளுவரின் கருத்துக்களைத் தொகுத்துரைக்க.

(அல்லது)

(ஆ) நல்லோர் பிறக்கும் குடியை விளம்பிநாகனார் எங்ஙனம் பாடுகிறார்?

15. (அ) நாடகக் கதைப் கோப்பைச் சான்றுகளுடன் விளக்குக.

(அல்லது)

(ஆ) சுவடுகள் நாவலின் கதைச்சுருக்கத்தை எழுதுக.

பகுதி இ — ($3 \times 10 = 30$ மதிப்பெண்கள்)

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. தலைவியின் துயரை முல்லைப்பாட்டு வழிப் புலப்படுத்துக.

17. நற்றிணையிலுள்ள மணியான கருத்துக்களைத் தொகுத்துரைக்க.

18. புறநானூற்றின் சிறப்புகளை நும் பாடப் பகுதியால் எடுத்துரைக்க.

19. இராசராசசோழன் நாடகத்தில் கையாளப்பட்டுள்ள உத்திகளைக் கட்டுரைக்க.

20. சுவடுகள் நாவலின் பாத்திரப் படைப்பை விரித்துரைக்க.

D–8074

Sub. Code
31B

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION, MAY 2025.

Third Semester

Part - I : HUMAN SKILLS DEVELOPMENT - I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Define human skills.

2. What is an interpersonal relationship?

3. Write the benefits of personality development.

4. What do you mean by self-esteem?

5. Mention any four negotiating skills.

6. What is a decision-making skills?

7. Name the types of attitudes.

8. What is a leadership skill?

9. Give some examples for human relation skills.

10. What is anger management?

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Write a paragraph on human skills.

Or

(b) Write a short note on interpersonal skills.

12. (a) Describe why thinking is important.

Or

(b) Give some tips for personality development.

13. (a) Describe the different types of goal setting skills.

Or

(b) Explain what are the steps used in decision making.

14. (a) Narrate the characteristics of attitudes.

Or

(b) Write a paragraph on common leadership styles.

15. (a) Describe benefits of human relations skills.

Or

(b) Highlight the techniques of stress management skills.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Elucidate mind and its functions.

17. Elaborate self-concept and self-esteem in your own words.

18. Write an essay on negotiating skills.

19. Sum up the characteristics and importance of change.

20. Summarize the styles and strategies of conflict management.

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D–8075

Sub. Code
32/13732/0132

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION, MAY 2025.

Third Semester

PART - II : ENGLISH PAPER - III

(CBCS 2018 – 2019 Academic Year Onwards/CBCS 2021 Calendar Year onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Why did Swami's father want him to sleep alone?

2. Where was St. Peter's church located?

3. What did Natalya say about Guess?

4. How does uncle James threaten Philip?

5. How was Eddie Killed?

6. Where does the play "The Pie and the Tart" take place?

7. Who is Mark Tallis in "Reunion"?

8. Name the children of Sen Gupta in "The Refugee".

9. Define Pronoun with example.

10. State the importance of Minutes.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Sketch the character of Mrs. Loisel in "The Diamond Necklace".

Or

(b) How did the verger treat his gowns?

12. (a) Describe the episode of the breakfast in "The Boy Comes Home".

Or

(b) What are Mrs. Meldon's views about war?

13. (a) Compare and contrast the characters of Jean and Pierrie in "The Pie and the Tart".

Or

(b) Explain the significance of the title "Reunion".

14. (a) Explore the themes of "A Kind of Justice".

Or

(b) Briefly analyse the role of Yassin in "The Refugee".

15. (a) Frame sentences with the following adverbs.

(i) Carefully

(ii) Never

(iii) Always

(iv) Unfortunately

(v) Well.

Or

(b) Describe one of your happiest memories in a paragraph.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Narrate how a coward boy Swami became a hero overnight.

17. How is loneliness depicted in "The Postmaster"?

18. Describe the character of Mrs. Pryde in "The Silver Idol".

19. Enumerate the types of noun with examples.

20. As the Manager of a Nature Park, write a notice in about 50 words prohibiting visitors from consuming any food items or beverages in the premises and warning them against littering.

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D–8164

Sub. Code
11333

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION, MAY 2025.

Third Semester

DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — $(10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Solve $a(xdy + 2ydx) = xy\,dy$.

2. Solve $xp^2 - 2yp + x = 0$.

3. Solve $y = (x - a)p - p^2$.

4. Solve $(D^{2} - 3D^2 + 4)y = 0$.

5. Solve $\dfrac{d^3y}{dx^3} = \sin^2 x$.

6. Solve $z\,dz + (x - a)dx = \left[h^2 - z^2 - (x - a)^2\right]^{1/2} dy$.

7. What is meant by singular integral?

8. Eliminate f from $z = f(x^2 + y^2)$.

9. Solve $\sqrt{p}+\sqrt{q}=1$.

10. Define cycloid.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Solve $x^2=(1+p^2)$.

Or

(b) Solve $y=xp+x(1+p^2)^{1/2}$.

12. (a) Solve $(D^2+5D+6)y=e^x$.

Or

(b) Solve $(D^4+D^3+D^2)y=5x^2$.

13. (a) Solve $\frac{dx}{dt}+2x-3y=t$; $\frac{dy}{dt}-3x+2y=e^{2t}$.

Or

(b) Solve $x^2\frac{d^2y}{dx^2}+4x\frac{dy}{dx}+2y=e^x$.

14. (a) Solve $x\frac{d^2y}{dx^2}-(2x-1)\frac{dy}{dx}+(x-1)y=e^x$.

Or

(b) Solve $q=xp+p^2$.

15. (a) Solve $z^4 q^2 - z^2 p = 1$.

Or

(b) Solve $pxy + pq + qy = yz$.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Solve $(D^2 + 1)y = x^2 e^{2x} + x\cos x$.

17. Solve $x^2 \dfrac{d^2y}{dx^2} + 3x\dfrac{dy}{dx} + y = \dfrac{1}{(1-x)^2}$.

18. Solve $(1-x)y_3 + (x^2 - 1)y_2 - x^2 y_1 + xy = 0$.

19. Determine the surface which satisfies the differential equation $(x^2 - a^2)p + (xy - az\tan\alpha)q = xz - ay\cot\alpha$ and passes through the curve $x^2 + y^2 = a^2$, $z = 0$.

20. Find the time required to empty a cylindrical tank one metre in diameter and 4 metres long through a hole 5 cm diameter if the tank is initially full and its axis is (a) vertical and (b) horizontal.

D–8165

Sub. Code
11334

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION, MAY 2025.

Third Semester

MECHANICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. State the triangle law of forces.

2. Explain like and unlike forces.

3. Define arm of the couple.

4. Explain positive and negative moment.

5. Define coefficient of friction.

6. Define coplanar forces.

7. Define vertex and directrix.

8. Define angle of friction.

9. Define central orbit.

10. Write the pedal equation f the central orbit.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Two forces act on a particle. If the sum and difference of the forces are at right angles to each other, show that the force are of equal magnitude.

Or

(b) Prove that the algebraic sum of the resolved parts of two forces in any direction is equal to the resolved part of the resultant in the same direction.

12. (a) $ABCD$ and $A'B'C'D'$ are parallelograms. Prove that forces $\overline{AA'}, \overline{B'B}, \overline{CC'}$ and $\overline{D'D}$ acting at a point will keep it at rest.

Or

(b) Two like parallel forces P and Q act on a rigid body at A and B respectively. If Q be changed to $\frac{P^2}{Q}$, show that the line of action of the resultant is the same as it would be if the forces where simply interchanged.

13. (a) Forces of 3, 4, 5, 6 and $2\sqrt{2}$ act respectively along the sides AB, BC, CD ad DA and along the diagonal AC of the square $ABCD$. Find the resultant.

Or

(b) Prove that any system of forces acting in one plane on a rigid body can be reduced to a single force or a couple.

14. (a) A body is projected with a velocity of 98 metres per sec. in a direction making an angle $\tan^{-1} 3$ with the horizon; show that it rises to a vertical height of 441 metres and that its time of flight is about 19 secs. Find also horizontal range through the point of projection ($g = 9.8$ metres/$\sec^2$).

Or

(b) A 100 gm cricket ball moving horizontally at 24 m/sec was hit straight back with a speed of 15 m/sec. If the contact lasted $\frac{1}{20}$ second, find the average force exerted by the bat.

15. (a) A cyclist riding at V cm, per sec. has to negotiate a corner. What is the least radius of the curve he may describe if μ is the coefficient of friction between the cycle and the road.

Or

(b) A particle is moving with S.H.M. and while making an oscillation from one extreme position to the other, its distances from the centre of oscillation at 3 consecutive seconds are x_1, x_2, x_3. Prove that the period of oscillation is $\dfrac{2\pi}{\cos^{-1}\left(\dfrac{X_1 + X_3}{2\pi}\right)}$.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. E is the middle point of the side CD of a square $ABCD$. Forces 16, 20, $4\sqrt{5}, 12\sqrt{2}$ Kg.wt. act along AB, AD, EA, CA in the directions indicated by the order of the letters. Sow that they are in equilibrium.

17. Prove that the resultant of any number of couples in the same plane on a rigid body is a single couple whose moment is equal to the algebraic sum of the moments of the several couples.

18. State and prove Varigon's theorem.

19. A ball is thrown from a point on a smooth horizontal ground with a speed V at angle α to the horizon. If e be the coefficient of restitution, show that the total time for which the ball rebounds on the ground is $\frac{2V \sin \alpha}{g(1-e)}$ and the horizontal distance travelled by it is $\frac{V^2 \sin 2\alpha}{g(1-e)}$.

20. Derive the differential equation of a central orbit.

D–8076

Sub. Code
41A/13741/ 0141

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION, MAY 2025.

Fourth Semester

Part I : TAMIL PAPER - IV

(CBCS 2018 – 2019 Academic Year Onwards/ 2021 Calendar Year onwards)

Time : Three hours Maximum : 75 marks

பகுதி அ — ($10 \times 2 = 20$ மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் ஓரிரு வரிகளில் விடை தருக.

1. அசை எத்தனை வகைப்படும்? அவை யாவை?

2. சிந்து என்றால் என்ன?

3. முல்லைக்குரிய பெரும்பொழுது யாது?

4. புறப்பொருள் எத்தனை வகைப்படும்?

5. தற்குறிப்பேற்றம் என்றால் என்ன?

6. பிறிது மொழிதல் என்றால் என்ன?

7. தொல்காப்பியத்தின் ஆசிரியர் யார்?

8. பதினென் கீழ்கணக்கில் அறநூல்கள் எத்தனை? இரண்டினைக் கூறு.

9. சங்க இலக்கியத்தில் அகமும், புறமும் கலந்த நூல்கள் எத்தனை? அவை யாவை?

10. தளை எத்தனை வகைப்படும்?

பகுதி ஆ — (5 × 5 = 25 மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் ஒரு பக்க அளவில் விடை தருக.

11. (அ) சீர் குறித்து எழுதுக.

(அல்லது)

(ஆ) வஞ்சிப்பா குறித்து எழுதுக.

12. (அ) அறத்தொடு நிற்றல் குறித்து விளக்குக.

(அல்லது)

(ஆ) செவியறிவுறூஉ - விளக்குக.

13. (அ) உருவ அணியைச் சான்றுடன் விளக்குக.

(அல்லது)

(ஆ) சிலேடை அணியைச் சான்றுடன் விளக்குக.

14. (அ) எட்டுத்தொகை குறித்து எழுதுக.

(அல்லது)

(ஆ) பெரியபுராணம் குறித்து எழுதுக.

15. (அ) கம்பராமாயணம் குறித்து எழுதுக.

(அல்லது)

(ஆ) பாண்டியன் பரிசு குறித்து கட்டுரை வரைக.

பகுதி இ — (3 × 10 = 30 மதிப்பெண்கள்)

எவையேனும் மூன்றனுக்கு மட்டும் கட்டுரை வடிவில் விடை தருக.

16. பாவகைகளுள் வெண்பா பெறுமிடம் குறித்து விவரி.

17. ஐந்திணைக்குரிய கருப்பொருட்கள் குறித்து கட்டுரை வரைக.

18. உவமை அணி குறித்து ஒரு கட்டுரை வரைக.

19. ஐம்பெரும் காப்பியங்கள் குறித்து ஒரு கட்டுரை வரைக.

20. பாஞ்சாலி சபதத்தில் பாரதியார் கூறும் கருத்துக்களைத் தொகுத்துரைக்க.

D–8077

Sub. Code
41B

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION, MAY 2025.

Fourth Semester

Part – I : HUMAN SKILLS DEVELOPMENT - II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours   Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Define Guidance.

2. What are human relational skills?

3. State the importance of conceptual skills.

4. What are the techniques of delivering a presentation?

5. Give two examples for technical skills.

6. How far will visionary quality be helpful to a leader?

7. What is the difference between community and society?

8. Why are understanding skills important?

9. How do you define a problem?

10. What are the benefits of cooperative learning skills?

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Distinguish between guidance and counselling.

Or

(b) Illustrate the need and importance of managerial skills.

12. (a) Write short notes on technical skills.

Or

(b) Mention the basic qualities of a leader.

13. (a) Enumerate the steps to be followed in planning for a presentation.

Or

(b) Explain the nature of organization skills.

14. (a) List out the ways to maintain relationship with others.

Or

(b) Briefly explain understanding skills.

15. (a) Why is problem solving an important skill?

Or

(b) How does an individual become socially responsible?

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Write an essay on human relational skills.

17. Discuss the importance of conceptual skills.

18. How do you manage multiple tasks simultaneously?

19. Comment on the major interactions between individuals and groups.

20. Bring out the benefits of cooperative learning skills.

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D–8078

Sub. Code
42/13742/0142

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION, MAY 2025.

Fourth Semester

Part - II : ENGLISH PAPER - IV

(CBCS 2018 – 2019 Academic Year Onwards/2021 Calendar Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. How did Lalajee show his gratitude to Jim Corbett?

2. What were the things that Eliza bought for the poor people in the hut?

3. Why does Alfred Doolittle want to meet Higgins?

4. Why did Swami go to the headmaster's room?

5. How is Shylock punished at the end of the play?

6. What does the lead casket contain?

7. When was Martin Luther king awarded the Nobel Prize?

8. Where did Toynbee meet Nehru for the first time?

9. Define clause.

10. What is a proverb?

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Compare and contrast the characters of Elisha and Efim.

Or

(b) Narrate the experience of Klaas with the fairies.

12. (a) Examine the role of Mrs. Pearce in "Pygmalion".

Or

(b) What were the reasons behind Swami's argument with Ebenezer?

13. (a) Why does Shylock demand Antonio's flesh instead of money?

Or

(b) How did Friar help Juliet?

14. (a) Explain the hardships faced by Negroes in America.

Or

(b) What was Nehru's reaction when he saw the general?

15. (a) Fill in the blanks with correct question tags :

(i) We are late for the movies, ____________?

(ii) Please stop talking, ____________?

(iii) Rani never acts so rudely, ____________?

(iv) John will come tonight, ____________?

(v) They don't like Chinese food, ____________?

Or

(b) Write a letter to the principal requesting for bonafide certificate for scholarship.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Justify the title of Tolstoy's "Little Girls Wiser than Men".

17. Explore the transformation of Eliza in Shaw's Pygmalion.

18. How does Shakespeare treat death in "Romeo and Juliet"?

19. How does Toynbee describe the characteristics of Nehru?

20. Write an essay on concord.

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D–8166

Sub. Code
11343

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION, MAY 2025.

Fourth Semester

ANALYSIS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours   Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Define countable and uncountable sets.

2. Show that any finite subset of a metric space is bounded.

3. In $\mathbb{R}$ with usual metric, show that every singleton set is closed.

4. Define complete metric space. Give an example.

5. Show that composition of two continuous function is continuous.

6. Define uniformly continuous function.

7. Define refinement.

8. If $T_x = T_\alpha$ is a contraction, show that $|\alpha| < 1$.

9. Show that if f is a non-constant real valued continuous function on R then the range of f is uncountable.

10. Show that (0, 1) with usual metric is not compact.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Prove that any infinite set is equivalent to a proper subset of itself.

Or

(b) In a metric space (M,d), prove that $|d(x,z)-d(y,z)| \leq d(x,y)$ for all $x, y, z \in M$.

12. (a) Let (M,d) be a metric space. Show that every subset of M is open if and only if $\{x\}$ is open for all $x \in M$.

Or

(b) Prove that the union of a finite number of closed set is closed in any metric space.

13. (a) Let A, B be subsets of $\mathbb{R}$. Prove that $\overline{A \times B} = \overline{A} \times \overline{B}$.

Or

(b) Let f and g be continuous real valued functions on a metric space M.

14. (a) Show that any constant function on a closed and bounded interval $[a,b]$ is integrable on $[a,b]$.

Or

(b) If f and g are integrable on $[a,b]$, then prove that fg is integrable on $[a,b]$ and $\left|\int_a^b f dx\right| \leq \int_a^b |f| dx$.

15. (a) Prove that the union of connected set is connected in a metric space.

Or

(b) Prove that a closed subspace of a compact metric space is compact.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. State and prove Minkowski's inequality.

17. Let M be a metric space and $A \subseteq M$. Prove that $\overline{A} = A \cup D(A)$.

18. State and prove Baire category theorem.

19. State and prove Daurboux theorem.

20. Prove that a subspace of $\mathbb{R}$ is connected if and only if it is an interval.

D–8167

Sub. Code
11344

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION, MAY 2025.

Fourth Semester

STATISTICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Define Weighted mean.

2. Define first quartile.

3. Define, r^{th} moment about any point.

4. If $f(x) = \begin{cases} \dfrac{K}{\pi(1+x^2)}, & if\ -\infty < x < \infty \\ 0, & \text{otherwise} \end{cases}$ is a p.d.f. of a continuous random variable X, then find the value of K.

5. Define interpolation.

6. Show that $E = (1-\nabla)^{-1}$.

7. Define contrary frequency.

8. Given that $(A) = (\alpha) = B = (\beta) = \dfrac{N}{2}$.

9. Define ideal index number.

10. Define time series. Give an example.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Prove that the sum of the squares of the deviations of a set of n values is minimum when the deviations are taken from their mean.

Or

(b) Find the median and quartiles of the heights in c.m. of eleven students given by 66, 65, 64, 70, 61, 60, 56, 63, 60, 67, 62.

12. (a) Prove that for any discrete distribution standard deviation is not less than the mean deviation from mean.

Or

(b) Find the G.M. for the following frequency distribution.

Marks	0-10	10-20	20-30	30-40
No.of students	5	8	3	4

13. (a) Fit a straight line to the following data regarding x as the independent variable.

x	0	1	2	3	4
y	1	1.8	3.3	4.5	6.3

Or

(b) Show that $-1 \leq \gamma \leq 1$.

14. (a) Prove that $\Delta(\log U_x) = \log\left(1 + \frac{\Delta U_x}{U_x}\right)$.

Or

(b) Check whether the attributes A and B are independent given that. $(AB) = 256, (\alpha B) = 768, (A\beta) = 48, (\alpha\beta) = 144$.

15. (a) Find the data given below, calculate the index numbers taking 1984 as base year.

Year	1984	1985	1986	1987	1988
Price of wheat per kg	4	5	6	7	8

Year	1989	1990	1991	1992
Price of wheat per kg	10	9	10	11

Or

(b) Fit a straight line trend by the method of least squares to the following data. Assuming that the same rate of charge continues what would be the predicated earnings for the year 1977?

Year	1970	1971	1972	1973	1974	1975	1976
Earnings in thousands	1.5	1.8	2.0	2.3	2.4	2.6	3.0

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Find the arithmetic mean $\overline{x}$, standard deviation σ and percentage of cases within $\overline{x} = \sigma, \overline{x} \pm 2\sigma$ and $\overline{x} = 3\sigma$ in the following frequency distribution.

Marks	10	9	8	7	6	5	4	3	2	1
Frequency	1	5	11	15	12	7	3	3	0	1

17. Fit a second degree parabola by taking x_i as the independent variable.

x	0	1	2	3	4
y	1	5	10	22	38

18. Three judges assign the ranks to 8 entries in a beauty contest.

Jude Mr.X	1	2	4	3	7	6	5	8
Judge Mr.Y	3	2	1	5	4	7	6	8
Judge Mr.Z	1	2	3	4	5	7	8	6

Which pair of judges has the nearest approach to common taste in beauty?

19. The following table gives the census population of a town for the years 1931-1971. Estimate the population for the year 1965 using an appropriate interpolation formula.

Year	1931	1941	1951	1961	1971
Population in lakhs	36	66	81	93	101

20. Construct the whole sale price index number for 1991 and 1992 from the data given below using 1990 as the base year.

Commodity	Whole sale price in Rupees per quintal		
	1990	1991	1992
Rice	700	750	825
Wheat	540	575	600
Ragi	300	325	310
Cholam	250	280	295
Flour	320	330	335
Ravai	325	350	360

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D–8168

Sub. Code
11351

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION, MAY 2025.

Fifth Semester

MODERN ALGEBRA

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Define symmetric difference of two sets. Give an example.

2. Define binary relation. Give an example.

3. Let G be a group such that $a^2 = e$ for all $a \in G$. Prove that G is abelian.

4. Define left coset and right coset.

5. Show that $(R, +) \cong (R^+, \cdot)$.

6. Define ring. Give an example.

7. Define Skew field.

8. Let R be a ring with identity 1. If I is an ideal of R and $1 \in I$, then show that $I = R$.

9. Define vector space.

10. Define orthogonal complement. Give an example.

PART B — $(5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) If A is a set consisting of n elements, then prove that the power set of A consists of 2^n elements.

Or

(b) Show that $A-(B \cup C)=(A-B) \cap (A-C)$.

12. (a) Prove that any permutation can be expressed as a product of transpositions.

Or

(b) Let G be a group and H be a subgroup of G. Prove that $a \in bH \Rightarrow aH = bH$.

13. (a) Prove that every group of prime order is cyclic.

Or

(b) Prove that a ring R has no zero-divisors if and only if cancellation law is valid in R.

14. (a) Prove that any finite integral domain is a field.

Or

(b) Prove that any Euclidean domain R has a identify element.

15. (a) Prove that the intersection of two subspaces of a vector spaces is a subspace.

Or

(b) Let W_1 and W_2 be subspaces of a finite dimensional inner product space. Prove that $(W_1 + W_2)^{\perp} = W_1^{\perp} \cap W_2^{\perp}$.

PART C — $(3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Prove that a subgroup of a cyclic group is cyclic.

17. State and prove Lagranges theorem.

18. Prove that isomorphism is an equivalence relation among groups.

19. State and prove the fundamental theorem of homomorphism.

20. Let V be a finite dimensional vector space over a field F. Let W be a subspace of V. Prove that (a) $\dim W \leq \dim V$ (b) $\dim \frac{V}{W} = \dim V - \dim W$.

D–8169

Sub. Code
11352

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION, MAY 2025.

Fifth Semester

OPERATIONS RESEARCH

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Define pivotal element.

2. Define feasible solution.

3. Define primal constraints.

4. Define dual variables.

5. What is meant by circling?

6. Define optimal feasible solution.

7. What is meant by infeasible solution?

8. Explain travelling salesman problem.

9. Define payoff matrix.

10. Define parallel crashing.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Using simplex method solve the LPP.

Maximize $z = 25x_1 + 20x_2$ subject to

$$16x_1 + 12x_2 \le 100$$
$$8x_1 + 16x_2 \le 80$$
$$x_1, x_2 \ge 0.$$

Or

(b) Solve the following LPP graphically.

Maximize $z = 20x_1 + 30x_2$ subject to

$$3x_1 + 3x_2 \le 36 \text{........(1)}$$

$$5x_1 + 2x_2 \le 50 \text{........(2)}$$

$$2x_1 + 6x_2 \le 60 \text{........(3)}$$

$$x_1, x_2 \ge 0.$$

12. (a) Using simplex method find the inverse of the matrix $\begin{pmatrix} 1 & 4 \\ 2 & 3 \end{pmatrix}$.

Or

(b) Write the dual of the LPP

Maximize $z = x_1 + 2x_2 + 3x_3$ subject to

$$4x_1 + 5x_2 + 4x_3 \le 9$$
$$6x_1 - x_2 + 5x_3 = 10$$
$$x_1, x_2, x_3 \ge 0.$$

13. (a) Write down the dual of the following LPP and solve them. Hence write down the optimal solution of the primal problem.

Maximize $z = 3x_1 + 2x_2$ subject to

$$2x_1 + x_2 \le 5;\ x_1 + x_3 \le 3;\ x_1, x_2 \ge 0.$$

Or

(b) Solve graphically the following LPP.

Maximize $z = 3x_1 + 2x_2$ subject to

$$x_1 - x_3 \le 1$$
$$x_1 + x_2 \ge 3.$$

14. (a) In a factory there are six jobs to be processed, each of which should go to machines A and B in the order AB. The processing time in minutes are given. Determine the optimal sequencing.

Jobs	1	2	3	4	5	6
Machine A	7	4	2	5	9	8
Machine B	3	8	6	6	4	1

Or

(b) A bus renting company has one bus at each of the five sheds S_1, S_2, S_3, S_4 and S_5. A customer in each of the five places P_1, P_2, P_3, P_4 and P_5 requires a bus for a tour. The distance in kilo meters between the sheds and places where the customers live are given in the following distance matrix. How should the buses be assigned to the customers so as to minimize the distance traveled? Find also the minimum distance traveled? Find also the minimum distance traveled by the bases.

	P1	P2	P3	P4	P5
S1	10	5	13	15	16
S2	3	9	18	13	6
S3	10	7	2	2	2
S4	5	11	9	7	12
S5	7	9	10	4	12

15. (a) Solve the game whose payoff matrix is given by

Player B

$$\text{Player A} \begin{pmatrix} 15 & 2 & 3 \\ 6 & 5 & 7 \\ -7 & 4 & 0 \end{pmatrix}$$

Or

(b) Is the following two person, zero-sum game stable? (The payoff is for player A). Solve the game.

Player B

$$\text{Player A} \begin{pmatrix} 5 & -10 & 9 & 0 \\ 6 & 7 & 8 & 1 \\ 8 & 7 & 15 & 2 \\ 3 & 4 & -1 & 4 \end{pmatrix}$$

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Solve problem using simplex method.

Maximize $z = 45x_1 + 80x_2$ subject to

$5x_1 + 20x_2 \leq 400; 10x_1 + 15x_2 \leq 450$

$x_1, x_2 \geq 0.$

17. Solve the LPP using two phase method.

Maximize $z = 5x_1 + 8x_2$ subject to

$3x_1 + 2x_2 \geq 3$

$x_1 + 4x_2 \geq 4$

$x_1 + x_2 \leq 5$

$x_1, x_2 \geq 0.$

18. Solve the following transportation problem by MODI method.

	I	II	III	IV	
A	20	21	16	18	10
B	17	28	14	16	9
C	29	23	19	20	7
b_j	6	10	4	5	26 / 25

19. A company has 4 machines on which to do 3 jobs. Each job can be assigned to one only machine. The cost of each job on each machine is given in the following table. What are the job assignments, which will minimize the cost?

	A	B	C	D
X	18	24	28	32
Y	9	13	17	19
Z	10	15	19	22

20. A project schedule has the following characteristics.

Activity	Time	Activity	Time
1-2	4	5-6	4
1-3	1	5-7	8
2-4	1	6-8	1
3-4	1	7-8	2
3-5	6	8-10	5
4-9	5	9-10	7

(a) Construct PERT network

(b) Compute T_E, T_L for each event

(c) Find the critical path.

D–8170

Sub. Code
11353

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION, MAY 2025.

Fifth Semester

NUMERICAL ANALYSIS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. When the Newton's formula converge?

2. Define operators E and Δ.

3. Write a sufficient condition for Gauss - Seidel method to converge.

4. Define interpolation and extrapolation.

5. Write the Newton's divided difference interpolation for unequal intervals.

6. Write the Lagrange's interpolation formula.

7. When can numerical differentiation be used?

8. What does Simpson's rule give exact result?

9. Give the formula for second order Runge-Kutta method.

10. Write down the Euler's algorithm for the differential equation $\frac{dy}{dx} = f(x, y)$.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Use the iteration method to find a root of the equation $x = \frac{1}{2} + \sin x$.

Or

(b) Find the smallest positive root of $x^3 - 2x + 0.5 = 0$ by Newton Raphson method.

12. (a) Evaluate $\Delta(\tan^{-1} x)$.

Or

(b) Find the backward difference table for the following:

x	0	0.1	0.2	0.3	0.4
e^x	1	1.1052	1.2214	1.3499	1.4918

13. (a) Evaluate $\Delta^{10}[(1-ax)(1-bx^2)(1-cx^3)(1-dx^4)]$.

Or

(b) Construct a divided difference table for the following data.

x	0	1	3	4
$f(x)$	1	4	40	85

14. (a) Find $\frac{d^2y}{dx^2}$ at $x = 0.96$ from the following data:

x	0.96	0.98	1.00	1.02	1.04
$f(x)$	0.77825	0.7739	0.7651	0.7563	0.7473

Or

(b) Evaluate $\int_0^1 e^{-x^2} dx$ by dividing the range into 4 equal parts using Simpson's rule.

15. (a) Using Taylor's series method compute $y(0.1)$ if $y' = x + y$, $y(0) = 1$.

Or

(b) Solve : $y_n - y_{n-1} - y_{n-2} = 0$.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Using the Gauss - Jordan method solve the following equations:

$$10x + y + z = 12$$
$$2x + 10y + z = 13$$
$$x + y + 5z = 7.$$

17. Solve the following equation using Jacobi's iteration method

$$20x + y - 2z = 17$$
$$3x + 20y - z = -18$$
$$2x - 3y + 20z = 25.$$

18. Apply Newton's backward formula to find a polynomial of degree 3 which included the following x, y pairs.

x	3	4	5	6
y	6	24	60	120

19. Solve $y_{n+2} + 6y_{n+1} + 9y_n = 2^n$, $y_0 = y_1 = 0$.

20. Using Adam's method find $y(0.4)$ given.

$$y' = \frac{xy}{2},\ y(0.1) = 1.01,\ y(0.2) = 1.022,\ y(0.3) = 1.023.$$

D–8171

Sub. Code
11354

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION, MAY 2025.

Fifth Semester

TRANSFORM TECHNIQUES

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Show that $L[K] = \frac{K}{s}$, $s > 0$ where k is a constant.

2. Find $L[\sin at]$.

3. Find $L^{-1}\left[\frac{2s+3}{s^2}\right]$.

4. Define even function. Give an example.

5. If $L[f(t)] = F(s)$, then show that $L[tf(t)] = -F'(s)$.

6. Define Fourier series.

7. State the Fourier integral formula.

8. Show that $F_s[f'(x)] = -sF_c(s)$.

9. Define z-transform.

10. Find the inverse z-transform of $X(z) = \frac{z}{z^2 + 7z + 10}$.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Find $L\left[\sin^3_{2t}\right]$.

Or

(b) Find $L\left[\frac{1-\cos t}{t}\right]$.

12. (a) Find $L^{-1}\left[\frac{s}{(s+3)^2+4}\right]$.

Or

(b) Solve $y''+2y'+y=te^{-t}$ given that $y=1,\ y'=2$ when $t=0$.

13. (a) Find the Fourier constant a_0 and a_n for the function $f(x)=e^x$ in the interval $-\pi<x<\pi$.

Or

(b) Obtain the Fourier sine series for $f(x)=\sin x$ in $0<x<\pi$.

14. (a) If $F[f(x)]=F(s)$, then prove that $F[e^{iax}f(x)]=F(s+a]$.

Or

(b) Find the Fourier cosine transform of e^{-at} and hence deduce that the Fourier sine transform of te^{-at} is $\frac{2as}{(s^2+a^2)^2}$.

15. (a) Find the z-transform of na^n.

Or

(b) Find the inverse z-transform of $\frac{z}{z^2+5z+6}$.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Find the Laplace transform of the periodic function $f(t) = Kt$ in $0 < t < 1$ with period 1.

17. Find the Fourier series for the function $f(x) = \left(\frac{\pi - x}{2}\right)^2$ in $0 \le x \le 2\pi$.

18. Find the cosine series for $f(x) = x^2$ in $0 < x < \pi$.

19. Prove that the Fourier transform of $e^{-x^2/2}$ is $e^{-s^2/2}$.

20. Solve $y_{n+1} - 3y_n = 2^n$, $y(0) = 1$.

D–8172

Sub. Code
11361

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION, MAY 2025.

Sixth Semester

DISCRETE MATHEMATICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Find the disjunction of two statements P and Q.

2. Define contradiction.

3. Define disjunctive normal form.

4. Define transitive relation. Give an example.

5. Define lattice.

6. Explain Hamming distance by an example.

7. Define complete graph. Give an example.

8. What is the chromatic number of K_p and any totally disconnected graph?

9. Define centre of a tree.

10. Show that every Hamiltonian graph is 2-connected.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Construct the truth table for $\rceil(P \vee Q) \vee (\rceil P \wedge \rceil Q)$.

Or

(b) Prove that following implication

$P \to (Q \to R) \Rightarrow (P \to Q) \to (P \to R)$.

12. (a) Show that the formula $Q \vee (P \wedge \rceil Q) \vee (\rceil P \wedge \rceil Q)$ is a tautology.

Or

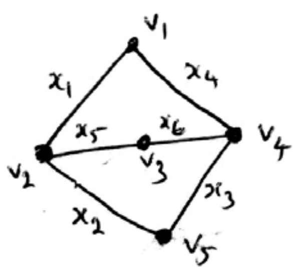
(b) Obtain the conjunctive normal form of $(\rceil P \to R) \wedge (Q \rightleftarrows P)$.

13. (a) Demonstrate the R is a valid inference from the premises $P \to Q, Q \to R$ and P.

Or

(b) Let $(L, \leq)$ be a lattice and $a, b, c \in L$. Prove that $a \vee (b \vee c) = (a \vee b) \vee c$.

14. (a) Write the adjacency matrix of the graph.



Or

(b) Show that an induced subgraph of a complete graph is complete.

15. (a) Prove that G s a tree if and only if G is connected and every edge of G is a bridge.

Or

(b) Prove that any connected graph with n vertices and $n-1$ edges is a tree.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Prove that $\neg(P \wedge Q) = \neg P \vee \neg Q$ and $\neg(P \vee Q) = \neg P \wedge \neg Q$ by using truth table.

17. Obtain the principal disjunctive normal form of $P \to ((P \to Q) \wedge \neg(\neg Q \vee \neg P))$.

18. Prove that, if $(L, \wedge, \vee)$ is complemented distributive lattice, then D'Morgan's laws $(a \vee b)' = a' \wedge b'$ and $(a \wedge b)' = a' \vee b'$ hold for all $a, b \in L$.

19. Prove that every uniquely n-colourable graph is $(n-1)$ connected.

20. Prove that the Petersen graph is nonhamiltonian.

D–8173

Sub. Code
11362

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION, MAY 2025.

Sixth Semester

FUZZY ALGEBRA

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Define convex set.

2. Define intersection of fuzzy set.

3. Define fuzzy relations.

4. Define similarity relation.

5. Given any n-any relation, how many different projections of the relation can be taken?

6. Explain binary fuzzy relation.

7. What is meant by a measure of fuzziness?

8. Define entropies of degree α.

9. Write the types of uncertainty.

10. Explain the principle of maximum entropy.

PART B — $(5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) If c is a continuous fuzzy complement, then prove that c has a unique equilibrium.

Or

(b) Prove that

$$\lim_{n\to\infty} i_w = \lim_{n\to\infty}\left(1-\min\left[1, \left((1-a)^w+(1-b)^w\right)^{1/w}\right]\right) = \min(a,b).$$

12. (a) Prove that for all $a,b \in [0, 1]$, $i(a,b) \geq i_{\min}(a,b)$.

Or

(b) Prove that the Yager complements are involutive for all $w \in (1, \infty)$.

13. (a) Solve the following fuzzy relation equation

$$P \circ \begin{bmatrix} .9 & .6 & .1 \\ .8 & .8 & .5 \\ .6 & .4 & .6 \end{bmatrix} = \begin{bmatrix} .6 & .6 & .5 \end{bmatrix}.$$

Or

(b) Show that the function Bel determined by the equation $Bel(A) = \sum_{B \subseteq A} m(B)$ for any given basic assignment m is a belief measure.

14. (a) Prove that the conditional entropy $H(X/Y) = H(X,Y) - H(Y)$.

Or

(b) Explain a joint entropy defined in terms of probability distribution on $X x Y$ and two simple entropies based on the marginal probability distribution.

15. (a) Prove that the U-uncertainty is subadditive.

Or

(b) Show that the maximum of the measure of fuzziness defined by $f(A) = -\sum_{x \in X} (\mu_A(x) \log_2 \mu_A(x) + [1 - \mu_A(x)] \log_2 [1 - \mu_A(x)])$ is $|X|$.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Prove that $\underset{w \to \infty}{Lim} \min\left[1, (a^w + b^w)^{1/w}\right] = \max(a, b)$.

17. Prove that a belief measure Bel on a finite power set $P(X)$ is a probability measure if and only if its basic assignment m is given by $m(\{x\}) = Bel(\{x\})$, and $m(A) = 0$ for all subsets of X that are not singletons.

18. Solve the fuzzy relation equation

$$P \circ \begin{bmatrix} .5 & 0 & .3 & 0 \\ .4 & 1 & .3 & 0 \\ 0 & .1 & 1 & .1 \\ .4 & .3 & .3 & .5 \end{bmatrix}.$$

19. Let m_X and m_Y be marginal basic assignments on set X and Y respectively and let m be a joint basic assignment on $X \times Y$ such that $m(A \times B) = m_X(A).m_X(B)$ for all $A \in P(X)$ ad $B \in P(Y)$. Prove that $E(m) = E(m_X) + E(m_Y)$.

20. Let $A \cap B$, $A \cap C$, $B \cap C$ and $A \cap B \cap C$ are the subsets of the universal set X. Find the value of $m(A \cap B) + m(A \cap C), m(B \cap C)$, $m(A \cap B \cap C)$ and $m(X)$ provided that $m(A \cap B) + m(A \cap B \cap C) = .2$, $m(A \cap C) + m(A \cap B \cap C) = .5$ and $m(B \cap C) + m(A \cap B \cap C) = .1$.

D–8174

Sub. Code
11363

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION, MAY 2025.

Sixth Semester

COMPLEX ANALYSIS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. For any non zero complex number z, show that $\arg z = -\arg \bar{z}$.

2. Verify the Cauchy - Riemann equations for $f(z) = e^z$.

3. Define analytic function.

4. Define generating function.

5. Find the fixed point of $w = \dfrac{1}{z - 2i}$.

6. Define the cross ratio of four distinct points z_1, z_2, z_3, z_4 if none of z_1, z_2, z_3, z_4 is ∞.

7. Define isolated singularity.

8. Find the pole and order of $f(z) = \dfrac{1}{z(z-1)^2}$.

9. Define residue of a function.

10. State the argument theorem.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) State and prove De-Movires theorem.

Or

(b) Find the analytic function $f(z) = u + iv$ if $v = 3x^2y - y^3$.

12. (a) Find the image of the circle $|z - 3i| = 3$ under the map $w = \frac{1}{z}$.

Or

(b) Find the bilinear transformation which maps $z_1 = 2,\ z_2 = i,\ z_3 = -2$ to $w_1 = 1, w_2 = i, w_3 = -1$ respectively.

13. (a) Find the general bilinear transformation which maps the unit circle onto $|w| = 1$ and the points $z = 1$ to $w = 1$ and $z = -1$ to $w = -1$.

Or

(b) Prove that $\int_{-c} f(z)\,dz = -\int_{c} f(z)\,dz$.

14. (a) Evaluate $\int_{c} (y - x - i3x^2)\,dz$ where c is the line segment from $z = 0$ to $z = 1 + i$.

Or

(b) Evaluate $\int_{c} \frac{z\,dz}{(9 - z^2)(z + i)}$ where c is $|z| = 2$.

15. (a) State and prove Rouche's theorem.

Or

(b) Using residue theorem evaluate $\int_c \frac{e^z}{(z+2)(z-1)} dz$ where c is $|z-1| = 1$.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. State and prove that Cartesian form of Cauchy - Riemann equations.

17. Find the analytic function $f(z) = u + iv$ if $u - v = (x - y)(x^2 + 4xy + y^2)$.

18. Show that the bilinear transformation which maps the unit circle $|z| = 1$ onto the unit circle $|w| = 1$ can be put in the form $w = e^{i\lambda}\left(\frac{az+b}{\overline{b}z+\overline{a}}\right)$ where λ is real. Further show that this transformation maps the circular disc $|z| \le 1$ onto the circular disc $|w| \le 1$ if and only if $|a| > |b|$.

19. State and prove Taylor's theorem.

20. Evaluate $\int_0^{2\pi} \frac{d\theta}{5 + 4\sin\theta}$ by contour integration.

D–8175

Sub. Code
11364

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION, MAY 2025.

Sixth Semester

COMBINATORICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours — Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. How many solutions does the equation $x + y + z = 17$ have, where x, y, z are non negative integers?

2. Find a closed form for the generating function for the sequence 0, 0, 1, 1, 1....

3. Find the sequence corresponding to the ordinary generating function $3x^3 + e^{2x}$.

4. Define partition.

5. Define lexicographic ordering.

6. Define derangement.

7. Define Euler function.

8. Define hit polynomial.

9. Define cycle index.

10. What is meant by order and degree of a permutation group?

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Prove that P_n^m = number of partitions of n into parts the largest of which is m.

Or

(b) In how many ways can 9 distinct objects be placed in 5 distinct boxes in such a way that 3 of these boxes would be occupied and 2 would be empty?

12. (a) Prove that the element f of $R[t]$ given by $f = \sum_{K=0}^{\infty} \alpha_K t^K$ has an inverse in $R[t]$ if and only if α_0 has an inverse in R.

Or

(b) Let n be a positive integer. Prove that the ordinary enumerator for the partition n is $F(t) = \dfrac{1}{(1-t)(1-t^2)(1-t^3).....}$.

13. (a) How many distinct terms are there in the expansion of $(\alpha_1 + \alpha_2 + \cdots + \alpha_p)^n$?

Or

(b) Prove $\sum_{a+b+c+d=n} \dfrac{n!}{a!b!c!d!} = 4^n$.

14. (a) Prove that $\zeta(t) = \sum_{j=0}^{N} W(j)(t-1)^j$.

Or

(b) State Menage problem an discuss it by an example.

15. (a) How many ways are there to arrange n-distinct objects in a circle?

Or

(b) How many distribution patterns are possible if we want to distribute a collection of 6 objects of type 3^2 into a collection of 6 objects of type 2^3 ?

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. If $D_1, D_2, ..., D_K$ form a partition of D, and S, is the set $S = \{\phi \in R^D / \text{for each } i = 1, 2, ..., k, \phi(D) = \text{constant for all } d \in D_i\}$, then prove that $\sum_{\phi \in S} W(\phi) = \prod_{i=1}^{k} \sum_{\gamma \in R} W(\gamma)^{|D_i|}$.

17. If $\lambda, \mu, \vdash N$ such that λ and μ have the some numbers of parts, prove that or disprove that $\lambda < \mu$ if and only if $\lambda' < \mu'$.

18. State and prove generalized inclusion and exclusion principle theorem.

19. Determine the cycle index of the dihedral group D_4.

20. State and prove Polya's theorem.

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