**D–1119**

| Sub. Code |
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| 11A/13711 |

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 2023.

First Semester

PART I : TAMIL PAPER – I

(பகுதி I : தமிழ் – I)

(CBCS 2018 – 2019 Academic Year Onwards/
2020–21 Calendar year onwards)

Time : Three hours Maximum : 75 marks

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

அனைத்து வினாக்களுக்கும் விடையளிக்க.

1. கவிஞர் கண்ணதாசனின் இயற்பெயர் யாது?
2. "செய்யும் தொழிலே தெய்வம்" - எனப் பாடியவர் யார்?
3. 'நோயற்ற வாழ்வு' கவிதையின் ஆசிரியர் யார்?
4. மீரா (மீ. இராசேந்திரன்) பிறந்த ஊர் எது?
5. ஞானக்கூத்தனின் இயற்பெயர் யாது?
6. கவிஞர் சிற்பி சர்ப்பயாகத்தில் குறிப்பிடும் பாம்புகளின் பெயர்களைக் குறிப்பிடுக.
7. அப்துல் ரகுமானின் படைப்புகள் இரண்டினைக் குறிப்பிடுக.
8. சிலம்பு கூறும் முப்பெரும் உண்மைகள் யாவை?
9. "யாரையோ நீ தொழுதனம் மடக்கொடி" - யார் யாரைப் பார்த்துக் கூறியது?
10. தேம்பாவணியின் ஆசிரியர் யார்?

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

அனைத்து வினாக்களுக்கும் ஒரு பக்க அளவில் விடையளிக்க.

11. (அ) "கோகுலத்துப் பசுக்கள்..." பாடலில் காணலாகும் கண்ணனின் சிறப்பினை விளக்குக.

(அல்லது)

(ஆ) பட்டுக்கோட்டை கலியாண சுந்தரத்தின் பகுத்தறிவுச் சிந்தனைகளை விளக்குக.

12. (அ) கண்ணனின் குறும்புகளைப் பாரதி வழி விளக்குக.

(அல்லது)

(ஆ) பாரதிதாசனின் கவித்திறத்தை ஆராய்க.

13. (அ) நோயற்ற வாழ்வு குறித்த நாமக்கல் கவிஞரின் கருத்துக்களைத் தொகுத்தெழுதுக.

(அல்லது)

(ஆ) 'சர்ப்ப யாகம்' கவிதை வழிச் சிற்பி கூறும் வெற்றிக்கான வழிகளை விளக்குக.

14. (அ) கோப்பெருந்தேவியின் தீக்கனா - குறித்து எழுதுக.

(அல்லது)

(ஆ) இராமன் வீதியிற் சென்றபோது நிகழ்ந்தவற்றை விளக்குக.

15. (அ) மந்திரக் கிழவர் மாண்புகள் குறித்தெழுதுக.

(அல்லது)

(ஆ) நபிகள் நாயகம் ஈத்தங்குலை வரவழைத்த திறம் குறித்தெழுதுக.

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

எவையேனும் மூன்றனுக்கு கட்டுரை வடிவில் விடையளிக்க.

16. ஸ்ரீ கிருஷ்ணகானம் கூறும் கண்ணனின் பெருமைகளைத் தொகுத்து எழுதுக.

17. பாரத மாதாவின் திருப்பள்ளி எழுச்சிச் சிறப்பினை விளக்கி எழுதுக.

18. கண்ணகி வழக்குரைத்த திறம் குறித்துக் கட்டுரைக்க.

19. மந்திரப்படலம் கூறும் செய்திகளைத் தொகுத்து எழுதுக.

20. காட்சிப்படலக் கருத்துக்களை விளக்கி வரைக.

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**D–1120**

| Sub. Code |
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| 11B |

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 2023.

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 questions.

1. What are called 'Barriers' in effective communication?

2. Define 'Communication'.

3. What is 'Dyadic Communication'?

4. Define 'Conversation'.

5. What does non-verbal communication refer to?

6. What is a layout in paragraph writing?

7. Write briefly on Group Discussion.

8. What is Body Language?

9. What is Report Writing?

10. What are typographical errors?

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Analyse facial expressions' significance as non-verbal communication.

Or

(b) Write the method to prepare an application for employment.

12. (a) Analyse Diction as one form of dyadic communication.

Or

(b) How does 'Posture' carry significance as a part of body language?

13. (a) Bring out the role of participation in Group Discussion.

Or

(b) Relate Behavioural Skills and Group Discussion.

14. (a) Discuss the advantages of use of words and phrases in written communication.

Or

(b) Write a note on Sentence Formation.

15. (a) Discuss the preparatory steps to be taken for writing a report.

Or

(b) Bring out the characteristics of an Effective Sentence.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Discuss the barriers to effective communication.

17. Discuss the purpose of meetings.

18. To be an effective writer, what are the desired qualities you should cultivate? Explain.

19. Explain the steps involved in preparing Curriculum Vitae.

20. Explain the different types of Report Writing.

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**D–1121**

**Sub. Code**
**12/13712**

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 2023

First Semester

Part II : ENGLISH PAPER - I

(CBCS 2018-19 Academic Year onwards/2021 Calendar Year)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. How water is the elixir of life?

2. How did the tiger died in Mrs. Packletide's tiger?

3. Where did Jim Corbett sit after killing tiger?

4. How machines are good servants but bad masters?

5. List out the drug-related health disorders.

6. Man has invented machines to save time and energy. Discuss.

7. How quickly can someone become addicted to a drug?

8. What drugs commonly cause problems and how do they affect the body?

9. How does a cat say "Thank you"?

10. How did Joad use the word 'Oasis' in the essay?

PART B — (5 × 5 = 25 marks)

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

11. (a) How does 'A deed of Bravery' deals with the heroic deeds of survival against all odds?

Or

(b) Discuss the character of the cat.

12. (a) What is the message conveyed in "Our Ancestors" by Carl Sagan?

Or

(b) What is the part played by Gandhi in South Africa?

13. (a) Illustrate the concept of "Food" by J.B.S. Haldane.

Or

(b) Why did Gandhi's attempts to become a member of Indian Society Fail?

14. (a) Change the following as directed :

(i) They have already discussed the book (change to passive)

(ii) The letters have to be delivered. (Change to active)

(iii) The company hired new workers last year. (Change to passive)

(iv) News reports are written by reporters. (Change to active)

(v) The book has already been discussed. (Change to active)

Or

(b) Fill in with proper prepositions.

(i) The cat jumped ———— the counter.

(ii) The book belongs ———— Anthony.

(iii) She was hiding ———— the table.

(iv) They were sitting ———— the tree.

(v) There is some milk ———— the fridge.

15. (a) Write an application to the principal for a Relief camp.

Or

(b) Write a dialogue between friends about lock down in their place.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. How C.V. Raman praises the importance of water as the life giving force to all, in his prose piece?

17. How A.G. Gardiner discusses that "How the art of the letter writing has been lost"?

18. Explain how Dr. Hardin B. Jones focuses on the drugs effect on the brain?

19. Write an appreciation of our civilization as said by Joad.

20. Narrate the incidents in the prose piece "A Hero on Probation".

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**D-1208**

**Sub. Code**
**11313**

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023

First Semester

CLASSICAL ALGEBRA

(CBCS 2018-19 Academic Year onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Solve $x^3 - 3x^2 - 4x + 12 = 0$.

2. Prove that any convergent sequence is bounded.

3. Test the convergence of $\Sigma \frac{(-1)^n \sin n\alpha}{n^3}$.

4. Write the working procedure of Newton's method.

5. Find the determinant value of $\begin{bmatrix} 2 & 2 & -4 \\ -1 & 3 & 2 \\ 1 & 2 & 3 \end{bmatrix}$.

6. Form the equation of the lowest degree with rational co-efficients whose roots are $3+\sqrt{5}$ and 1.

7. If $A = \begin{pmatrix} -2 & -4 \\ 3 & 6 \end{pmatrix}$ show that $A^2 = AA$.

8. Find the characteristic equation of $\begin{bmatrix} 1 & 2 \\ 1 & 1 \end{bmatrix}$.

9. Find the product of the eigen values of the matrix $\begin{pmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ 7 & 2 & -3 \end{pmatrix}$.

10. Write any two properties of Cayley Hamilton theorem.

PART B — (5 × 5 = 25 marks)

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

11. (a) Find $\underset{n\to\infty}{Lt}\left(a^{1/n}\right)$, where '$a$' is a positive real number.

Or

(b) Find the co-efficient of $x^r$ in the expansion of $(1+2x+3x^2+\cdots+\infty)^2$.

12. (a) Briefly explain about Horner's method.

Or

(b) Show that $\sum_{0}^{\infty}\frac{5n+1}{(2n+1)}=\frac{e}{2}+\frac{2}{e}$.

13. (a) If $\alpha, \beta, \gamma, \delta$ are the roots of $x^4+px^3+qx+r+1=0$. Find the value of $\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}+\frac{1}{\delta}$.

Or

(b) Prove that the sum of the cubes of the roots of $x^3-6x^2+11x-6=0$ is 36.

14. (a) Diminish the roots of $x^4 - 5x^3 + 7x^2 - 4x + 5$ by 2.

Or

(b) Determine the rank of $\begin{bmatrix} 1 & 4 & 5 \\ 2 & 6 & 8 \\ 3 & 7 & 2 \end{bmatrix}$.

15. (a) Solve $x + y + z = 9$, $2x + 5y + 7z = 52$, $2x + y - z = 0$ by Cramer's rule.

Or

(b) Find the characteristic equation of $\begin{bmatrix} a & b & c \\ b & c & a \\ c & a & b \end{bmatrix}$.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Show that $\log\sqrt{12} = 1 + \left(\frac{1}{2} + \frac{1}{3}\right)\frac{1}{4} + \left(\frac{1}{4} + \frac{1}{5}\right)\frac{1}{4^2} + \cdots$

17. Sum to infinity the series :

$$1 + \frac{2}{6} + \frac{2}{6}\cdot\frac{5}{12} + \frac{2}{6}\cdot\frac{5}{12}\cdot\frac{8}{18} + \cdots$$

18. Form the equation with rational co-efficients whose roots are $1 - \sqrt{2}, 2$.

19. Find the eigen value and eigen vectors of $\begin{pmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{pmatrix}$.

20. Test the consistency of $5x + 3y + 7z = 4$, $3x + 26y + 2z = 9$, $7x + 2y + 10z = 5$ and solve.

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**D–1209**

| Sub. Code |
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| 11314 |

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

First Semester

CALCULUS

(CBCS – 2018-19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. What are polar coordinates?

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

3. Define Pedal equation of a curve ($p - r$ equation).

4. Define critical points of $f(x, y)$.

5. Evaluate $\int x\, e^x\, dx$.

6. Evaluate $\int_0^1 \int_0^2 xy\; dy\, dx$.

7. State reduction formula.

8. Prove that $\lceil (n+1) = n!$ where $n$ is a positive integer.

9. Find the complete integral of $z = px + qy + (q/p) - p$.

10. Find $\int x^3 \cos 2x \, dx$.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) If $x^y = e^{x-y}$, prove that $\frac{dy}{dx} = \frac{\log x}{(1+\log x)^2}$.

Or

(b) Find $y_n$ for $y = \sin(ax+b)$.

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

Or

(b) Find the $p-r$ equation of the cardioid $r = a(1-\cos\theta)$.

13. (a) Evaluate $\int \frac{x^3}{(x-1)(x-2)} dx$.

Or

(b) Find the equation of tangent to $y = 2x^2 - 4x + 5$ at $(3,11)$.

14. (a) Solve : $\frac{dy}{dx} = \frac{y^3 + 3x^2 y}{x^3 + 3xy^2}$.

Or

(b) Evaluate $\int \cos^7 x \, dx$.

15. (a) Evaluate $\iint xy\ dx\ dy$ taken over the positive quadrant of the circle $x^2 + y^2 = a^2$.

Or

(b) Solve : $y^2z = p + x^2z = xy^2$, where $p = \frac{\partial z}{\partial x}$, $q = \frac{\partial z}{\partial y}$.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Find the maximum and minimum values of $u = x^3y^2(1 - x - y)$.

17. Find the radius of convergence at the point $\theta$ on the curve $x = a(\theta + \sin\theta)$, $y = a(1 - \cos\theta)$.

18. Evaluate $\int_0^\infty \int_x^\infty \frac{x^{-y}}{y} dy\, dx$.

19. Evaluate $\int_0^a \int_0^b \int_0^c xyz\ dz\ dy\ dx$.

20. Using Laplace transforms, solve $y' + 3y = e^{-2x}$ given $y(0) = 4$.

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| D–1122 | Sub. Code |
|---|---|
| | 21A |

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 2023.

Second Semester

Part I : TAMIL PAPER — II

(CBCS 2018 – 2019 Academic year onwards)

Time : Three hours Maximum : 75 marks

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

அனைத்து வினாக்களுக்கும் விடையளிக்க.

1. தேம்பாவணியின் காப்பியத் தலைவன் பெயரைக் குறிப்பிடுக.

2. நீலபத்மநாபன் எந்தப் படைப்பிற்காகச் சாகித்ய அகதெமி விருது பெற்றார்?

3. 'நூலிலாட்டு' என்றால் என்ன?

4. முதலெழுத்துக்களைச் சுட்டிக் கூறுக.

5. அன்மொழித்தொகை-விளக்கம் தருக.

6. 'ஆறில் ஒரு பங்கு' என்னும் சிறுகதையின் ஆசிரியர் யார்?

7. ஓரங்க நாடகம்-குறிப்பு வரைக.

8. இந்தியாவின் முதல் வானொலி நிலையம் எங்கு அமைக்கப்பட்டது?

9. பெரியபுராணத்தின் காப்பிய நாயகன் யார்?

10. பெண்களின் பாதுகாப்பிற்காகத் தமிழகக் காவல்துறை உருவாக்கியுள்ள 'செயலி' யாது?

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

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) புண் ஆற்றும் மருந்தாய் பாவம் தீர்க்க வந்த காலத்தினை வீரமாமுனிவர் எங்ஙனம் விவரிக்கின்றார்?

(அல்லது)

(ஆ) சாந்தி உள்ளம் உருகிப் போற்றி நின்றதனை விளக்கி வரைக.

12. (அ) நீலபத்மநாபனின் 'விமோசனம்' சிறுகதைச் சுருக்கத்தை எழுதுக.

(அல்லது)

(ஆ) தடாகையின் ஆற்றலைக் கம்பன் எங்ஙனம் விரிந்துரைக்கிறார்?

13. (அ) மொழி முதல் எழுத்துக்களை எடுத்துக்காட்டுகளுடன் விவரிக்க.

(அல்லது)

(ஆ) ஆகுபெயர் இலக்கணத்தைச் சான்று காட்டி விளக்குக.

14. (அ) மகாகவி பாரதியாரின் தேசப்பற்றைப் பாராட்டியுரைக்க.

(அல்லது)

(ஆ) தமிழ் நாவல் இலக்கிய வளர்ச்சி வரலாற்றை எடுத்துரைக்க.

15. (அ) கம்பன் கவித்திறத்தை நும் பாடப்பகுதியால் விவரிக்க.

(அல்லது)

(ஆ) கல்வி வளர்ச்சியில் தொலைக்காட்சியின் பங்கு குறித்து விளக்கிடுக.

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

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. சாந்தி உள்ளம் மகிழ்ந்து குழந்தை ஏசுவைப் போற்றுமாற்றை விவரிக்க.

17. நீலபத்மநாபனின் சிறுகதைகள் பேசும் சமூகக் கருத்துக்களைக் கட்டுரைக்க.

18. பிறமொழிச் சொற்களைத் தமிழில் ஆளும் முறைகள் குறித்து விவரிக்க.

19. போர்க்களத்தில் செய்தி தொடர்பு பெறுமிடத்தைக் கம்பராமாயணத்தின் வழி விளக்குக.

20. இணையப் பயன்பாட்டில் தமிழ்மொழி பெறும் முக்கியத்துவத்தைச் சான்றுகளுடன் எழுதுக.

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**D–1123**

| Sub. Code |
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| 21B |

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 2023.

Second Semester

Part I – COMMUNICATION SKILLS – II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What is Communication Skills?

2. What are comprised in Communication skills?

3. Define Intonation.

4. Why Phonetics is important in communication skills?

5. What is meant by soft skills?

6. What are the modes involved in conversation skills?

7. Define planning in presentation skills.

8. Explain the term Creative writing.

9. Define Resume.

10. What is meant by Corporal Communication Skills?

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Write the code and content of communication skills.

Or

(b) Explain the stimulus and Response of Communications Skills.

12. (a) Write the Guidelines for Effective Speaking in Communication Skills.

Or

(b) What are the Etiquettes of Communication Skills?

13. (a) How self-assessment is important in Communicating in Soft Skills.

Or

(b) Explain the modes of Conversation Skills.

14. (a) Define Listening Skill and its types.

Or

(b) Explain about editing and publishing.

15. (a) Write the Structure of Effective sentences in Writing Skills.

Or

(b) Write a short note on various kinds of letters.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Write an essay on the process of communication and factors.

17. Explain how phonetics is priority in Speaking Skill.

18. Write about Language Skills and its ability in Learner centre activities.

19. How writing skills is important in corporate Communication.

20. Explain the Structure of Effective Sentence and Paragraph.

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**D–1124**

| Sub. Code |
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| 22/13722 |

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 2023.

Second Semester

Part II – ENGLISH PAPER - II

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

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions

1. What type poem is 'The Road Not Taken'?

2. What did Andrea do with the money he had stolen as given in 'Andrea del Sarto'?

3. How is the speaker preoccupied with the depiction of pictures in 'Ode on a Grecian Urn'?

4. What do the first three lines of the poem 'Lines, Composed upon Westminster Bridge, September 3, 1802' emphasise?

5. What does the First Part of *Gitanjali* sing about?

6. What is the moral of *Gitanjali*?

7. How does Portia react to the Prince of Morocco's failure as a suitor?

8. What act does Jessica believe will solve the misery of life with Shylock?

9. Write the problems of Comprehension tests.

10. Read the given passage and answer the questions:

Looking back, I had come a long way. The little boy, born to cricket, who once fashioned a crude pitch with a mattock out of the side of a hill in the tiny hamlet of Lisarow, had gone on to play forty four times for Australia. From Lisarow to Lord's. Yes it had been a long, long way.

(a) Whom do you think the writer could be?

(i) A cricketer

(ii) A traveller

(iii) A peasant

(iv) A voyager

(b) He belongs to ————————

(c) How many times has he played for his country?

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Write the theme of the poem, 'Strange Meeting'.

Or

(b) How and why does Andrea compare his skill in painting with Michael Angelo and Raphael?

12. (a) How does the speaker react on seeing the figures on the Urn in 'Ode on a Grecian Urn'?

Or

(b) "The main theme of 'The Road Not Taken' is making choices" – Elucidate.

13. (a) Write the main concept of *Gitanjali*.

Or

(b) How does the speaker contemplate early-morning London from the Westminster Bridge?

14. (a) Discuss Shylock's dramatic function in *The Merchant of Venice*.

Or

(b) In the end how comic is *The Merchant of Venice*?

15. (a) Write a report on the damage done by five to the office building and the ways and means of carrying on with the business during the renovation of the building.

Or

(b) Read the following passage and answer the following questions:

Our days were spent in the servants' quarters in the south-east corner of the outer apartments. One of our servants was Shyam, a dark Chubby boy with curly locks, hailing from the District of Khulna. He would put me into a selected spot and, tracing a chalk line all around, warn me with solemn face and uplifted finger, of the perils of transgressing this ring.

Whether the threatened danger was material or spiritual I never fully understood, but a great fear used to possess me and I had read in the Ramayana of the tribulations of Sita for having left the ring drawn by Lakshman. So it was not possible for me to be sceptical of its potency.

(i) Where did the writer spend his day time?

(ii) Was Shyam the only servant?

(iii) Where did the servant come from?

(iv) Why was the author afraid of transgressing the circle drawn by the servant?

(v) What made Sita undergo the suffering?

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Critically appreciate the poem, 'The Coromandel Fishers'.

17. How does Rabindranath Tagore draw the picture of death through his songs in *Gitanjali*?

18. Draw the character sketch of Shylock in *The Merchant of Venice*.

19. Read the following passage and make notes:

The plants which man grows to provide food for himself and his animals must have water or they will die. This is because plant nutrients in the soil cannot enter the root unless they have first been dissolved in water. Plants also need to absorb large quantities of water from the soil to build up their tissues. They lose a great deal of water to the atmosphere each day as water vapour. The process by which plants lose water is called transpiration. In hot climates more water is lost, and this loss must also be replaced from the soil.

Rain supplies most of the water that plants need but unfortunately it does not always fall at the right time of the year or in sufficient quantities. Plants may stay alive if rain is scarce, but they will not yield such a good harvest of food.

For centuries, man had devised methods of supplementing natural supplies of water to his crops by means of irrigation. These methods vary according to the climate, the crops and the available water resources. In tropical and Mediterranean countries water is usually brought to the crops by a network of surface ditcher. This is known as surface irrigation. In Europe and in the U.S.A., water is normally pumped from a stream through pipes and spread on the field from the above. This is called overhead irrigation.

20. Write an essay on the following topic:

Information Technology Revolution.

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| D–1210 | Sub. Code |
|---|---|
| | 11323 |

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

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 questions.

1. Find the direction cosines of the line which is equally inclined to the axes.

2. Prove by direction cosines that the points (3, –1, 1), (5, –4, 2) and (11, –3, 5) are collinear.

3. Write the two point form of equation of the straight line.

4. Find the equation of the line through the points (–1, 3, 2) and (1, 6, 1)

5. How do you describe a cylinder?

6. What do you mean by skew lines?

7. If $\vec{r} = \vec{a}\cos\omega t + \vec{b}\sin\omega t$ where $a, b$ are constant vectors then prove that $\frac{d^2r}{dt^2} + \omega^2 r = 0$.

8. Find the equation to the sphere whose center is (2, –3, 4) and radius is 5 units.

9. State Green's theorem.

10. If $f = x^2yi + y^2zj + z^2xk$ find curl $f$.

PART B — (5 × 5 = 25 marks)

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

11. (a) A line makes 30° and 120° with the positive directions of $x$-axis and $y$-axis respectively. What angle does it make with the positive direction of the $z$-axis?

Or

(b) Show that the angle between two diagonals of a cube is $\cos^{-1}(1/3)$.

12. (a) Prove that the lines $x + y - z = 5$, $9x - 5y + z = 4$ and $6x - 8y + 4z = 3$, $x + 8y - 6z + 7 = 0$ are parallel.

Or

(b) Find the equation of the plane containing the point (–1, 7, 2) and the line $\frac{x+3}{2} = \frac{y+2}{3} = \frac{z-2}{-2}$.

13. (a) Find the equation of the cone whose vertex is the point (1, 1, 0) and whose base is the curve $y = 0$, $x^2 + z^2 = 4$.

Or

(b) Find the equation of the right circular cone whose vertex is at origin, whose axis is the line $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$ and the semi vertical angle of 30°.

14. (a) Find curl curl $f$ at (1, 1, 1) if $f = x^2yi + xzj + 2yzk$.

Or

(b) Prove that a plane section of a sphere is a circle.

15. (a) Verify Gauss divergence theorem for $f = (x^2 - yz)i - 2x^2yj + 2k$ over the cube bounded by $x = 0,\ y = 0,\ z = 0,\ x = a,\ y = a$ and $z = a$.

Or

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

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Show that the straight line whose direction cosines are given by $2l - m + 2n = 0$ and $lm + mn + nl = 0$ are at right angles.

17. Find the equation of right circular cylinder of radius 2 whose axis passes through (1, 2, 3) and has direction cosines proportional to (2, –3, 6).

18. Find the equation of the sphere through the circle $x^2 + y^2 + z^2 + 2x + 3y + 5z = 0$; $2x + 6y + 5z - 6 = 0$ and passing through the center of the sphere $x^2 + y^2 + z^2 - 2x - 4y + 6z + 1 = 0$.

19. If $S$ is solenoidal prove that curl curl curl curl $f = \nabla^4 f$ .

20. Find the work done by the force $F = 3xy\, i - 5zj + 10xk$ along the curve $x = t^2 + 1,\ y = 2t^2,\ z = t^3$ from $t = 1,$ to $t = 2$ .

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| D–1211 | Sub. Code |
|---|---|
| | 11324 |

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

Second Semester

SEQUENCES AND SERIES

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. State Cauchy's first theorem on limits.

2. Define bounded sequence.

3. Show that $\lim_{n\to\infty} n^{1/n} = 1$.

4. Prove that any convergent sequence is a cauchy sequence.

5. Show that $\sum \frac{1}{4n^2 - 1} = \frac{1}{2}$.

6. What is Cauchy's integral test?

7. Show that the series $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \ldots$. converges.

8. Discuss the convergence of $\sum_{n=2}^{\infty}\left(\frac{\sin n}{\log n}\right)$.

9. When do you say that $\Sigma b_n$ is a rearrangement of a series $\Sigma a_n$.

10. Show that the convergence of $0+\Sigma a_n$ implies the convergence of $\sum \frac{a_n}{n}$.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Show that $\lim_{n\to\infty}\frac{\sin n}{n}=0$.

Or

(b) Prove that a sequence cannot converge to two different limits.

12. (a) Prove that $(1/n)$ is a cauchy sequence.

Or

(b) Prove that $\lim_{n\to\infty}\frac{x^n}{n!}=0$.

13. (a) Test the convergence of $\sum \frac{1}{(\log n)^n}$.

Or

(b) Discuss the convergence of $\sum \frac{1}{\sqrt{n^3+1}}$.

14. (a) Let $(a_n)$ be a bounded sequence and $(b_n)$ be a monotonic decreasing bounded sequence. Then prove that $\Sigma a_n (b_n - b_{n+1})$ is absolutely convergent.

Or

(b) Test the convergence of $\sum\left(1+\frac{1}{n}\right)^{-n^2}$.

15. (a) Prove that the sum of an absolutely convergent series is unaltered by any rearrangement of its terms.

Or

(b) Prove that if $\Sigma a_n$ is an absolutely convergent and $(b_n)$ is a bounded sequence then $\sum a_n b_n$ is absolutely convergent.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Show that $\lim_{n\to\infty}\left(a^{1/n}\right)=1$ where $a>0$ is any real number.

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

18. State and prove Kummer's test.

19. Test the convergence of $\sum\frac{n^3+a}{2^n+a}$.

20. Prove that the series $\left(1-\frac{1}{2}\right)+\left(1-\frac{3}{4}\right)+\left(1-\frac{7}{8}\right)+\ldots$ converges. But, when the brackets are removed it oscillates.

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**D–1125**

| Sub. Code |
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| 31A/ 13731 |

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION, MAY 2023.

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. பத்துப்பாட்டு பெயர்க் காரணம் தருக.

2. மஞ்ஞைப்பத்து-குறிப்பு வரைக.

3. நற்றிணையின் பாடலடி வரையறையைச் சுட்டுக.

4. உலோச்சனார் சுட்டும் இரும்பு போன்ற மரம் எது?

5. திருக்குறளில் பயின்று வரும் பாவகையைக் கூறுக.

6. மங்கலம் என்பது யாது? திருக்குறள் வழி விளக்குக.

7. நான்மணிக் கடிகையின் ஆசிரியர் யார்?

8. பறை ஒலியால் இறக்கும் பறவை எது?

9. இராசராச சோழனின் மகள் பெயரைச் சுட்டுக.

10. சுவடுகள் நாவலில் இடம்பெறும் தலைமை மாந்தர் பெயர்களை எழுதுக.

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

பின்வரும் வினாக்களுக்கு ஒருபக்க அளவில் விடை தருக.

11. (அ) முல்லைப் பாட்டு கூறும் விரிச்சி கேட்டல் குறித்து எழுதுக.

(அல்லது)

(ஆ) மஞ்ஞைப்பத்து வெளிப்படுத்தும் வர்ணனைகளை விளக்குக.

12. (அ) மேகம் பெரும் மழை பொழிந்ததனால் ஏற்பட்ட பயன்களாகப் பெருங்குன்றூர்க் கிழார் குறிப்பிடுவன யாவை?

(அல்லது)

(ஆ) வரைவிடை மெலிவு ஆற்றுவிக்கும் தோழி தலைவனை நோக்கிக் கூறியது யாது?

13. (அ) குறித்த பருவத்தில் தலைவன் வாராமையால் ஏற்பட்ட தலைவியின் நிலையாகக் கருவூர்க் கோசிகனார் கூறுவனவற்றை எழுதுக.

(அல்லது)

(ஆ) வரைவிடை வைத்துப் பிரிந்தபோது தலைவி வருந்திய நிலையை உலோச்சனார் எங்ஙனம் புனைகின்றார்?

14. (அ) வாழ்க்கைத் துணை நலம் கூறும் செய்திகளைத் திருக்குறள் வழி ஆராய்க.

(அல்லது)

(ஆ) நான்மணிக் கடிகை சுட்டும் நல்லாள் பிறக்கும் குடியை அறிபவர் யார்?

15. (அ) இராசராச சோழன் நாடகத்தின் தொடக்கச் சிறப்பினை விளக்குக.

(அல்லது)

(ஆ) சுவடுகள் நாவலில் இரகுபதி பாத்திரப் படைப்பினை ஆராய்க.

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

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. முல்லைப் பாட்டு சுட்டும் கார்கால வருணனையைக் கட்டுரையாக்கம் செய்க.

17. கபிலர் குறிஞ்சித் திணை பாடுவதில் வல்லவர் என்பதை நும்பாடப் பகுதி கொண்டு விளக்கி வரைக.

18. பதிணென்கீழ்க் கணக்கு நூல்கள் சுட்டும் வாழ்வியல் அறங்களைத் தொகுத்துரைக்க.

19. இராசராச சோழன் நாடகத்தின் பாத்திரப்படைப்பு உருவாக்கம் குறித்து விவரிக்க.

20. சுவடுகள் நாவலின் கதைப் போக்கு அமைப்பினைக் கட்டுரை வடிவில் எழுதுக.

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**D–1126**

| Sub. Code |
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| 31B |

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc. B.C.A. DEGREE EXAMINATION, MAY 2023.

Third Semester

Part I – HUMAN SKILLS DEVELOPMENT-I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. What is Interpersonal Relationship?

2. What do you mean by developing human skills? Briefly answer.

3. Write briefly on Personality'.

4. Give the meaning of 'Positive Personality'.

5. Define 'Decision—Making' skills.

6. Give any two steps involved in decision making.

7. Write the meaning of goal setting.

8. Mention any one cause for Anger.

9. Write briefly on styles of Leadership.

10. What is Negotiation Skill?

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Write a note on levels of functions of mind.

Or

(b) Discuss the merits of good habits.

12. (a) How do you build a 'Positive Personality'?

Or

(b) Discuss the importance of self-acceptance.

13. (a) Discuss the skills involved in 'decision making'.

Or

(b) What are creative Negotiation and competitive Negotiation?

14. (a) What is resistance to change?

Or

(b) Write a note on 'pealing with change'.

15. (a) Discuss the necessity for developing positive attitudes.

Or

(b) Write the Canons of good human relations.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Explain the features of Interpersonal Behaviour.

17. Expound the etiquettes in using mobile phones and telephones.

18. Explain the various characteristics of Leadership.

19. Discuss in detail the causes and consequences of anger.

20. Explain the different methods of managing the stress.

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**D–1127**

**Sub. Code**
**32/13732**

DISTANCE EDUCATION

Common for B.A./B.Sc./B.C.A DEGREE EXAMINATION, MAY 2023.

Third Semester

PART II – ENGLISH PAPER III

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

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Write briefly about the Postmaster.

2. Who is the author of the prescribed one-act play — 'Progress'?

3. What was the discovering that astonished the Vicar?

4. What does the necklace in reality represent in 'The Diamond Necklace'?

5. Write the theme of the play 'The Proposal' briefly.

6. Why does Mrs. Higgins refuse to serve breakfast to Philip?

7. What according to Pierre, is a sure sign of starvation?

8. Why could Swami hardly breathe?[in 'A Hero]

9. Give any four examples for Common Noun.

10. Fill in the blanks with the Abstract Nouns formed from the words given in brackets:

(a) Solomon was famous for his _____ (wise).

(b) Always speak the _____(true).

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) "Guy de Maupassant talks about the deceptiveness of appearances in 'The Diamond Necklace". Justify.

Or

(b) Attempt a character sketch of the Verger.

12. (a) How do Lomov and Natalya fight over the quality of dogs?

Or

(b) Bringout the comic elements in 'The Boy Comes Home'.

13. (a) How does the playwright bring out Pierre's nervousness when he presents himself as the messenger to carry the eel pie?

Or

(b) Why did Swami keep expecting the devil to come and carry him away?

14. (a) What happened to the Postmaster and Ratan at the end of the story, 'The Postmaster'?

Or

(b) Write a summary of 'The Refugee'.

15. (a) Pick out the Adjectives in the following sentences and state their kind:

(i) Some dreams are like reality.

(ii) Such men are dangerous.

(iii) He lives on Yonder Mountain.

(iv) I saw several sheep in the valley.

(v) He is ninety years of age.

Or

(b) Choose the right verbs from brackets to complete each sentence:

(i) The wind (blew, galloped, flew) hard that day.

(ii) A cork (floats, sails, flows) on water.

(iii) A river (floats, flows, swims) by our village.

(iv) The bird has (flown, fled, run) out of the cage.

(v) The servant (lay, laid, put) the table for breakfast.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. How does 'The Diamond Necklace' explore the perceived power of objects?

17. Whom do you think was wiser, Swami or his father? Justify your preference. [in 'A Hero']

18. Comment on the tendency of wealthy families seeking ties with other wealthy families as presented in 'The Proposal'.

19. Describe the events that took place in your College Day celebration.

20. Fill in the blanks with correct kind of Pronouns:

(a) The prisoner hanged _____ (reflective)

(b) They _____ went there. (Emphasizing)

(c) _____ is my house. (demonstrative)

(d) Do good to _____ (indefinite)

(e) _____ of the girls was given a rose. (Distributive)

(f) _____ do you want to see ? (interrogative)

(g) This is the horse _____ won the race. (relative)

(h) This is the boy _____ the teacher praised. (relative)

(i) I _____ was there. (Emphasizing)

(j) The horse has hurt _____ (Reflexive)

_____

| D–1212 | Sub. Code |
|---|---|
| | 11333 |

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

Third Semester

DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Solve : $y = 2px + y^2p^3$.

2. Solve : $\left(D^2 + D + 1\right)y = 0$.

3. Solve : $\frac{dx}{yz} = \frac{dy}{xz} = \frac{dz}{xy}$.

4. Eliminate the arbitrary function $z = f\left(x^2 + y^2\right)$.

5. Verify the conduction of integrability for $(y+z)dx + (z+x)dy + (x+y)dz = 0$.

6. Define homogeneous linear differential equation.

7. Solve the equation $y'' + 4y' + 4y = 0$.

8. Solve $qe^x = pe^y$.

9. Find the orthogonal trajectories of the family of curves given by $r = a\sin\theta$.

10. Define Orthogonal trajectory.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Define exact differential equation. Solve $e^y dx + \left(xe^y + 2y\right)dy = 0$.

Or

(b) Solve : $y = 2px + y^2 p^3$.

12. (a) Solve : $xdy - ydx = \sqrt{x^2 + y^2}\,dx$.

Or

(b) Solve : $\left(D^2 - 5D + 6\right)y = 7e^{3x} + 5$.

13. (a) Solve : $x^2 \frac{d^2y}{dx^2} + 3x\frac{dy}{dx} + y = \frac{1}{(1-x)^2}$.

Or

(b) Solve the equations $\frac{dx}{+\left(y^2 - z^2\right)} = \frac{dy}{xy} = \frac{dz}{xz}$.

14. (a) Solve $\left(\frac{d^2y}{dx^2}\right) - \left(\frac{dy}{dx}\right)2\tan x + 5y = 0$.

Or

(b) Solve $\frac{d^2y}{dx^2} + \frac{dy}{dx}\cot x + 4y\,\mathrm{cosec}^2 x = 0$ by changing the independent variable $x$ to $z$.

15. (a) Solve $px + qy + \left(\frac{q}{p} - p\right) = 0$.

Or

(b) Show that the family of parabolas $y^2 = 4c(x + c)$ is self orthogonal in the sense that when a curve in the family intersects another curve of the family then it is orthogonal to it.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Solve $\frac{dx}{dt} + 4x + 3y = t$ ; $\frac{dy}{dt} + 2x + 5y = e^t$.

17. Solve the equation $\frac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$, by method of variation of parameters.

18. Solve $z(z - y)dx + (z + x)z\,dy + x(x + y)dz = 0$ by forming the auxillary.

19. Find the complete integral value of $q = (z + px)^2$ by using Charpits method.

20. Explain Brachistochrone problem.

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**D–1213**

| Sub. Code |
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| 11334 |

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION, MAY 2023.

Third Semester

MECHANICS

(CBCS 2018-19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. State triangle law of forces.

2. State parallelogram of forces.

3. Write the condition of equilibrium.

4. Define the centre of two parallel forces.

5. Define a couple.

6. What is the angle of projection?

7. Define the force of restitution.

8. Define the principle of conservation of momentum.

9. What is the velocity of central orbit?

10. Write the equation of polar co-ordinates.

SECTION 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, then show that the forces are of equal magnitude.

Or

(b) State and prove the converse of the triangle law of forces.

12. (a) Obtain the resultant of any number of coplanar forces.

Or

(b) Prove that if two couples, whose moments are equal and opposite, act in the same plane upon a rigid body, they balance one another.

13. (a) Derive the intrinsic equation of the catenary.

Or

(b) Show that the greatest height which is a particle with initial velocity $v$ can reach on a vertical wall at a distance '$a$' from the point of projection is $\frac{v^2}{2g} - \frac{ga^2}{2v^2}$. Prove also that the greatest height above the point of projection attained by the particle in its flight is $\frac{v^6}{2g(v^4 + g^2a^2)}$.

14. (a) Prove that the path of a projectile is a parabola.

Or

(b) A smooth sphere or particle whose mass is $m$ and whose coefficient of restitution is $e$, impinges obliquely on a smooth fixed plane. Find its velocity and direction of motion after impact.

15. (a) Derive the pedal equation of central orbit.

Or

(b) Find the law of force towards the pole under which the curve $r^n = a^n \cos n\theta$.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. A weight is supported on a smooth plane of inclination $\alpha$ by a string inclined to the horizon at an angle $\gamma$. If the slope of the plane be increased to $\beta$ and the slope of the string unaltered, the tension of the string is doubled. Prove that $\cos\alpha - 2\cos\beta = \tan\lambda$.

17. *ABCDEF* is a regular hexagon and at *A*, act forces represented by $\overline{AB}$, $2\overline{AC}$, $3\overline{AD}$, $4\overline{AE}$ and $5\overline{AF}$. Show that the magnitude of the resultant is $AB\sqrt{351}$ and that it makes an angle $\tan^{-1}\left(\frac{7}{\sqrt{3}}\right)$ with *AB*.

18. Prove that the effect of a couple upon a rigid body is not altered if it is transferred to a parallel plane provided its moment remains unchanged in magnitude and direction.

19. A particle is projected at an angle $\alpha$ with a velocity $u$ and it strikes up an inclined plane of inclination $\beta$ at right angles to the plane. Prove that

(a) $\cot\beta = 2\tan(\alpha - \beta)$

(b) $\cot\beta = \tan\alpha - 2\tan\beta$.

20. Obtain the loss of kinetic energy due to direct impact of two smooth spheres.

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**D–1128**

**Sub. Code**
**41A/13741**

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION,
MAY 2023.

Fourth Semester

Part - I — TAMIL – Paper IV

(CBCS – 2018-19 Academic Year Onwards/
2021 Calendar Year onwards)

Time : Three hours Maximum : 75 marks

பகுதி அ — (10 × 2 = 20 மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் விடையளிக்க.

1. இயலசையின் வகைகளைக் குறிப்பிடுக.

2. தளை எத்தனை வகைப்படும்?

3. கலிப்பாவிற்கான ஓசையைக் கூறுக.

4. குறிஞ்சித்திணைக்கான சிறுபொழுதுகளை எழுதுக.

5. செவியறிவுறூஉ என்றால் என்ன?

6. சிலேடை – குறிப்பு வரைக.

7. குறிஞ்சிப்பாட்டு என்னும் நூலைப் பாடியவர் யார்?

8. திருக்குறளில் மொத்தம் எத்தனை அதிகாரங்கள் உள்ளன?

9. சீவகசிந்தாமணி காப்பியத்தை இயற்றிய ஆசிரியர்?

10. 'பாஞ்சாலி சபதம்' காப்பியக் கதை மாந்தர்கள் இருவரைக் குறிப்பிடுக.

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

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) அடியின் வகைகளைச் சான்றுகளுடன் விளக்குக.

(அல்லது)

(ஆ) சிந்து என்னும் யாப்பு வகையை விளக்கி வரைக.

12. (அ) அறத்தொடு நிற்றல் என்றால் என்ன? அதன் முக்கியத்துவத்தைச் சுட்டுக.

(அல்லது)

(ஆ) சங்க காலத்தில் நடுகல் வழிபாடு மேற்கொண்ட வரலாற்றை எழுதுக.

13. (அ) 'மையோ மாமலையோ மறிகடலோ' – இதில் பயின்று வரும் அணியை விளக்குக.

(அல்லது)

(ஆ) மொழி நடையில் காற்புள்ளி எவ்வெவ்விடங்களில் பயன்படுத்த வேண்டும்?

14. (அ) பத்துப்பாட்டில் இடம்பெற்றுள்ள ஆற்றுப்படை நூல்களைப் பற்றி எழுதுக.

(அல்லது)

(ஆ) திருக்குறள் எங்ஙனம் பகுக்கப்பட்டுள்ளது? விளக்கி வரைக.

15. (அ) கம்பராமாயணத்தின் தனிச்சிறப்புகளைப் புலப்படுத்துக.

(அல்லது)

(ஆ) சிற்பியின் 'மௌன மயக்கங்கள்' கவிதைகள் குறித்து விரித்துரைக்க.

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

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. தொடையின் வகைகளைச் சான்றுகளுடன் விளக்கி வரைக.

17. புறத்திணையின் வகைகளைச் சான்றுகளுடன் விளக்குக.

18. செய்யுள் படைப்பில் அணி இலக்கணம் பெறுமிடத்தை எடுத்துரைக்க.

19. கம்பரின் கவித்திறத்தைச் சான்றுகளுடன் கட்டுரைக்க.

20. 'பாண்டியன் பரிசு' காப்பியத்தின் கதைக் களத்தை விரித்துரைக்க.

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**D-1129**

| Sub. Code |
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| 41B |

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION, MAY 2023

Fourth Semester

PART I — HUMAN SKILLS DEVELOPMENT – II

(CBCS 2018-19 Academic Year onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Write any four techniques of counselling.

2. Why are managerial skills important?

3. What is conceptual skills? Give two examples.

4. Write about the importance of organisational skills.

5. What are the two types of multitasking?

6. Write five qualities of a good leader.

7. What are the most common types of social interaction?

8. What are problem-solving skills?

9. Define dependability in problem solving skills.

10. What is the main goal of cooperative learning skills?

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Illustrate the role of a counsellor.

Or

(b) Elaborate the human relational skills.

12. (a) How to prepare for a presentation?

Or

(b) Define the nature of organizational skills.

13. (a) What are the skills you must convey in a job interview?

Or

(b) What are the demands of multi tasking?

14. (a) What are the employability skills?

Or

(b) Define intrapersonal skills with examples.

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

Or

(b) What is the importance of social responsibility?

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Describe managerial skills and its need.

17. Elaborate importance and meaning of conceptual skills.

18. Write an essay on nature, importance and types of organisational skills.

19. Responsibilities of an individual in a society. Explain.

20. How to handle a problem?

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**D–1130**

| Sub. Code |
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| 42/13742 |

DISTANCE EDUCATION

Common for B.A./B.Sc./B.C.A. DEGREE EXAMINATION, MAY 2023.

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. What surprise was in store for Lalajee before he left Mokameh Ghat?

2. In "A Day's Wait," how does the father dispel the boy's fear?

3. What is the meaning of the title, Pygmalion?

4. Where did Swami and his friends live?

5. On what condition does Shylock agree to loan money to Antonio?

6. Who was Paulina?

7. What was Gandhiji's weapon against the British rule?

8. How did Nehru endear himself to everyone?

9. What is meant by "Concord"?

10. How would you thank a stranger who lends you a pen at the post office?

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) What is the moral of the story, "Little Girls are Wiser than Men"?

Or

(b) Write a brief description of Klass Van Bommel.

12. (a) What happens during the Ambassador's garden party in *Pygmalion*?

Or

(b) Justify the title of the story, *Swami and His Friends*.

13. (a) What reasoning did Arragon use in choosing the casket?

Or

(b) What is the function of the Nurse in Romeo and Juliet?

14. (a) What was the legitimate aspiration of the blacks?

Or

(b) Describe Toynbee's second meeting with Nehru.

15. (a) Choose the correct form of the verb that agrees with the subject:

(i) The cost of cars ——————(is, are) high.

(ii) Neither the workers nor the manager ——————— (was, were) to blame.

(iii) Every spring the alumni ——————— (gather, gathers) in the Quadrangle for reception.

(iv) The crowd at the match ——————— (have, has) been standing the entire time.

Or

(b) Write a paragraph on the proverb, "Well begun is half done."

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. How were the trips by the two old men fulfilled in their own ways?

17. How does *Pygmalion* deal with the issue of social class?

18. Consider Romeo and Juliet a tragic love story.

19. Write an essay on the personality of Nehru from Toynbee's account.

20. Draft a discussion between a teacher and the student on the possible abuses of the Internet.

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| D–1214 | Sub. Code |
|---|---|
| | 11343 |

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

Fourth Semester

ANALYSIS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Define countable set.

2. Prove that any subset A of $\mathbb{R}$ which contains (0, 1] is uncountable.

3. What is usual metric on $\mathbb{R}^n$.

4. Prove that any open interval (a,b) is an open set in $\mathbb{R}$ with usual metric.

5. What is complete metric space?

6. State inverse function theorem.

7. Define contraction mapping.

8. What do you mean by Riemann integration?

9. What is an open cover for a metric space M?

10. Define uniform continuity.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Prove that any infinite set contains a countably infinite subset.

Or

(b) In $\mathbb{R}$ with usual metric prove that [a, b) is neither closed nor open.

12. (a) Prove that A is closed iff $A = \overline{A}$.

Or

(b) Prove that for a convergent sequence $(x_n)$ the limit is unique.

13. (a) State and prove Baire's category theorem.

Or

(b) Prove that the metric spaces [0, 1] and [0, 2] with usual metric are homeomorphic.

14. (a) Prove that $f : [0,1] \to \mathbb{R}$ defined by $f(x) = x^2$ is uniformly continuous on [0, 1].

Or

(b) State and prove intermediate value theorem.

15. (a) Prove that $(0, \infty)$ with usual metric is not compact.

Or

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

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Prove that [0,1] is uncountable.

17. Prove that in any metric space every closed ball is a closed set.

18. State and prove cantor's intersection theorem.

19. Prove that any closed interval [a, b] is a compact subset of $\mathbb{R}$.

20. Prove that continuous image of a compact metric space is compact.

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| D–1215 | Sub. Code |
|---|---|
| | 11344 |

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

Fourth Semester

STATISTICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Show that the A.M of the first $n$ natural number is $\frac{1}{2}(n+1)$.

2. 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.

3. Find the G.M. of the four numbers 2, 4, 6, 27.

4. Define Correlation.

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

6. Find whether the following data are consistent
$N = 600 \ \ (A) = 300 \ (B) = 400 \ (AB) = 50$.

7. Define Laspeyre's and Fishers Index Number.

8. State the normal equations for fitting a straight line.

9. State Newtons forward Interpolation formula for equal Intervals.

10. Explain seasonal variation in time series.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) The frequencies of the values 0, 1, 2, .....$n$ of a variable are given respectively by 1, $nc_1$, $nc_2$ .... $nc_n$. Show that the mean is $\frac{1}{2}n$.

Or

(b) Obtain the Median for the following frequency distribution

| $x$: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| $f$: | 8 | 10 | 11 | 16 | 20 | 25 | 15 | 9 | 6 |

12. (a) Fit a straight line to the following data :

| $x$: | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| $y$: | 2.1 | 3.5 | 5.4 | 7.3 | 8.2 |

Or

(b) Prove that $\gamma_{xy} = \frac{\sigma_x^{\,2} + \sigma_y^{\,2} - \sigma_{(x-y)}^{\,2}}{2\sigma_x \sigma_y}$.

13. (a) Prove that the regression co-efficients are independent of the change of origin but dependent on change of scale.

Or

(b) Evaluate

(i) $\frac{\Delta^2 x^3}{Ex^2}$ taking $h = 1$

(ii) $\Delta^3 (1 - ax)(1 - bx)(1 - (x))$.

14. (a) Find $U_x$ for the following data, using Gregory – Newtons formula and hence estimate $U_9$.

| $U_0$ | $U_1$ | $U_2$ | $U_3$ | $U_4$ |
|---|---|---|---|---|
| 1 | 11 | 21 | 28 | 29 |

Or

(b) Find $U_5$ given that $U_1 = 4, U_2 = 7, U_4 = 13, U_7 = 30$.

15. (a) Given $(A) = 30$; $(B) = 25; \alpha = 30$; $(\alpha\beta) = 20$

Find

(i) $N$ (ii) $(\beta)$

(iii) $(AB)$ (iv) $(A\beta)$

(v) $(\alpha\beta)$

Or

(b) Prove that Fishers index number is an Ideal Index Number.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. The scores of two cricketers $A$ and $B$ in 10 innings are given below. Find who is a better run gether and who is most consistent player.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| A scores (*xi*) | 40 | 25 | 19 | 80 | 38 | 8 | 67 | 121 | 66 | 76 |
| B scores (*yi*) | 28 | 70 | 31 | 0 | 14 | 111 | 66 | 31 | 25 | 4 |

17. Fit a second degree parabola by taking *xi* as a independent variable.

| | | | | | |
|---|---|---|---|---|---|
| $x$ : | 0 | 1 | 2 | 3 | 4 |
| $y$ : | 1 | 5 | 10 | 22 | 38 |

18. Calculate the correlation coefficient for the following data :

| | | | | | | |
|---|---|---|---|---|---|---|
| $x$ : | 10 | 12 | 18 | 24 | 23 | 27 |
| $y$ : | 13 | 18 | 12 | 25 | 30 | 10 |

19. Population was recorded in a village as follows

| | | | | | | |
|---|---|---|---|---|---|---|
| Year : | 1941 | 1951 | 1961 | 1971 | 1981 | 1991 |
| Population : | 2000 | 2300 | 2800 | 3400 | 4150 | 5120 |

Estimate the population for the year 1945 and 1985.

20. Calculate

(a) Laspeyre

(b) Paaches

(c) Fishers

(d) Bowles Index Number

| Commodities : | Base Year | | Current Year | |
|---|---|---|---|---|
| | Price | Quality | Price | Quality |
| A | 2 | 8 | 4 | 6 |
| B | 5 | 10 | 6 | 5 |
| C | 4 | 14 | 5 | 10 |
| D | 2 | 19 | 2 | 13 |

**D–1216**

| Sub. Code |
| --- |
| 11351 |

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

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 questions.

1. Define difference of sets.

2. State D' Morgan's laws.

3. Prove that any cyclic group is abelian.

4. Define order of an element.

5. Define normal sub group.

6. Define ring with an example.

7. Define prime ideal.

8. Define natural homomorphism.

9. Show that $\mathbb{R}$ is not a vector space over C.

10. Define rank and nullity of a matrix.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) For any three sets $A, B, C$ prove that

$$A \Delta B = (A - B) \cup (B - A)$$

Or

(b) Let $G$ be a group. Let $a, b, \in G$. Then prove that $(ab)^{-1} = b^{-1} a^{-1}$ and $\left(a^{-1}\right)^{-1} = a$.

12. (a) Prove that a subgroup of a cyclic group in cyclic.

Or

(b) Show that the intersection of two normal sub groups of a groups $G$ is a normal subgroup of $G_1$.

13. (a) Prove that in a ring with identity the identity element is unique.

Or

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

14. (a) Prove that the only isomorphism $f : Q \to Q$ is the identify map.

Or

(b) Prove that any Euclidean domain R is a U.F.D.

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

Or

(b) Let $V$ be a finite dimensional inner product space. Let $W$ be a subspace of $V$. Then prove that $\left(W^{\perp}\right)^{\perp} = W$.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Let $A$ and $B$ be two subgroups of a group $G$. Then prove that $AB$ is a subgroup of $G$ if and only if $AB = BA$.

17. State and prove Lagrange's theorem on groups.

18. State and prove the fundamental theorem of homomorphism.

19. Let $V$ be a vector space over = field $f$. Let $A$ and $B$ be subspaces of $V$. Prove that $\frac{A+B}{A} \cong \frac{B}{A \cap B}$.

20. Let $V$ be a finite dimensional vector space over a field $F$. Let $W$ be a subspace of $V$. Prove that

(a) $\dim \frac{W}{V} = \dim V$

(b) $\dim \frac{V}{W} = \dim V - \dim W$

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**D–1217**

| Sub. Code |
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| 11352 |

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

Fifth Semester

OPERATIONS RESEARCH

(CBCS 2018-19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. What is O.R.?

2. Define a basic solution.

3. Write the dual of the L.P.P

   Minimize $z = 4x_1 + 6x_2 + 18x_3$

   Subject to: $x_1 + 3x_2 \geq 3$

   $x_2 + 2x_3 \geq 5$ and

   $x_j \geq 0,\ j = 1, 2, 3$

4. What is meant by an unbounded solution in LPP?

5. What is the objective of an assignment problem?

6. Write down the mathematical formulation of transportation problem.

7. Define network.

8. Define maximin and minimax principle.

9. Write down the expansion of PERT and CPM.

10. Find the value of the game

$$\begin{array}{c} \\ A \end{array} \begin{array}{c} B \\ \begin{pmatrix} 10 & 6 \\ 8 & 3 \end{pmatrix} \end{array}$$

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Solve graphically:

Minimize $Z = 3x_1 + 2x_2$

Subject to the constraints

$$-2x_1 + x_2 = 1$$
$$x_1 \leq 2$$
$$x_1 + x_2 \leq 3$$
$$x_1, x_2 \geq 0$$

Or

(b) Reduce the following LPP to its standard form:

Maximize $Z^* = 3x_1 + 4x_2 + 6x_3$

Subject to the constraints:

$$2x_1 + x_2 + 2x_3 \geq 6$$
$$3x_1 + 2x_2 = 8$$
$$7x_1 - 3x_2 + 5x_3 \geq 9$$

12. (a) Using Big-M method solve the following LPP

Minimize $z = 4x_1 + 3x_2$

Subject to: $2x_1 + x_2 \geq 10$

$-3x_1 + 2x_2 \leq 6$

$x_1 + x_2 \geq 6$

$x_1, x_2 \geq 0$

Or

(b) Write down the dual of the principal LPP:

Maximize $Z = 3x_1 + x_2 + x_3 + 4x_4$

Subject to: $x_1 + x_2 - 2x_3 + x_4 = 5$

$x_1 - 2x_2 + 4x_3 + 2x_4 = 10$

$x_1, x_2, x_3, x_4 \geq 0$

13. (a) Using Vogel's approximation method, find a basic feasible solution to the following Transportation problem.

| | 1 | 2 | 3 | 4 | $a_i$ |
|---|---|---|---|---|---|
| I | 21 | 16 | 25 | 13 | 11 |
| II | 17 | 18 | 14 | 23 | 13 |
| III | 32 | 27 | 18 | 41 | 19 |
| $b_j$ | 6 | 10 | 12 | 15 | 43 |

Or

(b) Explain the steps in the Hungarian method for solving assignment problems.

14. (a) A T.V repairman finds that the time spent on his jobs has an exponential distribution with mean 30 minutes. If he repairs the sets in approximately poisson with an average rate of 10 per 8- hour day. What is repairmen's expected idle time?

Or

(b) There are five jobs each which must go through the two machines A and B in the order A–B processing times are given below

| Job | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Machine A | 10 | 2 | 18 | 6 | 20 |
| Machine B | 4 | 12 | 14 | 16 | 8 |

Determine the optimum sequences for the 5 jobs and the minimum total elapsed time.

15. (a) Using the principle of dominance solve the following game:

| | | Player B | | | |
|---|---|---|---|---|---|
| | | I | II | III | IV |
| Player A | I | 3 | 2 | 4 | 0 |
| | II | 3 | 4 | 2 | 4 |
| | III | 4 | 2 | 4 | 0 |
| | IV | 0 | 4 | 0 | 8 |

Or

(b) Explain the following terms:

(i) Pessimistic time

(ii) Optimistic time and

(iii) Most likely time

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Use simplex method to solve the following LPP:

Maximize $Z = 4x_1 + 10x_2$

Subject to: $2x_1 + x_2 \leq 50$

$2x_1 + 5x_2 \leq 100$

$2x_1 + 3x_2 \leq 90$

$x_1, x_2 \geq 0$

17. Use dual simplex method to solve the LPP

Maximize $Z = -3x_1 - 2x_2$

Subject to: $x_1 + x_2 \geq 1$

$x_1 + x_2 \leq 7$

$x_1 + 2x_2 \geq 10$

$x_2 \leq 3$

$x_1, x_2 \geq 0$

18. Solve the following transportation problem

| | | Destination | | | |
|---|---|---|---|---|---|
| | | A | B | C | Availability |
| Source | I | 6 | 8 | 4 | 14 |
| | II | 4 | 9 | 8 | 12 |
| | III | 1 | 2 | 6 | 5 |
| | Demand | 6 | 10 | 15 | |

19. Determine the optimal solution to the following assignment problem:

| | I | II | III | IV |
|---|---|---|---|---|
| A | 10 | 5 | 13 | 15 |
| B | 3 | 9 | 18 | 3 |
| C | 10 | 7 | 3 | 2 |
| D | 5 | 11 | 9 | 7 |

20. Solve the following $3 \times 3$ game

| | Player B | | |
|---|---|---|---|
| Player A | 1 | –1 | 3 |
| | 3 | 5 | –3 |
| | 6 | 2 | –2 |

**D–1218**

| Sub. Code |
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| 11353 |

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION, MAY 2023.

Fifth Semester

Mathematics

NUMERICAL ANALYSIS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Write down the formula for regula falsi method.

2. Show that $\Delta(\sin x) = 2\sin\frac{1}{2}.\cos\left(x+\frac{1}{2}\right)$.

3. Show that $\Delta\nabla = \Delta - \nabla$.

4. State the Newtons' divided difference interpolating formula.

5. Form the difference table for the following.

6. Write down the gauss backward interpolation formula.

7. State the Newton's forward difference formula to compute the derivatives.

8. State Simpson's $\frac{1}{3}$ rule.

9. What is the order of $y_{x+2} + y_{x+1} = 2^x$ ?

10. Solve $y_n - 6y_{n-1} + 9y_{n-2} = 0$ .

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

(b) Solve the equations using Jacobis iteration method.

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

12. (a) Prove that $\Delta \log f(x) = \log\left[1 + \frac{\Delta f(x)}{f(x)}\right]$.

Or

(b) Prove that $\Delta + \nabla = \frac{\Delta}{\nabla} - \frac{\nabla}{\Delta}$.

13. (a) Find $\frac{dy}{dx}$ at $x = 1$ form the following table.

| x | 0 | 1 | 3 |
|---|---|---|---|
| y | 1 | –2 | 4 |

Or

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

14. (a) Using Simpson's $\frac{1}{3}$ rule, evaluate $\int_0^1 \frac{x^2}{1+x^3} dx$ with $h = 0.25$.

Or

(b) Evaluate $\Delta[x(x+1)(x+2)(x+3)]$.

15. (a) Using R–K method of second order find $y(0.1)$, When $y' = -y$, $y(0) = 1$.

Or

(b) Using Taylor's series method, solve $\frac{dy}{dx} = x^2 + y^2 - 2$, $y(0) = 1$ at $x = 0.1$.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Find the real root of the equation $x^3 + x^2 - 1 = 0$ by iteration method.

17. Solve the system of equations.

$$8x - y + z = 18$$
$$2x + 5y - 2z = 3$$
$$x + y - 3z = -6$$

Using Gauss-seidel iteration method.

18. Using Trapezoidal and Simpsons rules, find $\int_0^1 x^2 dx$ by dividing $(0,1)$ into 4 equal intervals.

19. Solve $\frac{d^2y}{dx^2} - x.\left(\frac{dy}{dx}\right)^2 + y^2 = 0$ using Runge-Kutta method for $x = 0.2$; initial conditions are $x = 0,\ y = 1,\ y' = 0$.

20. Using Adam's – Bash forth predictor corrector formula find $y(0.4)$ given that $\frac{dy}{dx} = \frac{xy}{2}; y(0.1) = 1.01,$ $y(0.2) = 1.022,\ y(0.3) = 1.023$.

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**D–1219**

| Sub. Code |
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| 11354 |

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

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 questions.

1. Find $L\left(e^{at}\right)$.

2. Find $L^{-1}\left\{\dfrac{s^2-3s+4}{s^3}\right\}$.

3. If $L\{f(t)\}=F(s)$, prove that $L\{f(at)\}=\dfrac{1}{a}F(s/a)$.

4. Define even function with example.

5. When a function is defined in $(0, 2l)$, it is possible to expand it series? How?

6. Find the sine transform of $f(x)$, it

$$f(x)=\begin{cases}\sin x, & a<x<a\\ 0, & x>a\end{cases}$$

7. Define the root mean square value of a function $f(x)$ in $(0, 2\pi)$.

8. Define Parsevals identity in fourier series.

9. Find z-transform of $\left[\frac{1}{2^k}\right]$, $-4 \le k \le 4$.

10. Find $z^{-1}\left(\frac{1}{z-2}\right)$ when $|z| > 2$.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Find $L(\sin 2t \sin 3t + \cos^3 2t)$.

Or

(b) Find $L^{-1}\left(\frac{1}{(s+1)(s^2+2s+2)}\right)$.

12. (a) Apply convolution theorem to evaluate $L^{-1}\left\{\frac{s}{(s^2+a^2)^2}\right\}$.

Or

(b) Expand $f(x) = \sin x$ in $(-\pi, \pi)$ as fourier series.

13. (a) Find the fourier cosine series for $f(x) = x^2$ in $(0, \pi)$.

Or

(b) Find the fourier sine transform of $\frac{e^{-ax}}{x}$.

14. (a) Find fourier transform of $\left[\frac{\sin ax}{x}\right]$ and hence prove that $\int_{-\infty}^{\infty} \frac{\sin^2 ax}{x^2} dx = a\pi$.

Or

(b) Find $z[f(k)]$, where $f(k) = \begin{cases} 5^k, & k < 0 \\ 3^k, & k \geq 0 \end{cases}$

15. (a) Evaluate $z^{-1}\left(\frac{2z^2 - 10z + 13}{(z-3)^2(z-2)}\right)$ when $2 < |z| < 3$.

Or

(b) Find $z^{-1}\left\{\frac{z^2 + 2z}{z^2 + 2z + 4}\right\}$ by using Residue theorem.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Using Laplace transform solve $(D-2)x - (D+1)y = 6e^{3t}$ $(2D-3)x + (D-3)y = 6e^{3t}$ given $x(0) = 3$, $y(0) = 0$.

17. Find the fouries series of $f(x)$, where

$f(x) = \begin{cases} -\pi, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$

and hence prove that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots = \frac{\pi^2}{8}$.

18. Expand $f(x) = x \sin x$ for $(-\pi, \pi)$ and hence prove that $\frac{\pi - 2}{4} = \frac{1}{1.3} + \frac{1}{3.5} + \frac{1}{5.7} + \frac{1}{7.9} + \cdots\cdots$

19. Find the Fourier sine and cosine transform of $x^{n-1}$. Hence deduce that $\frac{1}{\sqrt{x}}$ is self reciprocal under both the transforms. Also find $F\left\{\frac{1}{\sqrt{|x|}}\right\}$.

20. Solve $6y_{k+2} - y_{k+1} - y_k = 0$, given $y(0) = 0$, $y(1) = 1$.

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**D–1220**

| Sub. Code |
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| 11361 |

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

Sixth Semester

DISCRETE MATHEMATICS

(CBCS 2018-19 Academic Year onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. What are Sentential connectives.

2. Define atomic and compound statements.

3. Define tautology.

4. State De Morgan's Laws.

5. Give an example for a lattice.

6. Define Hamming distance.

7. When a graph is said to be disconnected?

8. Define bipartite graph.

9. What do you mean by fundamental circuit?

10. Define Hamiltonian graph.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Determine the truth table for $P \to (Q \to R)$.

Or

(b) Verify $(PVQ) \to P$ is a tautology.

12. (a) Prove that every chain is a lattice.

Or

(b) State any four properties of Lattice.

13. (a) Let $X = 1011, Y = 0101$ Find $\delta(x, y)$.

Or

(b) Prove that is any graph $G$, the number of vertices of odd degree is even.

14. (a) Prove that every cycle has even number of edges in common with any cutset.

Or

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

15. (a) Show that every tree with exactly two vertices of degree 1 is a path.

Or

(b) Prove that if $G$ is a $(p,q)$ graph, the coefficient of $\lambda^{p-1}$ in $f(G,\lambda)$ is –q.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Obtain the disjunctive normal form of $P \to ((P \to Q) \wedge \neg(\neg Q \vee \neg \mathrm{P})$.

17. Prove that $(L \times M, \wedge, V)$ is a lattice.

18. If a graph $G$ is uniquely n-colourable prove that $\delta(G) \geq n-1$.

19. Prove that every tree has a center consisting of either one point or two adjacent points.

20. Prove that every hamiltonian graph is 2-connected.

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| D–1221 | Sub. Code |
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| | 11362 |

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION, MAY 2023.

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. Differentiate between the crisp set and a fuzzy set.

2. Define intersection of two fuzzy sets, given an example.

3. Calculate the following :

   (a) $[-3, 4], [-3, 4]$

   (b) $[-4, 6] / [1, 2]$

4. State the properties for a fuzzy set $A$ on $R$ to quality as a fuzzy number.

5. What is meant by a proximity relation?

6. Define fuzzy measure.

7. What are the types of Hartley information?

8. Define measure of dissonance.

9. Define measure of confusion.

10. What are the three aspects of uncertainty and information?

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Show that $A, B \in F(x)$,

(i) $^{\alpha}(A \cap B) = {}^{\alpha}A \cap {}^{\alpha}B$

(ii) $^{\alpha}(\overline{A}) = {}^{(1-\alpha)+}\overline{A}$

Or

(b) Show that the standard fuzzy intersection is the only idempotent $t$–norm.

12. (a) Determine the addition of two fuzzy numbers $A$ and $B$ whose membership functions are given by

$$A(x) = \begin{cases} 0 & for \quad x \le -1 \text{ and } x > 3 \\ (x+1)/2 & for \quad -1 < x \le 1 \\ (3-x)/2 & for \quad 1 < x \le 3 \end{cases}$$

$$B(x) = \begin{cases} 0 & for \quad x \le 1 \text{ and } x > 5 \\ (x-1)/2 & for \quad 1 < x \le 3 \\ (5-x)/2 & for \quad 3 < x \le 5 \end{cases}$$

Or

(b) Explain the arithmetic operations on fuzzy numbers with suitable example.

13. (a) Explain Fuzzy ordering relation in detail.

Or

(b) Prove that a belief measure Bel on a finite power set $P(x)$ is a probability measure iff the associated basic probability assignment function $m$ is given by $m(\{x\}) = Bel(\{x\})$ and $m(A) = 0$ for all subsets of $X$ that are not singletons.

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

Or

(b) Explain the measure of fuzziness.

15. (a) Explain the entropy like measures.

Or

(b) Describe the U-uncertainty in detail.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Let $A \in F(R)$. Prove that $A$ is a fuzzy number if and only if there exists a closed interval $[a,b] \neq \varphi$ such that

$$A(x) = \begin{cases} 1 & for \quad x \in [a, b] \\ l(x) & for \quad x \in [-\infty, a] \\ r(x) & for \quad x \in [b, \infty]. \end{cases}$$

17. (a) Find the transitive max-min closure of the fuzzy relation $R = \begin{bmatrix} 1 & 0.2 & 0 & 0 \\ 0 & 0 & 0.4 & 0.3 \\ 1 & 0.2 & 0 & 0 \\ 0 & 0 & 0.4 & 0.3 \end{bmatrix}$

(b) What is meant by a Sagittal diagram? Explain with suitable illustration.

18. Explain fuzzy compatibility relations in detail.

19. Prove that the inequality

$$-\sum_{i=1}^{n} pi \log_2 pi \leq -\sum_{i=1}^{n} Pi \log_2 qi$$

20. Describe the overview of uncertainty measures in detail.

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**D–1222**

| Sub. Code |
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| 11363 |

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

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. Define Complex Plane.
2. Write C.R. Equations.
3. Define Entire function.
4. Prove that $u = 2x - x^3 + 3xy^2$ is harmonic.
5. Write some elementary transformations.
6. Define Cross ratio.
7. Write cauchy's integral formula.
8. State local mapping theorem.
9. Write Maclaurin's series.
10. Define a pole of *f(z)*.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Show that $u = \log\sqrt{x^2 + y^2}$ is harmonic and find its conjugate.

Or

(b) Find radius of Convergence for $\sum_{n=1}^{\infty} \frac{z^n}{n^2}$

12. (a) Find the points where the mapping $w = z^n$ ($n$ positive integer) is conformal.

Or

(b) Prove that any bilinear transformation preserves cross ratio.

13. (a) Evaluate $\int_c f(z)dz$ where $f(z) = y - x - i3x^2$ and C is the line segment from $z = 0$ to $z = 1 + i$.

Or

(b) State and prove Maximum modulus theorem.

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

Or

(b) Expand *Cos z* into a Taylor's series about $z = \frac{\pi}{2}$.

15. (a) Prove that an isolated singularity '$a$' of *f(z)* is a pole if and only if $\lim_{Z \to a} f(z) = \infty$.

Or

(b) Evaluate $\int_c \frac{dz}{2z+3}$ where C is $|z| = 2$.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Derive Cauchy-Riemann equations.

17. Show that the transformation $w = \frac{5-4z}{4z-2}$ maps the unit circle $|z| = 1$ into a circle of radius unity and centre $-1/2$.

18. Prove that $\int_c \frac{zdz}{z^2-1} = 2\pi i$ where c is the positively oriented circle $|z| = 2$.

19. Expand $f(z) = \frac{1}{2}$ in Taylor's series about $z = 1$ and $z = i$.

20. Use residue theorem to evaluate $\int \frac{3z^2+z-1}{(z^2-1)(z-3)} dz$ around the circle $|z| = 2$.

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**D–1223**

| Sub. Code |
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| 11364 |

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

Sixth Semester

COMBINATORICS

(CBCS 2018-19 Academic Year onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. What is called the stirling number of the second kind.

2. In how many permutations of the word AUROBIND do the vowels appear in the alphabetical order?

3. Write the symbolic expressions of the exponential generating function for a sequence.

4. Find the ordinary generating function (OGF) for $\varphi(n)$ if $\varphi(n)$ is the number of partitions of $n$ into odd parts.

5. Define conjugate ordering.

6. Define Euler function.

7. In all possible throws of 6 dice, how many will have atleast four of them showing the same face?

8. What is the permanent of a matrix?

9. Define cycle index of a permutation group.

10. Describe the direct sum of two permutation groups.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Explain the stirling numbers of the second kind.

Or

(b) Prove that the following

(i) $R(1^n;m) = S_n^{\ m}$

(ii) $R'(1^n;m) = S_m^{\ 1} + S_m^{\ 2} + \cdots + S_n^{\ m}$

(iii) $R(1^n;1^m) = m!\ S_n^{\ m}$

(iv) $R'(1^n;1^m)\_ = m^n$

12. (a) Prove that the element $f$ of $R[t]$, given by $f = \sum_{k=0}^{\infty} a_k t^k$ has an inverse in $R[t]$ if $f\alpha_0$ has an inverse in $R$.

Or

(b) Explain recurrence relation with example.

13. (a) Explain the complete Homogeneous symmetric functions $h_\lambda$ with illustrations.

Or

(b) If $\alpha_1 \ldots\ldots \alpha_p$ belong to a commutative ring $A$, and n is a positive integer, prove that $(\alpha_1 + \alpha_2 + \ldots + \alpha_p)^n = \sum_{\substack{n_1, n_2 \ldots np \geq 0 \\ n_1 + n_2 + \ldots n_p = n}} \binom{n}{n_1, n_2 \ldots n_p} \alpha_1^{n1} \alpha_2^{n_2} \ldots \alpha_p^{n_p}$.

14. (a) Discuss the Menage problem with appropriate illustrations.

Or

(b) Let $E(m) =$ sum of the weights of elements of $S$ that posses exactly $m$ of the properties, then prove that $E(m) = w(m) - \binom{m+1}{m} w(m+1) + \binom{m+2}{m} w(m+2) \ldots$

$(-1)^{N-M} \binom{N}{m} w(N)$

15. (a) Explain Necklace problem.

Or

(b) Obtain the counting series for the directed graphs on 4 points.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Derive the recurrence formula for $S_n^m$.

17. Explain the generation functions with example.

18. Explain the power sum symmetric functions $S_\lambda$.

19. Disuses the problem of Fibonacci.

20. State and prove Polya's enumeration theorem.

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