D–1788	Sub. Code
	11 A/13711/0111

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.B.A./B.B.A. (Banking)/B.C.A./ M.B.A. (Five Year Integrated) DEGREE EXAMINATION, DECEMBER 2023.

First Semester

Part I — TAMIL – PAPER – I

(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. குருவாயூர் கண்ணனின் நிறம் யாது?

2. ஆயர்பாடி மாளிகையில் கண்ணன் செய்வது யாது?

3. கண்ணதாசனின் இயற்பெயரைக் குறிப்பிடுக.

4. பட்டுக்கோட்டை கல்யாண சுந்தரம் பிறந்த ஊர் யாது?

5. 'செய்யும் தொழிலே தெய்வம்' என்னும் பாடல் இடம்பெற்ற திரைப்படம்?

6. பாரத மாதாவிற்குத் 'திருப்பள்ளி எழுச்சி' பாடியவர் யார்?

7. சர்ப்ப யாகம் - நூல் குறிப்பு வரைக.

8. கண்ணகியின் சிலம்பில் எப்பரல்கள் இருந்தன?

9. உமறுப்புலவரை ஆதரித்த வள்ளல் பெயரை எழுதுக.

10. தேம்பாவணி - பொருள் தருக.

பகுதி ஆ — (5 × 5 = 25 மதிப்பெண்கள்)

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) கண்ணன் துயில் எழுப்ப கோபியரைக் கண்ணதாசன் அழைக்குமாற்றை எழுதுக.

(அல்லது)

(ஆ) கவிஞர் பட்டுக்கோட்டை கல்யாண சுந்தரம் பற்றி குறிப்பு வரைக.

12. (அ) கண்ணனின் குறும்புகளைப் பாரதியார் எங்ஙனம் பாடுகிறார்?

(அல்லது)

(ஆ) பிறை நிலவைக் கவிஞர் பெ.தூரன் உருவகிக்குமாற்றை விவரிக்க.

13. (அ) 'வெறும் புகழ்' கவிதை வழி வல்லிக்கண்ணன் யதார்த்தத்தை எவ்வாறு உணர்த்துகிறார்?

(அல்லது)

(ஆ) கண்ணகியின் வருகையை வாயில் காவலன் மன்னனுக்கு எங்ஙனம் அறிவிக்கிறான்?

14. (அ) நபிகள் நாயகம் அறபியை ஆட்கொண்ட திறத்தை விளக்கி வரைக.

(அல்லது)

(ஆ) இறைவனை வணங்க கன்னித்தாயும் சூசையும் ஆயர்களை அழைக்குமாற்றை எழுதுக.

15. (அ) வழக்குரை காதையை சிலப்பதிகாரத்தின் வழி நின்று விளக்குக.

(அல்லது)

(ஆ) கு.ப. இராஜகோபாலனின் படைப்புகளை விளக்குக.

பகுதி இ — (3 × 10 = 30 மதிப்பெண்கள்)

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. கண்ணதாசன் கண்ணனைப் புகழ்ந்துரைக்குமாற்றை விளக்கி வரைக.

17. பாரதிதாசன் உலகப்பன் பாடல் வழிக் கூறும் கருத்துக்களைத் தொகுத்துரைக்க.

18. இராமனின் சிறப்புகளைக் கம்பர் எடுத்துரைக்குமாற்றை விவரிக்க.

19. இளங்கோவடிகளின் கவித்திறத்தை நும் பாடப் பகுதியால் பாராட்டியுரைக்க.

20. தேம்பாவணி காப்பியச் சிறப்புகளை எடுத்துரைக்க.

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D–1789

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 Year Integrated) DEGREE EXAMINATION, DECEMBER 2023.

First Semester

Part I — COMMUNICATION SKILLS – I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Write the origin of the term 'Communication'.

2. Write the meaning of 'Communication'.

3. What is 'Oral Communication'?

4. Write any one importance of Oral Communication.

5. When do we claim that a communication is effective?

6. What is called as Body Language?

7. What are gestures?

8. Mention any one purpose of 'Meeting'.

9. What is logical presentation in Group Discussion?

10. Define 'Professional report'.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Discuss the different types of Communication.

Or

(b) Write a note on Intonation.

12. (a) Discuss telephonic conversation as one of the forms of dyadic conversation.

Or

(b) Discuss the forms of Oral Communication.

13. (a) Write on the Format of a Report.

Or

(b) Write a note on the types of Reports.

14. (a) Write a note on Content Writing.

Or

(b) Discuss the three stages 'drafting, correction and final draft preparation'.

15. (a) Discuss the two senses in which the word 'meeting' is used.

Or

(b) Discuss the purpose of conducting group discussion.

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

Answer any THREE questions.

16. Examine the principles of effective communication.

17. Discuss the purpose of meetings.

18. Elucidate the features of written communication.

19. Analyse the steps involved in Essay Writing.

20. Explain the ways of organizing a group discussion.

D–1790

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, DECEMBER 2023.

First Semester

Part II – ENGLISH PAPER – I

(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. What makes water one of the most powerful and wonderful things on earth?
2. Why did Mrs. Packletide want to kill a tiger?
3. From where did Narwa and Haria collect bamboos for basket making?
4. How does the essay 'On Letter Writing' begin?
5. What are the good points of our civilization according to C.E.M. Joad?
6. Write Joad's opinion on machines in modern man's life.
7. Put the verbs in the brackets in the correct tense:

   (a) I _____ (fall) asleep in the middle of his boring story.

   (b) Even the best of students _____ (make) such mistakes.

8. Fill in the blanks with Prepositions:

(a) He is running _____ the temple.

(b) He left _____ London yesterday.

9. Fill in the blanks with suitable Articles.

(a) Which road is _____ right one?

(b) He is _____ salesman of _____ rare merit.

10. Write the purpose of Précis Writing.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) What are the measures that are used to present soil erosion? ('Water the Elixir of Life')

Or

(b) Do you think Mrs. Packletide was able to achieve her heart's desire? Give reasons.

12. (a) How does Jim Corbett portray the friendship between Nawara and Haria?

Or

(b) How should a letter be written according to Alpha of the Plough (A.G. Gardiner)?

13. (a) Present the description given by Joad on modern civilization man's life.

Or

(b) Write a short summary of 'Food' by J.B.S. Haldane.

14. (a) You have arranged to meet a friend at the railway station but you could not do so. Write a letter of apology, explaining the lapse on your part.

Or

(b) Use the correct form choosing from the verbs given in brackets:

(i) Ten thousand rupees a month _____ (is /are) a good salary.

(ii) Six months _____ (is/are) a long time to stay away from home.

(iii) Either my mother or I _____ (am/is) to do the work.

(iv) Neither Sita nor her friends _____ (are/is) attending marriage.

(v) Bread and butter _____ (is/are) enough for me.

15. (a) Build a dialogue between you and your teacher. You are asking him/her to give you guidance for choosing a suitable course.

Or

(b) Write a paragraph on the following topic.
'The First money I earned'.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Why does C.V. Raman call water as elixir? Justify.

17. Bring out the humour in 'Mrs. Packletide's Tiger'.

18. What does C.E. Joad talk about our civilization in his essay 'Our Civilization'? Explain.

19. Write a paragraph on using the hints given below:

A king unhappy – his people lazy – plans to teach them a lesson – puts a big stone in the middle of the road and purse of gold under it – many people pass by – no effort made to remove the stone – all go round it – curse the stone – blame the government – and await its removal – the stone lays there for a month – a stranger passes by – removes the stone with difficulty – finds the purse of gold – feels happy – the people feel ashamed...

20. Report the following conversation in Indirect Speech.

(a) Can you tell me how to find the post office?

(b) Which post office do you mean?

(c) Is there more than one? I mean the one on the campus.

(d) Oh, the Campus Post Office? Go straight along this road to the third street light and then turn right.

(e) I see. Will it be open at this time?

D–1881

Sub. Code
11313

DISTANCE EDUCATION

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

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 questions.

1. Write down the middle term of $\left(x - \frac{2}{x}\right)^{12}$.

2. Form the equation with rational coefficients one of whose roots in $\sqrt{2} + \sqrt{3}$.

3. If α, β, γ are the roots of $x^3 + bx^2 + qx + r = 0$, then find $\Sigma\alpha$.

4. State the Descarte's rule of sign.

5. Define strum's function.

6. Prove that A.M > G.M.

7. Define adjoint of a matrix.

8. Define rank of a matrix.

9. Find the eigen values of the matrix $\begin{pmatrix} 1 & 2 & 3 \\ 0 & 4 & 5 \\ 0 & 0 & 6 \end{pmatrix}$.

10. State Cayley – Hamilton theorem.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Evaluate $\frac{1}{(128)^{1/3}}$ correct to 5 places of decimals.

Or

(b) Solve $x^4 - 2x^3 + 4x^2 + 6x - 21 = 0$, given that two of its roots are equal in magnitude but opposite in sign.

12. (a) Increase by 2 the roots of $x^4 - x^3 - 10x^2 + 4x + 24 = 0$ and hence solve the equation.

Or

(b) Solve the equation

$x^4 + 20x^3 - 143x^2 + 430x + 462 = 0$ by removing its second term.

13. (a) Find the number of real roots of the equation $x^4 - 14x^2 + 16x + 9 = 0$.

Or

(b) Prove that, if $n > 2$, $(n!)^2 > n^n$.

14. (a) Show that the system of equations $x+2y+z=11$; $4x+6y+5z=8$; $2x+2y+3z=19$.

Or

(b) Prove that the interchange of any two rows (or columns) of the determinant changes its sign.

15. (a) Find the rank of the matrix $\begin{pmatrix} 4 & 2 & 1 & 3 \\ 6 & 3 & 4 & 7 \\ 2 & 1 & 0 & 7 \end{pmatrix}$.

Or

(b) Find the eigen vectors of the matrix $\begin{pmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{pmatrix}$.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Sum the series to infinity $\frac{15}{16}+\frac{15}{16}.\frac{21}{24}+\frac{15}{16}.\frac{21}{24}.\frac{27}{32}+....$

17. Solve the equation $4x^3-24x^2+23x+18=0$, given that the roots are in arithmetic progression.

18. Find the positive root of $x^3-x-3=0$ correct to two places of decimals by Horner's method.

19. If x and y are positive quantities whose sum is 4, then show that $\left(x+\frac{1}{x}\right)^2+\left(y+\frac{1}{y}\right)^2$ is notless than $12\frac{1}{2}$.

20. Verify Cayley Hamilton theorem for the matrix $A=\begin{pmatrix}1 & 0 & -2\\ 2 & 2 & 4\\ 0 & 0 & 2\end{pmatrix}$, find A^{-1} and A^4.

D–1882

Sub. Code
11314

DISTANCE EDUCATION

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

First Semester

CALCULUS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Find $\frac{dy}{dx}$ if $y = x^2 \cos 3x$.

2. If $y = \frac{1}{ax+b}$, find y_n.

3. Prove that $D^n\left[\sin(ax+b)\right] = a^n \sin\left(\frac{n\pi}{2} + ax + b\right)$.

4. Define Evolute.

5. Define Curvature.

6. Find the envelope of the family of circle :
   $(x-a)^2 + y^2 = 2a$ where a is the parameter.

7. Define Gamma function.

8. Evaluate $\int_0^a \int_0^b xy \, dx \, dy$.

9. Find $L\left[t e^{-at}\right]$.

10. Find $L^{-1}\left[\frac{s}{s^2+4^2}\right]$.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) If $y = \sin^3 x$, find y_n.

Or

(b) Find the asymptotes of

$y^3 - 6xy^2 + 11x^2y - 6x^3 + x + y = 0$.

12. (a) Find the co-ordinates of center of curvature of the curve $xy = c^2$ at (c,c).

Or

(b) Evaluate $\int_0^{4a} \int_{x^2/4a}^{\sqrt{4ax}} \int_0^3 dz \, dy \, dx$.

13. (a) Evaluate $\int_0^1 (x + \log x)^4 \, dx$.

Or

(b) Show that $\Gamma(n+1) = n\Gamma n$ if $n > 0$.

14. (a) Show that $\Gamma(n) = \int_0^1 \left[\log\left(\frac{1}{x}\right)\right]^{n-1} dx$.

Or

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

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

Or

(b) Eliminate the functions f and ϕ from $z = f(x+ay) + \phi(x-ay)$.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Verify Euler's theorem for

$u = e^{x/y}\sin\left(\frac{x}{y}\right) + e^{y/x}\cos\left(\frac{y}{x}\right)$.

17. Show that the maximum value of $y = \left(\frac{1}{x}\right)^x$ is $e^{1/e}$.

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

19. Solve the equation $\frac{d^2y}{dt^2}+2\frac{dy}{dt}+5y=4e^{-t}$ given that $y=\frac{dy}{dt}=0$ when $t=0$.

20. Solve $z=px+qy+\sqrt{1+p^2+q^2}$.

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D–1791

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, DECEMBER 2023.

Second Semester

Part – I – TAMIL PAPER – II

(CBCS 2018 – 19 Academic year onwards)

Time : Three hours Maximum : 75 marks

பகுதி அ — (10 × 2 = 20 மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் விடையளிக்க.

1. வீரமாமுனிவர் - குறிப்பு வரைக.
2. ஆயர்கள் குழந்தையை எவ்வாறு போற்றினர்?
3. "மதிற்போர்" என்றால் என்ன?
4. நீல பத்ம நாபனின் சிறுகதைகள் இரண்டிகைக் கூறுக.
5. ஐய வினா என்றால் என்ன?
6. பால் எத்தனை வகைப்படும்?
7. நாடகத்மிழ் - குறிப்பு வரைக.
8. மரபுக் கவிதை என்றால் என்ன?
9. சமணர்கள் இயற்றிய அறநூல்கள் யாவை?
10. தமிழில் இணையத்தின் பங்கு யாது?

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

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) "சாந்தி உள்ளம் உருகி போற்றி நின்றதனை" - விளக்குக.

(அல்லது)

(ஆ) பண்ணாற்றும் மருந்தால் பாவம் தீர்க்க வந்த காலத்தினை விவரி.

12. (அ) "விமோசனம்" சிறுகதை உணர்த்தும் பெண்களின் நிலையை எடுத்துரைக்க.

(அல்லது)

(ஆ) "கூழை தாங்கிய எருமை" என்பதனை விளக்குக.

13. (அ) பிறமொழிச் சொற்களைத் தமிழில் ஆளும் முறை பற்றி நீவிர் அறிவது யாது?

(அல்லது)

(ஆ) மொழி முதல் எழுத்துக்கள் குறித்து விளக்குக.

14. (அ) நாடகத் தமிழ் வளர்ச்சியில் பம்மல் சந்பந்த முதலியாரின் பங்களிப்பு யாது?

(அல்லது)

(ஆ) மரபுக் கவிதையில் பாரதிதாசனின் முக்கியத்துவம் யாது?

15. (அ) தொலைக்காட்சி தமிழுக்கு ஆற்றிவரும் பங்களிப்பு யாது?

(அல்லது)

(ஆ) தமிழ் வளர்ச்சியில் இணையத்தின் முக்கியத்துவம் பற்றி விளக்குக.

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

பின்வரும் வினாக்களுக்கு மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. நும் பாடப்பகுதியில் அமைந்துள்ள தேம்பாவணி பாடல் கருத்துக்களை தொகுத்துரைக்க.

17. கம்பன் புறத்திணையில் காணப்படும் "புறத்துறை மகளிர்" எனும் தலைப்பில் கட்டுரை வரைக.

18. சார்பெழுத்து என்றால் என்ன? அதன் வகைகளை எடுத்துக்காட்டுகளுடன் விளக்குக.

19. தமிழ்மொழிக்கு சைவ சமயப் பெரியவர்கள் ஆற்றிய தொண்டினை விவரிக்க.

20. பிற்கால காப்பியங்களில் இடம் பெற்றுள்ள "கம்பராமாயணம்" பற்றி ஒரு கட்டுரை வரைக.

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D–1792	Sub. Code
	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, DECEMBER 2023.

Second Semester

Part I — COMMUNICATION SKILLS – II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL questions.

1. What is meant by code of communication skills?

2. What do you mean by communication skills?

3. What are the three main elements of effective speaking?

4. Mention any four tips to improve speaking skills.

5. What are the types of listening?

6. What are the five stages of interview?

7. Write any two important elements for paragraph writing.

8. What does an editor do in publishing?

9. What is corporate communication?

10. Write any two tips for writing press release.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Jot down the whole communication process.

Or

(b) How do stimulus and response play a major role in communication? Explain.

12. (a) Write in detail about pronunciation etiquette in communication skills.

Or

(b) 'Phonetic symbols aid is improving one's communication skills' — Elucidate.

13. (a) Write a paragraph on Stress and Intonation.

Or

(b) Give some self-assessment exercise for improving soft skills.

14. (a) What are the differences between discriminative and comprehensive listening?

Or

(b) Explain in detail about three modes of communication.

15. (a) How do you write a business proposal email?

Or

(b) What is the star method of interviewing? Explain.

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

Answer any THREE questions.

16. 'Is interference of mother tongue the major barrier for effective communication' – Discuss.

17. Why does phonetics learning become significant for communicative skills? Explain.

18. Write in detail about online presentation tools for presentation skills.

19. Prepare a resume for a new job.

20. You have received a communication for an interview for a job in Wipro. How will you prepare for an interview?

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D–1793

Sub. Code
22/13722

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, DECEMBER 2023.

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 — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. To Whom the Sonnets of Shakespeare addressed?

2. What are the emotions evoked in “Lines Composed upon Westminster Bridge”?

3. To Which pointer does Andrea Del Sarto Compare Himself?

4. Define Soliloquy.

5. What does “Yellow Wood” stand for?

6. Where does the solider in strange meeting find himself?

7. What does the word “Gitanjali” mean?

8. Why did Shylock hate Antonio?

9. What is the theme of the poem Coromandal Fishers?

10. What is note making?

PART B — (5 × 5 = 25 marks)

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

11. (a) Discuss briefly the romantic elements in "Lines composed upon West Minster Bridge".

Or

(b) What is the effect of Browning's dramatic monologue?

12. (a) Bring out the symbolism in the poem "Andrea del Sarto".

Or

(b) "Let us sleep now..." what does the 'sleep' signify in Wilfred Owen's "Strange Meeting"?

13. (a) How does Tagore express material desires and ego as main barriers in the path towards God?

Or

(b) Is Shylock a Villian or victim?

14. (a) Attempt a short note on the morning scene at the seashore with reference to the Poem Coramandel Fishers.

Or

(b) What does Stephen Spender's "The Express" Symbolize? Discuss briefly.

15. (a) What is the format of note-making?

Or

(b) What are steps to organize an essay?

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Elucidate the subject matter and theme of "Beauty is truth", truth beauty, – that is all ye need to know on earth, and all you need to know".

17. Justify the title "The Road not taken" as a metaphor of life.

18. Elucidate Tagore's use of imagery in "Gitanjali" with appropriate language.

19. Make notes of the following passage :

Butterflies can be seen fluttering over flowers in the Himalayas, in the Gangetic plain or deep down in the villages in Tamilnadu. These beautiful creatures are useful pollinators. Their wings are formed of pigments of red yellow, black and white, while the blues, the greens and the metallic iridescent hues are the result of refraction. The patterns on butterfly wings are created by a mass of tiny coloured scales which overlap almost like the tiles on a roof. Their antennae are used primarily to find food and mates. They are covered with microscopic sense organs and moved by basal muscles. Through these, they perceive odours, changes in temperature, humidity in the air and certain other stimuli.

20. Read the following passage and answer the questions given below :

After we got independence, we in India have been trying to raise our standard of living. Though progress has not been as quick as we could have wished, there is no doubt that, in the last twenty-five years, we have been steadily inching our way towards some of our goals, we have almost enough food for our huge population, thanks to the revolution in agriculture. We have built a sound industrial base. We have dethroned hundreds of big and small white elephants – the princes. We have been trying to distribute land more fairly – But with limited success so far. We have also been trying to find employment for our youth – again with only partial success. These and other problems would no doubt become manageable if we could check the steep growth of our population.

(a) Have living standards in India risen rapidly?

(b) Who have we been trying to do with only partial success?

(c) What have we succeeded in doing?

(d) Have we succeeded in checking the population growth?

(e) Have we been trying seriously to check it?

D–1883

Sub. Code
11323

DISTANCE EDUCATION

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

Second Semester

ANALYTICAL GEOMETRY AND VECTOR 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 the equation of the straight line parallel to the line $3x - 2y + 7 = 0$ through the point (1, 2).

2. Define Direction cosines.

3. Find the angle between the planes
$2x - y + z = 6,\ x + y + 2z = 3$.

4. Find the equation of line through $(3, 4, 0)$ and perpendicular to the plane $2x + 3y - 4z = 4$.

5. Find the angle between the plane $x - 3y + 2z = 1$ and the line $\frac{x-1}{2} = \frac{y-1}{1} = \frac{z-1}{-3}$.

6. Write down the equation of Right circular cone.

7. Determine center and radius of the sphere $4\left(x^2+y^2+z^2\right)-16x-24y+43=0$.

8. Find $\nabla(\log r)$.

9. If $\vec{V}=(x+3y)\vec{i}+(y-2)\vec{j}+(x+\lambda z)\vec{k}$ is solenoidal, then find the value of λ.

10. State Green's theorem.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Find the locus of the foot of the perpendiculars drawn from the pole to the tangents to the circle $r=2a\cos\theta$.

Or

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

12. (a) Find the equation of the through $(2, 3, -4)$ and $(1,-1, 3)$ and parallel to the $x-$axis.

Or

(b) Obtain a symmetrical form for the equations $2x-2y-z=2$ and $x+2y-2z=4$ of a straight line.

13. (a) Find the image of the point $(2, -3, 3)$ in the plane $x-2y-z+1=0$.

Or

(b) Find the equation of the sphere passing through the points $(0, 1, 3), (1, 2, 4), (2, 3, 1), (3, 0, 2)$.

14. (a) Find the equation of the right circular cylinder of radius 2 and having as axis of the line $\frac{x-1}{2}=\frac{y-2}{1}=\frac{z-3}{2}$.

Or

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

15. (a) Show that $\vec{F}=\left(6xy+z^2\right)\vec{i}+\left(3x^2-z\right)\vec{j}+\left(3xz^2-y\right)\vec{k}$ is irrotational vector and find the scalar potential ϕ such that $\nabla\phi=\vec{F}$.

Or

(b) If $\vec{F}=3xy\vec{i}-y^2\vec{j}$, evaluate $\int_C \vec{F}\cdot d\vec{r}$, where C is the curve in the xy plane $y=2x^2$, from $(0, 0)$ to $(1, 2)$.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. A point moves such that a tangent from it to the circle $x^2+y^2+4x-5y+6=0$ is double the length of the tangent to the circle $x^2+y^2=4$. Show that the locus is a circle. Find its center and radius?

17. Find the shortest between the lines $\frac{x+2}{2}=\frac{y+6}{3}=\frac{z-34}{-10}$ and $\frac{x+6}{4}=\frac{y-7}{-3}=\frac{z-7}{-2}$. Also find the equation of the shortest distance.

18. Find the center and radius of the circle $x^2 + y^2 + z^2 - 2x - 4y - 6z - 2 = 0$, $x + 2y + 2z = 20$.

19. Find the equation of the right circular cylinder whose guiding circle is $x^2 + y^2 + z^2 = 9$, $x - y + z = 3$.

20. Verify Gauss divergence theorem for $\vec{F} = (x^2 - yz)\vec{i} + (y^2 - zx)\vec{j} + (z^2 - xy)\vec{k}$ taken over the rectangular parallelopiped $0 \le x \le a, 0 \le y \le b, 0 \le z \le c$.

D–1884	Sub. Code
	11324

DISTANCE EDUCATION

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

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 questions.

1. Define monotonic sequence. Give an example.

2. Show that the constant sequence 1, 1, 1, …. Converges to 1.

3. State the Cauchy's general principle of convergence.

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

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

6. State the root test.

7. Define absolutely convergent series.

8. State Raabe's test.

9. Let $\sum \frac{1}{n^2} = S$. Prove that $1 + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \ldots = \frac{3}{4}S$.

10. Define alternating series. Give an example.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Prove that any sequence (a_n) diverging to $-\infty$ is bounded above but not bounded below.

Or

(b) Prove that the sequence $\left((-1)^n\right)$ is not convergent.

12. (a) Show that $\lim_{n\to\infty}\left(n^{1/n}\right) = 1$.

Or

(b) Let $(a_n) = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \ldots + \frac{1}{n!}$ show that $\lim_{n\to\infty} a_n$ exists and lies between 2 and 3.

13. (a) Prove that every sequence (a_n) has a monotonic subsequence.

Or

(b) Prove that any convergent sequence is a Cauchy sequence.

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

Or

(b) State and prove D'Alembert's ratio test.

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

Or

(b) Prove that the sum of absolutely convergent series is unaltered by any rearrangement of terms.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Show that :

(a) $\lim_{n \to \infty} \frac{\sin n}{n} = 0$

(b) $\lim_{n \to \infty} \frac{n}{\sqrt{n^2 + 1}} = 1$

(c) $\lim_{n \to \infty} \frac{n^2 + n + 1}{n^3 + 2}$.

17. State and prove Cesaro's theorem.

18. Prove that the series $\sum \frac{1}{n^p}$ converges if $p > 1$ and diverges if $p \leq 1$.

19. State and prove Cauchy's condensation test.

20. State and prove Leibnitz's test.

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D–1794

Sub. Code
31A/13731

DISTANCE EDUCATION

Common for B.A./B.Sc./B.C.A. DEGREE EXAMINATION, DECEMBER 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 விடையளிக்கவும்.

1. முல்லைப்பாட்டின் ஆசிரியர் யார்?

2. நாழிகைக் கணக்கரின் பணி யாது?

3. ஐங்குறு நூற்றில் கபிலர் சுட்டும் மரங்களின் பெயர்களை எழுதுக.

4. நற்றிணைப் பாடல்களைத் தொகுப்பித்த அரசன் யார்?

5. சோம்பலோடு இருப்பவர்க்கு எவை கிட்டாதெனக் கருவூர்க் கோசிகனார் கூறுகிறார்?

6. ஆனந்தப் பையுள் துறையை விளக்குக.

7. பாடாண் திணை - குறிப்பு வரைக.

8. திருக்குறளுக்கு வழங்கப்பெறும் வேறு பெயர்கள் யாவை?

9. விமலாதித்தன் யார்?

10. புதினம் - விளக்கம் தருக.

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

பின்வரும் வினாக்களுக்கு ஒருபக்க அளவில் விடை தருக.

11. (அ) தலைவனின் பாசறை அமைப்பினை விளக்குக.

(அல்லது)

(ஆ) தலைமகன் தன் நெஞ்சிற்குக் கூறுவதாக அமைந்த பரணர் பாடற் கருத்துக்களை விளக்குக.

12. (அ) அகநானூற்றுப் பாலைநில வருணனையைச் சேந்தம் பூதனார் பாடல் வழி விளக்குக.

(அல்லது)

(ஆ) சோழன் குளமுற்றுத்துத் துஞ்சிய கிள்ளிவளவனின் சிறப்புகளாக மாறோக்கத்து நப்பசலையார் கூறுவனவற்றை எடுத்துரைக்க.

13. (அ) மலையமான் திருமுடிக்காரியின் வள்ளல் தன்மையைச் சுட்டுக.

(அல்லது)

(ஆ) புறநானூறு காட்டும் கையறு நிலைப் பாடலை நும் பாடப்பகுதி கொண்டு விளக்குக.

14. (அ) அறிவுடைமை குறித்துத் திருவள்ளுவர் கூறுவன யாவை?

(அல்லது)

(ஆ) நான்மணிக்கடிகை சுட்டும் வாழ்க்கை நெறிகளை எழுதுக.

15. (அ) இராசராச சோழன் நாடகத்தில் இடம்பெறும் நாடக உத்திகளை விளக்கி வரைக.

(அல்லது)

(ஆ) சுவடுகள் நாவலில் பார்வதியின் பாத்திரப் படைப்பை ஆராய்க.

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

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. முல்லைபாட்டு வெளிப்படுத்தும் தலைவியின் கற்புநிலை மேன்மையைக் கட்டுரையாக்கம் செய்க.

17. நற்றிணை வெளிப்படுத்தும் இயற்கை வருணனைகளைத் தொகுத்துரைக்க.

18. திருக்குறள் வெளிப்படுத்தும் அறக்கோட்பாடுகளை நும் பாடப்பகுதி கொண்டு விளக்கி வரைக.

19. இராசராசசோழன் நாடகத்தின் கதைக் கோப்புச் சிறப்பைக் கட்டுரை வடிவில் எழுதுக.

20. சுவடுகள் நாவலில் பாத்திரப்படைப்பு உருவாக்கத்தினை ஆராய்ந்து கட்டுரை எழுதுக.

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D–1795

Sub. Code
31B

DISTANCE EDUCATION

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

Third Semester

Part-I — HUMAN SKILLS DEVELOPMENT – I

(CBCS 2018-19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Define Interpersonal Relationship.

2. Define Attitude.

3. What is meant by 'Counselling'?

4. What is Dais Etiquette?

5. Write briefly on self esteem.

6. Give the meaning of 'Leadership'.

7. What is called as positive attitude?

8. Write briefly on goal setting.

9. Give the meaning of 'Anger'.

10. What is 'Stress'?

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Write a note on Interpersonal Behaviour.

Or

(b) Write on the significance of thinking ahead.

12. (a) Discuss the effects of 'Conflicts'.

Or

(b) Comment on the different terms of 'Counselling'.

13. (a) Bring out the etiquettes in using mobile phones.

Or

(b) Write a short note on the types of Habits.

14. (a) Discuss the advantages of Negotiations.

Or

(b) Discuss the importance of Goal Setting.

15. (a) Discuss the canons of good human relations.

Or

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

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Discuss in details the merits of good habits.

17. Explain the characteristics and importance of 'Change'.

18. Discuss the significance of Self-esteem.

19. Explain the factors that influence personality.

20. Write elaborately on the Management of conflicts.

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D–1796

Sub. Code
32/13732

DISTANCE EDUCATION

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

Third Semester

PART II — ENGLISH — PAPER III

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

Time : Three hours Maximum : 75 marks

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

Answer ALL questions.

1. Who is Ratan? [in 'The Postmaster']

2. Where is the story, 'The Postmaster' set?

3. How did Verger lose his job?

4. Why is Mathilde envious of Madame Forestier?

5. What is the setting of the play, 'The Proposal'?

6. Why does Philip refuse to join the jam business in Uncle James' dream?

7. Why was Pierre pinched? How did he defend himself before judge Gaston?

8. Why could Swami not keep a light burning?

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

(a) We all love ———— (honest)

(b) The element has great ———— (strong)

10. What is an Adjective?

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) How does Guy de Maupassant treat the danger of martyrdom in 'The Diamond Necklace'?

Or

(b) What was Albert Foreman's reply to the questions of the bank manager? What does his answer reflect?

12. (a) How do Lomov and Natalya argue over the ownership of Oxen Meadows?

Or

(b) How does the play, 'The Boy Comes Home' analyse the problems of the generation gap?

13. (a) Why do the vagabonds go back to the bakery after eating the pie in 'The Pie and the Tart'?

Or

(b) Describe the rapport between Ratan and the Postmaster.

14. (a) How has Swami become a hero?

Or

(b) Analyse the play, 'The Silver Idol'.

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

(i) I know a funny little man.

(ii) He is a man of few words.

(iii) I have told you this many times before.

(iv) How many marks did you got?

(v) An empty vessel makes much noise.

Or

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

(i) The thieves (robbed, stole, won) all property from the house.

(ii) Columbs (discovered, invented, explored) America.

(iii) The moon (raised, rose, awoke) early.

(iv) Cocks (sing, caw, crow) in the morning.

(v) They (hanged, hung, swung) the pictured on the wall.

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

Answer any THREE questions.

16. Describe how Albert Foreman prospered in his business as a tobacconist and newsagent.

17. What are the similarities and differences between Jean and Pierre? Explain.

18. Sketch the character of Lomov in 'The Proposal'.

19. Describe the place where you have gone recently on picnic.

20. Fill in the blanks with Adverbs chosen from the list given :

Angrily, badly, brutally, silently, seldom, patiently, loudly, soon, tunefully, noisily

(a) The child has been ———— treated.

(b) The choir sang ————.

(c) The burglar crept ————.

(d) The minister listened ———— to the complaints of the villagers.

(e) The children played ———— in the house.

(f) She ———— comes here now,

(g) I hope you will ———— be well.

(h) I was ready when John called ———— for me to come.

(i) He did ———— in the examination.

(j) The bull charged ————.

———————————

D–1885

Sub. Code
11333

DISTANCE EDUCATION

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

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 questions.

1. Define order of a differential equation.

2. Solve $\frac{dy}{dx}+\left(\frac{1-y^2}{1-x^2}\right)^{1/2}=0$.

3. Solve $\left(D^2-5D+4\right)y=0$.

4. Find the particular integral of $\left(D^2+5D+6\right)y=e^x$.

5. Solve $\left(D^2-3\right)x-4y=0$; $\left(D^2+1\right)y+x=0$.

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

7. Eliminate the arbitrary function f from $z=e^y f(x+y)$.

8. Solve : $pq = k$.

9. Find the complete integral of $z = px + qy + 2\sqrt{pq}$.

10. Solve : $q = xp$.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Solve : $\left(y - 3x^2\right)dx - x\left(1 - xy^2\right)dy = 0$.

Or

(b) Solve : $\left(D^2 - 8D + 9\right)y = 8 \sin 5x$.

12. (a) Solve $\frac{dx}{z(x+y)} = \frac{dy}{z(x-y)} = \frac{dz}{x^2 + y^2}$.

Or

(b) Solve : $y\left(xy + 2x^2y^2\right)dx + x\left(xy - x^2y^2\right)dy = 0$.

13. (a) Solve $p^2 + \left(x + y - \frac{2y}{x}\right)p + xy + \frac{y^2}{x^2} - y - \frac{y^2}{x} = 0$.

Or

(b) Solve : $\left(D^2 - 4\right)y = \sin^2 x$.

14. (a) Eliminate h and k from $(x-h)^2 + (y-k)^2 + z^2 = \gamma^2$.

Or

(b) Find the integral surface of $x^2p + y^2q + z^2 = 0$ which passes through the hyperbola $xy = x + y; z = 1$.

15. (a) Solve : $q(p - \sin x) = \cos y$.

Or

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

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Solve :

(a) $y = px + \frac{a}{p}$.

(b) $\left(1 - y^2 + \frac{y^4}{x^2}\right)p^2 - \frac{2y}{x}p + \frac{y^2}{x^2} = 0$.

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

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

19. Solve : $px(y^2 + z) - qy(x^2 + z) = z(x^2 - y^2)$.

20. Solve : $p^2 + q^2 - 2px - 2qy + 1 = 0$.

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D–1886

Sub. Code
11334

DISTANCE EDUCATION

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

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. Prove that the resultant of two equal forces P, P at an angle α is 2P $\cos\frac{\alpha}{2}$ in a direction bisecting the angle between them.

2. State Lami's theorem.

3. Define like and unlike parallel forces.

4. Write down the condition of equilibrium.

5. Define a couple with an example.

6. Define angle of friction.

7. Define a common catenary.

8. Define Projectile and its trajectory.

9. Give an example for Impulsive force.

10. What is meant by central force?

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) The resultant of two forces P and Q is at right angles to P. Show that the angle between the forces is $\cos^{-1}(-P/Q)$.

Or

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

12. (a) Show that a system of coplanar forces acting on a rigid body can be reduced to a single force acting at an arbitrary point in their plane together with a couple whose moment is equal to the algebraic sum of the moments of the forces about the point.

Or

(b) Explain the reduction of any number of coplanar forces.

13. (a) Discuss the equilibrium of a body on a rough inclined plane under a force parallel to the plane.

Or

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

14. (a) Show that $x = c\log(\sec\psi + \tan\psi)$.

Or

(b) If h and h' be the greatest heights in the two paths of a projectile with a given velocity for a given range R, then prove that $R = 4\sqrt{hh'}$.

15. (a) Discuss the direct impact of a smooth sphere on a fixed smooth plane.

Or

(b) Explain the two-fold problems in central orbits.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. State and prove the parallelogram law of forces.

17. State and prove Varigan's theorem on moments.

18. A uniform ladder is in limiting equilibrium with one end resting on a rough horizontal plane and the other against a rough vertical wall, the angle of friction being λ and λ' respectively. Show that the inclination θ of the ladder to the horizon is given by $\tan\theta = \frac{\cos(\lambda + \lambda')}{2\sin\lambda\cos\lambda}$.

19. Find the loss of KE due to direct impact of two smooth spheres.

20. Derive the general solution of the Simple Harmonic motion.

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D–1797

Sub. Code
41A/13741

DISTANCE EDUCATION

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

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 விடையளிக்கவும்.

1. வெண்பாவில் பயின்று வரும் தளைகள் யாவை?

2. கண்ணி வகைப் பாடல்கள் எவ்வாறு அமைந்திருக்கும்?

3. அறத்தொடு நிற்றல் என்றால் என்ன?

4. அன்பின் ஐந்திணைகளைக் குறிப்பிடுக.

5. அணி இலக்கணம் பேசும் நூலினைக் குறிப்பிடுக.

6. சிலேடை அணி எத்தனை வகைப்படும்? அவை யாவை?

7. தொல்காப்பியத்திற்குப் பாயிரம் எழுதியவர் யார்?

8. பத்துப்பாட்டு நூல்களைக் குறிப்பிடுக.

9. பாண்டியன் பரிசு நூலின் கதைத் தலைவி யார்?

10. இயேசு காவியம் எத்தனை பாகங்களைக் கொண்டது?

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

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) ஆசிரியப்பாவின் பொது இலக்கணம் கூறி அதன் வகைகளைச் சுட்டுக.

(அல்லது)

(ஆ) சிந்துப் பாடலின் இலக்கணம் கூறி அதன் வகைகளை விளக்குக.

12. (அ) ஐந்திணைகளின் கருப்பொருள் குறித்து எழுதுக.

(அல்லது)

(ஆ) அறத்தொடு நிற்றல் நிலையில் தோழியின் பங்கு பற்றி எழுதுக.

13. (அ) உருவக அணியினைச் சான்றுடன் விளக்குக.

(அல்லது)

(ஆ) நிறுத்தற் குறியினைப் பயன்படுத்தும் முறைகள் பற்றி எழுதுக.

14. (அ) வீரயுகப் பாடல்கள் குறித்து எழுதுக.

(அல்லது)

(ஆ) குறுந்தொகைப் பாடல்களின் காதற்சிறப்பினை விளக்குக.

15. (அ) பாஞ்சாலி சபதத்தின் தனித்தன்மையை விளக்குக.

(அல்லது)

(ஆ) பாண்டியன் பரிசு காவியத்தில் வரும் சமூகச் சிந்தனைகளை நிரல்படுத்துக.

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

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. கலிப்பாவின் பொது இலக்கணம் கூறி வகைகளை விரிவாக எழுதுக.

17. புதுக்கவிதையின் வளர்ச்சிக்குக் குறியீடு எவ்வாறு துணை நிற்கிறது?

18. புறப்பொருள் துறைகளில் கையறுநிலை பெறும் இடத்தினை ஆராய்க.

19. இரட்டைக் காப்பியங்களில் காணலாகும் அறச்சிந்தனைகளை நிரல்படுத்துக.

20. இயேசு காவியத்தின் வழி இறைவனின் அருட்செயலை விளக்குக.

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D–1798	Sub. Code
	41B

DISTANCE EDUCATION

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

Fourth Semester

Part I — HUMAN SKILLS DEVELOPMENT – II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL questions.

1. What is called communication?

2. What is the goal of a presentation?

3. Will the thinking skill support one to achieve one's target?

4. Write any two styles that have been followed by leaders.

5. What are Hard Skills?

6. Write any two forms of Technical Communication.

7. Write any one features of group discussion.

8. Define Motivation.

9. Give any two characteristics that are attributed to a good leader.

10. Suggest anyone way to arrest stress.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Describe effective communication.

Or

(b) How do you plan for good presentation of a speech?

12. (a) Write a note on Paternalistic style of leadership.

Or

(b) Discuss the need for leadership skill.

13. (a) Give the necessity for having Conceptual Skills.

Or

(b) Discuss the need for Managerial Skills.

14. (a) Discuss some of the procedures to apply Technical Skills.

Or

(b) Bring out some of the causes for Multi-tasking.

15. (a) Give some time management tips to increase the productivity.

Or

(b) Discuss some types of stress normally we meet.

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

Answer any THREE questions.

16. Explain the techniques of counselling.

17. What are the eight easy steps for an effective speech?

18. Does personality development skill play an important role in bringing out one's career achievement?

19. Explain in detail the requirements of understanding skills at societal level.

20. Explain the importance of Organisation Skills.

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D–1799

Sub. Code
42/13742

DISTANCE EDUCATION

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

Fourth Semester

PART II — ENGLISH – PAPER IV

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

Time : Three hours Maximum : 75 marks

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

Answer ALL questions.

1. Who is the author of 'Boy who wanted more Cheese'?

2. Who was Lalajee?

3. Write the confusion with which the boy was worrying in 'A Day's Wait'.

4. What have Pickering and Higgins written respectively?

5. Why did Swamy run away from home?

6. After his father threatens to disinherit him if he marries Perdita, what did Florizel do?

7. How does Shylock initially describe his demand for a pound of flesh to Bassanio and Antonio?

8. Why is Romeo exiled?

9. Add Tag Questions :

(a) None of us knew the answer, ————

(b) Use your eyes, ————.

10. Correct the following sentences :

(a) There is atleast fifty persons waiting outside.

(b) Either my sister or my brothers is coming.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Analyse the story 'A Day's Wait'.

Or

(b) Write a short summary of 'Boy who wanted more Cheese'.

12. (a) Write the advice given by Jim Corbett to Lalajee after Lalajee has recovered.

Or

(b) How did the father clear the confusion of his son in 'A Day's Wait'?

13. (a) It has been said that *Pygmalion* is not a play about turning a flower girl into a duchess, but one about turning a woman into a human being. Do you agree?

Or

(b) How does the structure of the narrative inform the sense of time in Swami's world in *Swamy and Friends*?

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

Or

(b) Discuss the resurrection scene in *The Winter's Tale*. Is the apparent miracle real?

15. (a) Discuss the impact caused by Martin Luther King's assassination.

Or

(b) Expand the proverb – 'All that glitters is not Gold'.

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

Answer any THREE questions.

16. What is the message conveyed through the story, 'Little Girls wiser than Man'?

17. Describe the primary ways in which Eliza Doolittle changes in the course of the play, *Pygmalion*.

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

19. Discuss Portia's character. How is she compared to the men around her? Is Bassanio a worthy husband too her?

20. Give the details on the Do's and Don'ts of Group Discussion.

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D–1887	Sub. Code
	11343

DISTANCE EDUCATION

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

Fourth Semester

ANALYSIS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Define subspace of a metric space. Give an example.

2. In $\mathbb{R}$ with usual metric, prove that $[0, 1)$ is not open.

3. Prove that Q is countable.

4. Define second category. Give an example.

5. Define a connected set. Give an example.

6. Prove that the composition of two continuous function is continuous.

7. State Daurboux theorem.

8. Define disconnected metric space.

9. Define a sequentially compact metric space.

10. Prove that $[0, \infty)$ with usual metric is not compact.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Show that $\mathbf{N} \times N$ is countable.

Or

(b) If x, y are equal numbers, prove that $|x - y| \geq \big||x| - |y|\big|$.

12. (a) Prove that ¢ with usual metric is complete.

Or

(b) Show that a subset A of a complete metric space M is complete if and only if A is closed.

13. (a) Let (M_1, d_1) and (M_2, d_2) be two metric spaces. Let $a \in M_1$ prove that $f : M_1 \to M_2$ is continuous at a if and only if $(x_n) \to a \Rightarrow (f(x_n)) \to f(a)$.

Or

(b) Prove that the metric spaces $(0, 1)$ and $(0, \infty)$ with usual metrics are homeomorphic.

14. (a) State and prove intermediate value theorem.

Or

(b) If A and B are connected subsets of a metric spaces M and if $A \cap B \neq \varphi$, then prove that $A \cup B$ is connected.

15. (a) Show that a non-empty subset of a totally bounded set is totally bounded.

Or

(b) Prove that any compact subset A of a metric space (M, d) is closed.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. State and prove Holder's inequality.

17. State and prove Baire's Category theorem.

18. Let (M_1, d_1) and (M_2, d_2) be two metric spaces. Prove that $f : M_1 \to M_2$ is continuous if and only if $f(\overline{A}) \subset \overline{f(A)}$ for all $A \subseteq M_1$.

19. Prove that $\mathbb{R}$ is connected.

20. State and prove Heine – Borel theorem.

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D–1888

Sub. Code
11344

DISTANCE EDUCATION

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

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. Find the median of the height in c.m. of eight students given by 66, 65, 64, 70, 61, 60, 67, 62.

2. Define Harmonic mean.

3. Write down the formula for Bowely's coefficient of skewness.

4. Write down the normal equations of second degree parabola.

5. Write down the formula for Karl Pearson's coefficient of correlation.

6. Define line of regression.

7. Write down the Newton forward different formula.

8. What are the components of time series?

9. What is mean by class frequency?

10. Write the Fishers index number formula.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Calculate the standard deviation from the following data :

14, 22, 9, 15, 20, 17, 12, 11.

Or

(b) Find the G.M. and H.M. of the following distribution :

x :	1	2	3	4	5
f :	2	4	3	2	1

12. (a) Find the coefficient of correlation between x and y from the following data :

x :	10	14	15	28	35	48
y :	74	61	50	54	43	26

Or

(b) Out of the two lines of regression given by $x + 2y - 5 = 0$ and $2x + 3y - 8 = 0$ which one is the regression line of x on y?

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

x :	0	1	2	3	4
y :	12	15	17	22	24

Or

(b) Estimate the missing term of the following :

x :	0	1	2	3	4
y :	1	3	9	–	81

14. (a) Find whether the following data are consistent

$N = 600, (A) = 300, (B) = 400, (AB) = 50$.

Or

(b) If $U_{75} = 246, U_{80} = 202, U_{85} = 118$ and $U_{90} = 40$, find U_{79}.

15. (a) (i) Using three year moving averages determine the trend.

(ii) Also determine the short term fluctuations.

Year :	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Production :	21	22	23	25	24	22	25	26	27	26

Or

(b) From the following data, construct the simple aggregative index number for 1992.

Commodities	Price in 1991 Rs.	Price in 1992 Rs.
Rice	7	8
Wheat	3.5	3.75

Commodities	Price in 1991 Rs.	Price in 1992 Rs.
Oil	40	45
Gas	78	85
Flour	4.5	5.25

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Calculate the first four central moments from the following data to find β_1 and β_2 and discuss the name of the distribution :

X:	0	1	2	3	4	5	6
f:	5	15	17	25	19	14	5

17. Calculate the mode from the following series :

Class interval	Frequency
0-5	20
5-10	24
10-15	32
15-20	28
20-25	20
25-30	16

Class interval	Frequency
30-35	34
35-40	10
40-45	8

18. 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

19. Ten competitors in a beauty contest are ranked by three judges in the following order :

First Judge :	1	4	6	3	2	9	7	8	10	5
Second Judge :	2	6	5	4	7	10	9	3	8	1
Third Judge :	3	7	4	5	10	8	9	2	6	1

Use the method of rank correlation coefficient to determine which pair of judges have the nearest approach to common taste in beauty?

20. Find the cost of living index number for 1992 on the base of 1991 on the basis from the following data using :

(a) Family budget method

(b) Aggregate expenditure method.

Commodity	Price in Rs.		Quantity in Quintals in 1991
	1991	1992	
Rice	7	7.5	6
Wheat	6	6.75	3.5
Flour	5	5	0.5
Oil	30	32	3
Sugar	8	8.5	1

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D–1889	Sub. Code
	11351

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION,
DECEMBER 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 Empty set. Give an example.

2. Find the equivalence relation induced by the partition $\{\{1\}, \{2,3\}, \{4\}\}$ of $S = \{1, 2, 3, 4\}$.

3. Show that in a group, $x^2 = x \Leftrightarrow x = e$.

4. Define a cyclic group. Give an example.

5. State Fermat's theorem.

6. Let $f: G \to G'$ be a homomorphism. Prove that $f(a^{-1}) = [f(a)]^{-1}$.

7. Define a commutative ring.

8. Define a prime ideal.

9. Define a vector space over a field F.

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

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Prove that $A-(B\cap C)=(A-B)\cup(A-C)$, for any three sets A, B, C.

Or

(b) If $f: A \to B$ and $g: B \to C$ are bijections, then prove that $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$.

12. (a) Prove that the intersection of two subgroups of a group G is also a subgroup of G.

Or

(b) Prove that $a^m \cdot a^n = a^{m+n}$ for all $m, n \in \mathbf{Z}$.

13. (a) State and prove Euler's theorem.

Or

(b) State and prove fundamental theorem of ring homomorphism.

14. (a) Prove that the polynomial $f(x)=x^2+8x-2$ is irreducible over Q.

Or

(b) Prove that the characteristic of a integral domain D is either 0 or a prime number.

15. (a) Prove that $\dim V = \text{rank } T + \text{nullity } T$ if $T : V \to W$ be a linear transformation.

Or

(b) Prove that any subset of a linearly independent set is linearly independent.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. For any three sets A, B and C, prove that $(A - B) \times C = (A \times C) - (B \times C)$.

17. State and prove Lagrange's theorem.

18. Prove that z_n is an integral domain if and only if n is a prime.

19. Let p be a prime. Prove that $(z_p, \oplus, \odot)$ is a field.

20. Prove that every finite dimensional inner product space has an orthonormal basis.

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D–1890

Sub. Code
11352

DISTANCE EDUCATION

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

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. What is the scope of O.R.?

2. What is the role of slack variable?

3. What do you mean by primal – dual problem?

4. Define integer programming problem.

5. What is meant by unbalanced transportation problem?

6. Write down the difference between the transportation problem and the assignment problem.

7. What is sequencing problem?

8. What is meant by two person zero sum game?

9. What is the value of the game whose pay off matrix is $\begin{pmatrix} 3 & 1 \\ 1 & 3 \end{pmatrix}$?

10. What is meant by "no passing rule" in a sequencing problem?

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Explain the general methods of solving O.R. models.

Or

(b) Express the following LPP in the canonical form

Maximize $Z = 2x_1 + 3x_2 + x_3$

Subject to the constraints

$$4x_1 - 3x_2 + x_3 \leq 6$$
$$x_1 + 5x_2 - 7x_3 \geq -4$$
$$x_1, x_3 \geq 0$$

x_2 is unrestricted.

12. (a) Construct the dual of the LPP :

Minimize $Z = 4x_1 + 6x_2 + 18\ x_3$

Subject to the constraints

$x_1 + 3x_2 \geq 3$
$x_2 + 2x_3 \geq 5$
$x_1, x_2, x_3 \geq 0.$

Or

(b) Describe Gomary's method of solving an all integer programming problem.

13. (a) Explain Vogel's approximation method.

Or

(b) Solve the following transportation problem :

8	7	3	60
3	8	9	70
11	3	5	80
50	80	80	

14. (a) Explain Hungarian method algorithm.

Or

(b) Find the sequence of jobs that minimizes the total elapsed time to complete the following jobs on two machines.

Job :	1	2	3	4	5	6
Machine A :	3	12	5	2	9	11
Machine B :	8	10	9	6	3	1

15. (a) Explain the following terms :

(i) Pay off matrix

(ii) Dominance property.

Or

(b) Distinguish between PERT and CPM.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Use Big-M method to solve

Minimize $Z = 4x_1 + 3x_2$

Subject to

$$\begin{aligned} 2x_1 + x_2 &\geq 10 \\ -3x_1 + 2x_2 &\leq 6 \\ x_1 + x_2 &\geq 6 \end{aligned}$$

and $x_1, x_2 \geq 0$.

17. Use duality to solve the following LPP :

Maximize $Z = 2x_1 + 2x_2$

Subject to

$$\begin{aligned} 2x_1 + 4x_2 &\geq 1 \\ -x_1 - 2x_2 &\leq -1 \\ 2x_1 + x_2 &\geq 1 \end{aligned}$$

and $x_1, x_2, x_3 \geq 0$.

18. Solve the following transportation problem to minimize the total cost of transportation :

		Destination				
		1	2	3	4	Supply
Origin	1	14	56	48	27	70
	2	82	35	21	81	47
	3	99	31	71	63	93
Demand		70	35	45	60	210

19. A batch of 4 jobs can be assigned to 5 different machines. The set up time (in hours) for each job on various machines is given below :

Machines

Job	1	2	3	4	5
1	10	11	4	2	8
2	7	11	10	14	12
3	5	6	9	12	14
4	13	15	11	10	7

Solve the assignment problem.

20. Solve the following 2×4 game graphically :

$$\begin{array}{c} \\ \text{Player A} \end{array} \begin{array}{c} \text{Player B} \\ \begin{pmatrix} 1 & 0 & 4 & -1 \\ -1 & 1 & -2 & 5 \end{pmatrix} \end{array}$$

D–1891

Sub. Code
11353

DISTANCE EDUCATION

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

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 questions.

1. State the Newton-Raphson formula for iteration.

2. Evaluate $\Delta\left(\tan^{-1} x\right)$.

3. Show that $\delta = E^{1/2} - E^{-1/2}$.

4. Write the Newton's forward difference interpolation formula.

5. Write the Hermite's formula.

6. Solve $y_{x+2} - 3y_{x+1} + 2y_x = 0$.

7. What is the error in Simpson's rule?

8. Solve $\left(E^2 + E + 1\right)y_n = 0$.

9. State Taylor's theorem.

10. Give the formula for Adam's predictor – corrector method.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Solve by iteration method : $x^3 - x - 4 = 0$.

Or

(b) Find the approximate root of $x e^x - 3 = 0$ by Newton's-Raphson method.

12. (a) Solve :

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

By Jocobi's method.

Or

(b) Prove that :

(i) $\frac{1}{2}\delta^2 + \delta\sqrt{\frac{1+\delta^2}{4}} = \Delta$.

(ii) If $u_0 = 1, u_1 = 5, u_2 = 8, u_3 = 3, u_4 = 7, u_5 = 0$, find $\Delta^5 u_0$.

13. (a) Find the divided difference of y from the following table :

x :	1	2	7	8
y :	1	5	5	4

Or

(b) Apply Stirling's formula to find $y(25)$ for the following data :

x :	20	24	28	32
y :	2854	3162	3544	3992

14. (a) Evaluate $\int_0^1 \frac{dx}{1+x}$ using Simpson's $\frac{3}{8}$ rule.

Or

(b) Derive the Newton's – Cote's formula for numerical integration.

15. (a) Solve $y_{n+2} - 3y_{n+1} + 2y_n = 5^n + 2^n$.

Or

(b) Write the properties of R-K method.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Find the smallest positive root of $x^2 - \log_e x - 12 = 0$ by Regula Falsi method.

17. By using Gauss-Seidal iteration method solve :

$8x - y + z = 18$

$2x + 5y - 2z = 3$

$x + y - 3z = -6$.

18. Using Everett's formula find $f(1.15)$ given that $f(1) = 1$, $f(1.1) = 1.049$, $f(1.2) = 1.096$ and $f(1.3) = 1.14$.

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

(a) Trapezoidal rule,

(b) Simpson's rule.

20. Using Adam's Predictor-corrector method find $y(1.4)$ if y satisfies $\frac{dy}{dx} = \frac{1-xy}{x^2}$ and

$y(1) = 1,\ y(1.1) = 0.996,\ y(1.2) = 0.986,\ y(1.3) = 0.972$.

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D–1892	Sub. Code
	11354

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION,
DECEMBER 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. Show that $L[1] = 1/s$.

2. Show that $L[\sin bt] = \dfrac{b}{s^2 + b^2}$.

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

4. Define odd and even function.

5. Write the formula for 'a_n' in the Fourier series expansion of $f(x)$ in $(0, 2\pi)$.

6. Find a_0 if $f(x) = x^2, -\pi \le x \le \pi$.

7. Define Fourier sine transform.

8. Show that $F_c[f'(x)] = -\sqrt{2/\pi}\, f(0) + s\, F_s(s)$.

9. Show that $z\left[(-1)^n\right] = \dfrac{z}{z+1}$.

10. Find $z^{-1}\left[\dfrac{1}{(z-a)^2}\right]$.

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

(b) Find $L[\sin h\ at \sin at]$.

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

Or

(b) Find $L^{-1}\left[\dfrac{3s^2-4s+1}{s^4} + \dfrac{1}{s^{7/2}}\right]$.

13. (a) Obtain the Fourier series to represent the function $f(x) = x$ in $(-\pi, \pi)$.

Or

(b) Find the half range cosine series for $f(x) = \sin x$ in $0 < x < \pi$.

14. (a) Find the Fourier sine transform of $\frac{x}{x^2+a^2}$.

Or

(b) State and prove Parseval's identify in Fourier transform.

15. (a) If $Z\{f(n)\}=\bar{f}(z)$, then prove that $z\{f(-n)\}=\bar{f}(\frac{1}{z})$.

Or

(b) Find $Z\{n^2\}$.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Let $f(t)$ be a piecewise, continuous periodic function with period p. Prove that $L[f(t)]=\frac{1}{1-e^{-ps}}\int_0^p e^{-st}f(t)dt$.

17. Solve $\frac{d^2y}{dt^2}+2\frac{dy}{dt}+5y=4e^{-t}$, using Laplace transform, given $y=\frac{dy}{dt}=0$ when $t=0$.

18. Find the Fourier series for the function $f(x)=x^2$ in $0\le x\le 2\pi$.

19. Find the Fourier transform of $f(x)=\begin{cases}\cos x, & if\ |x|<\pi/2\\ 0, & if\ |x|>\pi/2\end{cases}$.

20. Solve $y_{k+2}-4y_{k+1}+4y_k=0$ where $y(0)=y(1)=0$.

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D–1893

Sub. Code
11361

DISTANCE EDUCATION

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

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 questions.

1. Find the truth value of $p \wedge \neg p$.

2. Write the dual of $(P \wedge Q) \vee R$ and $(P \vee Q) \wedge F$.

3. Prove the implication $P \Rightarrow (Q \to P)$.

4. Prove that $P \to (Q \to P) \Leftrightarrow \neg P \to (P \to Q)$.

5. Define lattice. Give an example.

6. Define Boolean algebra.

7. State and dual of $a \wedge (b \vee c) = (a \wedge b) \vee (a \wedge c)$ and $a \vee \overline{a} = 1$.

8. Define Euler graph.

9. Define Chromatic number of a graph.

10. Define spanning tree of a graph.

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

(b) Show that P is equivalent to $\neg(\neg P)$, $P \wedge P$, $P \vee P$, $P \wedge (P \vee Q)$, $(P \wedge Q) \vee (P \wedge \neg Q)$.

12. (a) Show that $\neg(P \wedge \neg Q) \wedge \neg Q \vee R \wedge \neg R$ imply $\neg P$.

Or

(b) Obtain the principal conjunction normal form for $(\neg P \to R) \wedge (Q \rightleftarrows P)$.

13. (a) Prove that $(\exists x)(P(x) \wedge Q(x)) \Rightarrow (\exists x)P(x) \wedge (\exists x)Q(x)$.

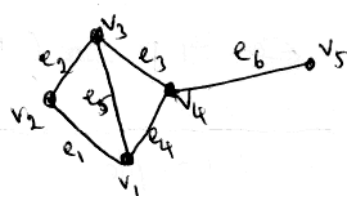
Or

(b) Prove that every chain is a lattice.

14. (a) Prove that the number of vertices of odd degree in a graph is always even.

Or

(b) Construct the adjacency matrix of the following graph :



15. (a) Prove that a graph G is a tree if and only if it is minimally connected.

Or

(b) If G is a tree with n vertices then prove that G has $n-1$ edges.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Show that $(x)(P(x) \vee Q(x)) \Rightarrow (x)P(x) \vee (\exists x)Q(x)$.

17. Show that $R \rightarrow \neg Q$, $R \vee S$, $S \rightarrow \neg Q, P \rightarrow Q$ implies $\neg P$.

18. (a) Let $e: B^m \rightarrow B^n$ be a group code. Prove that the minimum distance of e is the minimum weight of a non-zero code word.

(b) Explain decoding and error correction functions with example.

19. Prove that every connected graph G is an Euler graph if and only if all vertices and of even degree.

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

(b) Prove that any graph G with n vertices, $n-1$ edges and no circuit is connected.

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D–1894	Sub. Code
	11362

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION,
DECEMBER 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 questions.

1. What is meant by height of a fuzzy set? Give an example.

2. Define normal and subnormal fuzzy set.

3. Define support of fuzzy set. Give an example.

4. Define fuzzy union.

5. State laws of absorption.

6. When will a point 'a' is dual point?

7. What is meant by fuzzy upper bound?

8. Define a fuzzy number. Give an example.

9. State Cauchy's functional equation.

10. Explain Semantic.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Prove that every fuzzy complement has at most one equilibrium.

Or

(b) Write any five properties of fuzzy intersection with suitable examples.

12. (a) Explain a fuzzy union / t-concern.

Or

(b) If $A \subseteq E$ and $B \subseteq F$, then prove that $A \cdot B \subseteq E \cdot F$ and $A/B \subseteq E/F$.

13. (a) Show that for every fuzzy partial ordering on X, the sets of undominated and undominating elements of X are non-empty.

Or

(b) If $R = \begin{bmatrix} .7 & .5 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & .4 & 0 & 0 \\ 0 & 0 & .8 & 0 \end{bmatrix}$, then prove that $R \cup (R \cup R) = R'$.

14. (a) Prove that, given a consonant body of evidence $(\mathcal{F}, m)$ the associated consonant belief and plansibility measures posses the property : $Bel(A \cap B) = \min [Bel(A), Bel(B)]$ for all $A, B \in / p(x)$.

Or

(b) Explain the different types of uncertainty.

15. (a) Consider two joint probability distributions on $X \times Y, (X = \{a, b, c\}, Y = N_5)$ defined by the matrix.

	1	2	3	4	5
a	.1	0	0	.05	0
b	0	.3	.1	0	.2
c	.05	0	0	.1	.1

Calculate $H(X), H(Y), H(X, Y)$.

Or

(b) Explain the principles of uncertainty and information.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. State and prove D'Morgan's laws in fuzzy sets by an example.

17. (a) Let A and B be fuzzy sets defined on a universal set X. Prove that $|A| + |B| = |A \cup B| + |A \cap B|$.

(b) Show that a fuzzy set A on $\mathbb{R}$ is convex if and only if $A(\uparrow x_1 + (1 - \uparrow)x_2) \geq \min[A(x_1), A(x_2)]$ for all $x_1, x_2 \in \mathbb{R}$ and all $\lambda \in [0, 1]$.

18. Let $M_P = \begin{bmatrix} 0.3 & 0.4 & 0.5 \\ 0 & 1 & 0.1 \\ 0.2 & 0.6 & 0.7 \end{bmatrix}$ and $M_Q = \begin{bmatrix} 0.3 & 0.5 & 0.6 & 0.7 \\ 0 & 1 & 0.3 & 0.2 \\ 1 & 0.2 & 0.3 & 0.5 \end{bmatrix}$

(a) Compute $M_{P \circ Q}$

(b) Prove that $(P \circ Q)^{-1} = Q^{-1} \circ P^{-1}$.

19. Prove that every possibility measure π on $p(x)$ can be uniquely determined by a possibility distribution function $\gamma: X \to [0, 1]$ via the formula $\pi(A) = \max_{x \in A} \gamma(x)$ for each $A \in p(x)$.

20. Maximize the function

$$H(p_1, p_2, ..., p_n) = \sum_{i=1}^{n} p_i \, l_n p_i$$

Subject to the constraints $E(x) = \sum_{i=1}^{n} p_i x_i$ and

$p_i \geq 0, \sum_{i=1}^{n} p_i = 1$. Estimate the maximum entropy probabilities.

D–1895	Sub. Code
	11363

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION,
DECEMBER 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 questions.

1. Define Sterigraphic projection.

2. Define harmonic function.

3. Find the invariant points of the transformation $w = \dfrac{1+z}{1-z}$.

4. Prove that the transformation $w = \bar{z}$ is not a bilinear transformation.

5. State the cross ratio of the points (z_1, z_2, z_3, z_4).

6. Evaluate $\int_C \dfrac{dz}{z-a}$ where C is the circle with center a and radius r.

7. Evaluate $\int_C \frac{\cos z}{\left(z - \pi/2\right)^2} dz$; $C : |z| = 2$.

8. Write down the Maclaurin's series expansion of sin *hz*.

9. Define isolated singularity.

10. Find the residue of $f(z) = \cot z$.

PART B — (5 × 5 = 25 marks)

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

11. (a) Prove that $f(z) = e^x(\cos y - i \sin y)$ is nowhere differentiable.

Or

(b) Prove that the functions $f(z)$ and $\overline{f(\bar{z})}$ are simultaneously analytic.

12. (a) Find the analytic function $f(z) = u + iv$ if $v = x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$.

Or

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

13. (a) Prove that any bilinear transformation preserves cross ratio.

Or

(b) Prove that $\left| \int_a^b f(t)\, dt \right| \leq \int_a^b |f(t) dt|$.

14. (a) Evaluate $\int_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)}\, dz$ where C is the circle $|z| = 3$.

Or

(b) State the prove Liouville's theorem.

15. (a) Find the residue of $f(z) = \frac{e^z}{z^2(z^2+9)}$ at its poles.

Or

(b) State and prove Rouche's theorem.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. State and prove Cauchy – Riemann equations in Cartesian co-ordinates.

17. Find the analytic function $f(z) = u + iv$ if $u + v = \frac{\sin 2x}{\cos h\, 2y - \cos 2x}$.

18. Prove that any bilinear transformation which maps the real-axis onto the unit circle $|w| = 1$ can be written in the form $w = e^{i\lambda}\left(\frac{z-\alpha}{z-\overline{\alpha}}\right)$ where λ is real. Further this transformation maps the upper half - plane Im $z \geq 0$ onto the unit circular disc $|w| \leq 1$ if and only if Im $\alpha > 0$.

19. Let $f(z)$ be analytic inside and on a simple closed curve C. Let z_0 be any point inside C. Then prove that $\int_C \frac{f(z)}{z - z_0} dz = 2\pi i \, f(z_0)$.

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

D–1896

Sub. Code
11364

DISTANCE EDUCATION

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

Sixth Semester

COMBINATORICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Define Fibonacci number.

2. Define recurrence relation.

3. Define generating function.

4. Let n be a positive integer. Let $a_k = C(n, k)$ for $k = 0, 1, 2, ..., n$. Find the generating function for the sequence a_0, a_1, a_n.

5. Obtain the recurrence relation for the solution $D(k) = 5.2^k$.

6. Find the homogenous solution of
$F(k) - 7F(k-1) + 10F(k-2) = 6 + 8k$.

7. How many three-letter words can be formed from the letters in the set $\{a, b, y, z\}$.

8. State the inclusion and exclusion principle.

9. Define permutation group.

10. State Polya's theorem.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Prove that the stirling number $s(p, k)$ of the first kind counts the number of arrangements of p objects into k non-empty circular permutations.

Or

(b) Show that the function $f(x) = k$, where k is a constant, is primitive recursive.

12. (a) Show that the set of divisors of a positive integer n is recursive?

Or

(b) Obtain the recurrence relation from $y_k = A2^k + B3^k$.

13. (a) Find the recurrence relation satifying $y_n = (A + Bn)4^n$.

Or

(b) Solve $f_k - 8f_{k-1} + 16f_{k-2} = 0$ where $f_2 = 16$ and $f_3 = 80$.

14. (a) Find the particular solution of the recurrence relation $f_n + f_{n-1} = 3n2^n$.

Or

(b) Find the generating function for the infinite sequence 1, α, α^2, α^3, α^4,..., where α is fixed.

15. (a) Prove that S_n is a finite group of order $\lfloor \underline{n}$ and is non abelian if $n > 2$.

Or

(b) How many different necklaces are there that contain 4 red and 3 blue beads?

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Solve the Fibonacci sequence $\{f_n\}$ define by $f_n = f_{n-1} + f_{n-2}$ for $n \geq 2$ with the initial conditions $f_0 = 1$ and $f_1 = 1$.

17. Using generating function, solve the recurrence relation $y_n = 3y_{n-1} + 2;\ n \geq 1$ with $y_0 = 1$.

18. In a class, if 25 students, 12 have taken Physics, 8 have taken Physics but not Maths. Find the number of students who have taken Physics and Maths and those who have taken Maths but not Physics?

19. For $n \geq 1$, prove that

$$Q_n = n! - \binom{n-1}{1}(n-1)! + \binom{n-1}{2}(n-2)! - \binom{n-1}{3}(n-3)! + \ldots$$

$$\ldots + (-1)^{n-1}\binom{n-1}{n-1}1\,!.$$

20. Let C be a colouring in G. Prove that the number $\left|\{f * e : f \text{ in } G\}\right|$ of different colourings that are equivalent to c equals the number $\frac{|G|}{|G(c)|}$ obtained by dividing the number of permutations in G by the number of permutations in the stabilizers of c. Here G is a permutation groups of X and G, a set of colourings of X such that G acts on G.
