D–4072

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

DISTANCE EDUCATION

Common for B.A./B.Sc./B.B.A./B.B.A. (Banking)/B.C.A./M.B.A (5 Years Integrated) DEGREE EXAMINATION, MAY 2024.

First Semester

Part I : TAMIL Paper – I

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

Time : Three hours Maximum : 75 marks

பகுதி அ — (10 × 2 = 20 மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் விடையளிக்க.

1. கண்ணதாசனின் இயற்பெயரைத் தருக.

2. பட்டுக்கோட்டை கல்யாணசுந்தரம் பிறந்த ஊர் யாது?

3. பாரதியார் பாடிய காவியங்கள் இரண்டினைக் குறிப்பிடுக.

4. பாரதிதாசனின் புனைப்பெயர்களைச் சுட்டுக.

5. கு.பா.ராஜகோபாலன் எக்காரணத்தால் அரசுப் பணியை விட்டார்?

6. இருமுறை சாகித்திய அகாதமி விருது பெற்ற தமிழ்க்கவிஞர்?

7. 'நேயர் விருப்பம்' என்ற கவிதை நூலின் ஆசிரியர்?

8. சிலப்பதிகாரத்தில் அமைந்துள்ள காதைகளின் எண்ணிக்கை?

9. எப்பெயரில் கம்பர் காப்பியம் படைத்தார்?

10. தேம்பாவணி – பொருள் விளக்கம் தருக.

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

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) 'குருவாயூருக்கு வாருங்கள்' எனக் கண்ணதாசன் அழைக்குமாற்றை விளக்குக.

(அல்லது)

(ஆ) பட்டுக்கோட்டை கல்யாணசுந்தரத்தின் இலக்கியப் பணிகளைச் சுட்டியுரைக்க.

12. (அ) கண்ணனின் விளையாட்டுகளைப் பாரதியார் எங்ஙனம் பாடுகிறார்?

(அல்லது)

(ஆ) பெ. தூரன் 'தளிர்க்கீற்று' என்று எதனைக் குறிப்பிடுகிறார்?

13. (அ) வல்லிக்கண்ணனின் வாழ்க்கைக் குறிப்பைச் சுருக்கி வரைக.

(அல்லது)

(ஆ) மீராவின் தனித்துவத்தை 'பதினைந்து' என்ற கவிதையின் வழிக் கூறுக.

14. (அ) சர்ப்பயாகம் கவிதையில் பேசப்படும் பாம்புகளின் பெயர்களை எழுதுக.

(அல்லது)

(ஆ) தலைவி கண்ணுக்கு மை எழுதாமைக்கான காரணங்களை எழுதுக.

15. (அ) வழக்குரை காதையின் செய்திகளைத் தொகுத்துரைக்க.

(அல்லது)

(ஆ) இயேசு அனுபவித்த துன்பங்களைச் சூசை கூறுமாற்றை விளக்குக.

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

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. கண்ணனின் பெருமைகளைக் கண்ணதாசன் பாடல்கள் வழிக் கட்டுரைக்க.

17. பாரதியார் 'திருப்பள்ளி எழுச்சி' பாடுமாற்றை விளக்கி வரைக.

18. நோய்க்கான அறிகுறிகள் பற்றி நாமக்கல் கவிஞர் கூறுவனவற்றை விவரிக்க.

19. கம்பராமாயண 'மந்திர படலம்' கூறும் செய்திகளைத் தொகுத்துரைக்க.

20. நபிகள் நாயகம் ஈச்சங்குலை வரவழைத்தத் திறத்தை எடுத்துரைக்க.

———————

D–4073

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,
MAY 2024.

First Semester

Part I — COMMUNICATION SKILLS – I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Mention different types of Communication.

2. Why anger is a psychological barrier to communication?

3. Define oral communication.

4. Explain falling intonation with an example.

5. What is a business letter?

6. What are the four types of sentence structure?

7. Define ‘Essay’.

8. What are gestures?

9. What are the different types of Report?

10. Define ‘Group Discussion’.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Explain the principles of Effective Communication.

Or

(b) Discuss various forms of oral communication.

12. (a) Explain the importance of facial expressions and eye contact in communication.

Or

(b) Rewrite as directed :

(i) As he was ill, he couldn't attend the class. (Change into compound sentence)

(ii) It was a rainy day and he remained at home. (Change into simple sentence)

(iii) When he saw a snake, he ran away. (Change into compound sentence)

(iv) He finished his home work and he went out to play. (Change into complex sentence)

(v) He wrote a novel (Analyse this sentence)

13. (a) Explain the salient features of an essay.

Or

(b) Mention some characteristics of an Effective sentence.

14. (a) Explain different types of Reports.

Or

(b) Discuss the importance of group discussion.

15. (a) How will you organise a meeting?

Or

(b) Explain the various steps involved in preparing application for Employment and curriculum – vitae.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Describe the process of communication.

17. Discuss the importance of words and phrases in written communication.

18. Prepare on application for the post of Asst. Professor in English at Axc college Tiruchi, Attach your curriculum vitae.

19. Prepare a technical report about an accident in a company.

20. Prepare a Group Discussion on the topic "Uses and misuse of mobile phones".

———————

D–4074

Sub. Code
12/13712/ 0112/0312

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.B.A./B.B.A. (Banking)/ B.C.A./M.B.A. (5 Year Integrated) DEGREE EXAMINATION, MAY 2024.

First Semester

Part II — ENGLISH PAPER – I

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

Time : Three hours Maximum : 75 marks

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

Answer ALL questions.

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

2. Was Mr. Packletide successful in her mission of killing a tiger?

3. What changes do Narwa and Haria follow during winter and summer regarding their profession?

4. How does Joad praise our civilization?

5. Write the dangers of our civilization as pointed out by Joad.

6. Who is considered the father of medicine?

7. Put the verbs in the brackets in the correct tense :

(a) He ———————— (work) for four hours when I ———————— (arrive) here.

(b) At this moment I ———————— (do) an exercise on tenses.

8. Fill in the blanks with Prepositions :

(a) I walked ———————— the street.

(b) He always keeps the keys ———————— the pillow.

9. Fill in the blanks with suitable Articles :

(a) How does ———————— wounded tiger behave?

(b) Which road is ———————— right one?

10. Join the given sentences to form Compound Sentences :

(a) My uncle is coming. My aunt is coming.

(b) I knocked at the door. No one answered.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) How does soil erosion happen and what are its main causes?

Or

(b) How did Miss. Mebbin manage to get her week-end cottage? Why did she plant so many tiger lilies in her garden?

12. (a) Why does Jim Corbett consider Haria as rescuer of Narwa in 'A Deed of Bravery'?

Or

(b) What is the advise given by the author in 'On Letter Writing'?

13. (a) Why is our civilization more secure than previous civilizations according to C.E.M. Joad?

Or

(b) Write a short summary of 'A Hero on Probation' by B.R. Nanda.

14. (a) Write a letter to the Principal of your college pointing out some of the difficulties you and other students have experienced in the college.

Or

(b) Rewrite the following questions in Indirect Speech. Use the Simple Past Tense for the reporting verb :

(i) What is your name?

(ii) Where were you born?

(iii) How big is your family?

(iv) What time is it?

(v) How often do you go to theatre?

15. (a) Rewrite the following sentences in the Passive Voice :

(i) The thief pushed open the door.

(ii) They have solved the mystery at long last.

(iii) We did not expect to win.

(iv) Somebody drove us round Delhi in a big car.

(v) His loud cries woke me at about midnight.

Or

(b) Write a paragraph on the following topic.

'Tele-play I enjoyed'.

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

Answer any THREE questions.

16. How does C.V. Raman explain the value of water in his essay, 'Water-the Elixir of life'?

17. Analyse the elements of satire in 'Mrs. Packletide's Tiger'.

18. Discuss the dangers of drug abuse as pointed out by Hardin B. Jones.

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

Three friends – set out on a journey pass through a forest – find a purse of gold – each one desires to possess the entire gold – one of them is sent to buy food – the other two plan to kill him – the first one brings poisoned food – the other two kill him on his arrival – eat the food and die – moral.

20. Build a dialogue between you and the librarian. You have gone to the library – search for a particular book – since not found you seek help from the librarian.

———————

D–4165	Sub. Code
	11313

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2024.

First Semester

CLASSICAL ALGEBRA

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL the questions.

1. State the division algorithm.

2. If α, β, γ are roots of $x^3 + px^2 + qx + r = 0$ then find $\sum(\alpha + \beta - \gamma)$.

3. Multiply the roots of the equation $3x^2 - 2x^2 - x + 1 = 0$ by 4 and obtain the new equation.

4. Define reciprocal equation.

5. State Rolle's theorem.

6. Define perfect number.

7. Prove that $(n!)^2 > n^n$ for $n > 2$.

8. Define non-singular matrix with an example.

9. Define eigen vectors.

10. State the Cayley-Hamilton theorem.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) If one root of the equation $2x^3 - 11x^2 + 38x - 39 = 0$ is $2 - 3i$, solve the equation.

Or

(b) Show that the sum of the cubes of the roots of $x^n + p_1 x^{n-1} + \cdots + p_n = 0$ is $3p_1 p_2 = p_1^3 - 3p_3$.

12. (a) Solve $x^4 - 12x^3 + 48x^2 - 72x + 35 = 0$ by removing the second term.

Or

(b) If a, b, c are three positive real numbers, then prove that $(a+b+c)\ (ab+bc+ca) > 9\,a\,b\,c$.

13. (a) If $a_1, a_2, \ldots, a_n$ are positive real numbers each less than 1 then show that

$(1+a_1)(1+a_2)\ldots(1+a_n) < \dfrac{1}{1-s}$ if $s < 1$.

Or

(b) Find the inverse of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & -1 & 4 \\ -2 & 2 & 1 \end{bmatrix}$.

14. (a) Find the rank of the matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 4 & 7 \end{bmatrix}$.

Or

(b) Show that the system of equations.

$x + 2y + z = 11$

$4x + 6y + 5z = 8$

$2x + 2y + 3z = 19$

is consistent.

15. (a) Show that the matrix $A=\begin{bmatrix} 2 & -3 & 1 \\ 3 & 1 & 3 \\ -5 & 2 & -4 \end{bmatrix}$ satisfies the characteristic equation $A(A-I)(A+2I)=0$.

Or

(b) Using Cayley-Hamilton theorem find the inverse of the matrix $A=\begin{bmatrix} 1 & 0 & -2 \\ 2 & 2 & 4 \\ 0 & 0 & 2 \end{bmatrix}$

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

Answer any THREE questions.

16. If the sum of two roots of the equation $x^4+px^3+qx^2+rx+s=0$ equals the sum of the other two, prove that $p^3+8r=4pq$.

17. Diminish the roots of the equation.

$2x^4-x^3-2x^2+5x-1=0$ by 3.

18. State and prove Weierstrass inequality.

19. Find the inverse of the matrix $A=\begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 1 \\ 1 & 1 & 2 \end{bmatrix}$.

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

———————

D–4166

Sub. Code
11314

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION, MAY 2024.

First Semester

Mathematics

CALCULUS

(CBCS–2018–2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Differentiate $(2x-1)^3$ with respect to x.

2. If $y = x^3 e^{ax}$, then show that $y'' = e^{ax}(a^2x^3 + 6ax^2 + 6x)$.

3. Define centre of curvature.

4. Define asymptotes of a curve.

5. Define envelope.

6. Evaluate $\int_0^1 x e^{3x}\, dx$.

7. Evaluate $\int_0^1 \int_0^1 \int_0^1 xyz\ dx\, dy\, dz$.

8. Evaluate $\int_0^\infty x^4 e^{-x}\, dx$ by Gamma function.

9. Find $L[t^n\ e^{at}]$.

10. Form the partial differential equation by eliminating a and b from $z = ax^3 + by^3$.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) If $y = \tan(x + y)$, prove that $\frac{d^2y}{dx^2} = \frac{-2(1+y^2)}{y^5}$.

Or

(b) Find y_n if $y = \frac{1}{x^2 + a^2}$.

12. (a) Find the radius of curvature of $x = a\cos^3\theta,\ y = a\sin^3\theta$.

Or

(b) Find the evoluate of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$.

13. (a) Find the envelope of the family of lines $y = mx + \frac{a}{m}$, where a is a constant.

Or

(b) Prove that $\sqrt{n + \frac{1}{2}} = \frac{(2n)!\sqrt{\pi}}{4^n.\ n!}$, $n = 0,1,2,$ here find $\sqrt{\frac{5}{2}}$.

14. (a) Evaluate $\int_0^{\frac{\pi}{2}} \sin^3 x \cos^5 x \, dx$.

Or

(b) Change the order of integration and hence evaluate $\int_0^{\infty}\int_x^{\infty} \frac{e^{-y}}{y} \, dx \, dy$.

15. (a) Find $L^{-1}\left[\frac{s+2}{s^2+4s+5)^2}\right]$.

Or

(b) Find the complete integral of $z^2(p^2+q^2+1)=1$.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Prove that the normal to a given curve is tangent to its evolute.

17. Sate and prove Euler's theorem.

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

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

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

———————

D–4075	Sub. Code
	21 A/0321 A

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 2024.

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. தேம்பாவணியின் காப்பியத் தலைவன் பெயரைக் குறிப்பிடுக.

2. நீலபத்மநாபன் எழுதிய நாவல்கள் இரண்டினைக் குறிப்பிடுக.

3. நூலிலாட்டு – சிறுகுறிப்பு வரைக.

4. முதலெழுத்துக்களைச் சுட்டிக் கூறுக.

5. வேற்றுமைப் புணர்ச்சி என்றால் என்ன?

6. 'ஆசிய ஜோதி' என்னும் நூலின் ஆசிரியர்?

7. தனித்தமிழ் இயக்கம் கண்ட அறிஞர்?

8. முதல் ஆழ்வார்கள் யாவர்?

9. 'உதிரிப்பூக்கள்' என்னும் திரைப்படத்தை இயக்கியவர்?

10. 'சூடாமணி' என்னும் காப்பியத்தை இயற்றியவர்?

பகுதி ஆ — (5 × 5 = 25 மதிப்பெண்கள்)

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) சாந்தி கேட்ட வேத உரையை வீரமாமுனிவர் எங்ஙனம் விவரிக்கின்றார்?

(அல்லது)

(ஆ) வீரமாமுனிவர் வெளிப்படுத்தியுள்ள தமிழ்மரபுகளை எடுத்துரைக்க.

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

(அல்லது)

(ஆ) தாடகை வதையால் இராமன் பெற்ற பயன்களைச் சுட்டியுரைக்க.

13. (அ) சார்பெழுத்துக்களைச் சான்றுகளுடன் விளக்கி வரைக.

(அல்லது)

(ஆ) அன்மொழித் தொகையின் இலக்கணத்தை விளக்கி வரைக.

14. (அ) புதுக்கவிதையின் வளர்ச்சி வரலாற்றைச் சுருக்கி எழுதுக.

(அல்லது)

(ஆ) கவிஞர் கண்ணதாசனின் கவித்திறத்தை விளக்கி வரைக.

15. (அ) ஞானசம்பந்தரின் பக்தித்திறத்தைப் பாராட்டியுரைக்க.

(அல்லது)

(ஆ) தமிழ் வானொலிகளின் சமூகப் பணிகளைப் புலப்படுத்துக.

பகுதி இ — (3 × 10 = 30 மதிப்பெண்கள்)

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. இயேசுபிரான் பொறை, மிடி, தாழ்வு கொண்டதன் காரணங்களை விளக்குக.

17. 'கருணைமனு' சிறுகதை உரைக்கும் கருத்துக்களைக் கட்டுரைக்க.

18. கம்பன் பேசியுள்ள புறத்திணைச் செய்திகளைத் தொகுத்துரைக்க.

19. தமிழில் பிறமொழிச் சொற்கள் ஆளும் முறைகளைப் புலப்படுத்துக.

20. பெரியபுராணம் பேசும் இல்லற மாண்பை எடுத்துரைக்க.

———————

D–4076

Sub. Code
21B/0321B

DISTANCE EDUCATION

Common for B.A./B.Sc./B.B.A./B.B.A (Banking)/B.C.A./M.B.A.
(5 Year Integrated) DEGREE EXAMINATION, MAY 2024.

Second Semester

Part I — COMMUNICATION SKILLS – II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Define the code of communication skills.

2. Why is timing important in communication?

3. What are the essential elements of communication process?

4. State the uses of feedback.

5. What is front vowel?

6. What are personal skills?

7. What is the most important component of a language?

8. What is the key sentence of the paragraph?

9. Who published newsletters?

10. What is a proposal?

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

(b) Write about the merits and demerits of written communication.

12. (a) Describe back vowels.

Or

(b) What is the difference between personal and inter-personal skills?

13. (a) What are the different types of soft skills?

Or

(b) What are the rules to be followed while greeting or responding to a greeting?

14. (a) Write a note on passive listening.

Or

(b) What are the characteristics of Technical Writing?

15. (a) What is Editing? Discuss its various types.

Or

(b) What are the essential parts of a business letter?

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Explain the various elements of communication skills.

17. Discuss the ten commandments of Good speaking.

18. Explain personal and inter-personal skills.

19. Discuss the different skills required during interview.

20. Draft a Good Resume.

———————

D–4077

Sub. Code
22/13722/ 0122/0322

DISTANCE EDUCATION

Common for B.A./B.Sc./B.B.A./B.B.A. (Banking)/B.C.A./M.B.A. (5 Years Integrated) DEGREE EXAMINATION, MAY 2024.

Second Semester

Part II — ENGLISH PAPER – II

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

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Write the rhyme scheme of Shakespearean sonnet.
2. What is the message of 'Grecian urn'?
3. Who is Andrea Del Sarto?
4. Who is the speaker of the poem 'Strange' Meeting and explain the significance?
5. Explain the title 'Gitanjali'.
6. Which of the two roads did the poet choose and why?
7. The poet says, 'Let us set our catamarans free'. What does it mean?
8. Who is Portia in the drama 'The Merchant of Venice'?
9. What is the structure of an essay?
10. List any two methods of note-making.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Write a critical note on Shakespearean sonnet.

Or

(b) What qualities do you find in 'Andrea Del Sarto'?

12. (a) What are the Romantic characteristics in the poem 'Grecian urn'?

Or

(b) How is Tagore's philosophy of life reflected in 'Gitanjali'?

13. (a) Where did the two roads diverge? What was the difficulty experienced by the poet?

Or

(b) Write a critical appreciation of the poem the 'Strange Meeting'.

14. (a) Sketch the character of Shylock.

Or

(b) How does the poet describe his experience from the Westminster Bridge?

15. (a) Write down the uses of note-making.

Or

(b) Explain the two classification of Report Writing.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Discuss the ultimate tone of the poem 'Andrea Del Sarto'.

17. How does Kearts 'Grecian Urn' affect our thoughts?

18. Describe Portia's argument in 'The Merchant of Venice'.

19. Write an essay on 'The Road Not Taken'.

20. Write a critical note on 'Forest in India'.

———————

D–4167	Sub. Code
	11323

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2024.

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 coordinates of the intersecting point of the straight lines $2x + 7y - 25 = 0$ and $7x - 2y - 8 = 0$.

2. Find the equation of the circle which has its centre at the point $(6, 1)$ and touches the straight line $5x + 12y - 3 = 0$.

3. Write the equation of the plane in intercept form.

4. Define skewlines.

5. Find the centre and radius of the sphere $2x^2 + 2y^2 + 2z^2 - 2x - 4z - 5 = 0$.

6. Write the general equation of right circular cone.

7. Find a unit vector normal to the surface $x^2 - y^2 + z = 2$ at the point $(1, -1, 2)$.

8. If $\vec{F} = x^3\vec{i} + y^3\vec{j} + z^3\vec{k}$, find the div curl $\vec{F}$.

9. Write down the formula for work done by the force $\vec{F}$ along a curve C.

10. State Gauss Divergence theorem.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Find the equation of the circle passing through the points (0, 1), (2, 3) and (–2, 5).

Or

(b) Find the directions cosines of the line which is equally inclined to the axis.

12. (a) Find the equation of the plane passing through the points (3, 1, 2), (3, 4, 4) and perpendicular to the plane $5x + y + 4z = 0$.

Or

(b) Find the symmetrical form of the equations of the line of intersection of the planes $x + 5y - z - 7 = 0$, $2x - 5y + 3z + 1 = 0$.

13. (a) Find the root of the perpendicular drawn from (–2, 7, –1) to the plane $2x - y + z = 0$.

Or

(b) Find the equation of the sphere which has its centre at the point (6, –1, 2) and touches the plane $2x - y + 2z - 2 = 0$.

14. (a) Find the equation of the right circular cylinder of radius 3 with axis $\frac{x+2}{3} = \frac{y-4}{6} = \frac{z-1}{2}$.

Or

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

15. (a) Find the directional derivative of $\phi = xy + yz + zx$ in the direction of the vector $\vec{i} + 2\vec{j} + 2\vec{k}$ at (1, 2, 0).

Or

(b) If $\vec{F} = x^2\vec{i} + xy\vec{j}$, evaluate $\int_C \vec{F}.d\vec{r}$ from (0, 0) to (1, 1) along the line $y = x$.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Find the equations of to the tangents to the circle $x^2 + y^2 + z^2 + 8x + 4y - 5 = 0$ from the point (3, –3).

17. Show that the lines $\frac{x-5}{4} = \frac{y-7}{4} = \frac{z+3}{-5}$ and $\frac{x-8}{7} = \frac{y-4}{1} = \frac{z-5}{3}$ are coplanar and find their common point.

18. Find the equations of the spheres which passes through the circle

$x^2 + y^2 + z^2 - 2x + 2y + 4z - 3 = 0$;

$2x + y + z - 4 = 0$ and touch the plane $3x + 4y - 14 = 0$.

19. Find the equation of the tangent plane to the cone $9x^2 - 4y^2 + 16z^2 = 0$ which contain the line $\frac{x}{32} = \frac{y}{72} = \frac{z}{32}$.

20. Verify Green's theorem in the XY plane for $\int_C (xy + y^2)\,dx + x^2 dy$ where C is closed curve of the region bounded by $y = x$ and $y = x^2$.

D–4168	Sub. Code
	11324

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2024.

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 bounded sequence. Give an example.

2. Prove that $\lim_{n\to\infty} \frac{1}{2^n} = 0$.

3. Define a limit point.

4. Prove that $(n^2) \to \infty$ where $n > 1$.

5. Test the convergence of the series whose n^{th} term is $\frac{5+n}{3+n^2}$.

6. State Kummer's test.

7. Show that the series $1 - \frac{1}{5} + \frac{1}{9} - \frac{1}{13} + ...$ converges.

8. Show that $\sum \frac{(-1)^n}{n^2}$ is absolutely convergent.

9. State Leibnitz's test.

10. State Abel's theorem on multiplication of series.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Prove that any convergent sequence is a bounded sequence.

Or

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

12. (a) Let $a_n=\frac{1}{n+1}+\frac{1}{n+2}+....+\frac{1}{n+n}$. Show that (a_n) converges.

Or

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

13. (a) Prove that a monotonic increasing sequence which is bounded above converges to its l.u.b.

Or

(b) State and prove comparision test.

14. (a) State and prove Cauchy's general principle of convergence.

Or

(b) State and prove Raabe's test.

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

Or

(b) Prove that every absolutely convergent series is convergent.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. If $(a_n) \to a$ and $a_n \neq 0$ for all $n, a \neq 0$, then prove that $\left(\frac{1}{a^n}\right) \to \left(\frac{1}{a}\right)$.

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

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

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

20. If the series $\sum a_n$ and $\sum b_n$ converges to the sums a and b respectively and if one of the series, say $\sum a_n$ is absolutely convergent, then prove that the Cauchy product $\sum c_n$ converges to the sum ab.

———————

D–4078

Sub. Code
31A/13731

DISTANCE EDUCATION

Common for B.A/B.Sc./B.C.A. DEGREE EXAMINATION,
MAY 2024.

Third Semester

Part I : TAMIL — Paper III

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

Time : Three hours Maximum : 75 marks

பகுதி அ — (10 × 2 = 20 மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் விடையளிக்க.

1. விரிச்சி கேட்டல் என்றால் என்ன?

2. மதுரைக்காஞ்சியின் ஆசிரியரைக் கூறுக.

3. அலர் - பொருள் தருக.

4. ஐங்குறுநூற்று வைப்புமுறையில் முதலில் அமைந்துள்ள திணை.

5. அகநானூற்றின் மூன்று பகுப்புகளை எழுதுக.

6. கையறுநிலை என்பதை விளக்குக.

7. 'நான்மணிக்கடிகை' பெயர்க்காரணம் தருக.

8. திருக்குறனின் சிறப்புப் பெயர்கள் இரண்டினை எழுதுக.

9. இராசராசசோழன் நாடகத்தின் ஆசிரியர்.

10. 'சுவடுகள்' நாவலின் கதைக்கரு யாது?

பகுதி ஆ — (5 × 5 = 25 மதிப்பெண்கள்)

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) ஐங்குறுநூற்றைப் பாடியோர் வரலாற்றை எழுதுக.

(அல்லது)

(ஆ) கபிலரின் கவித்திறத்தைச் சான்றுகள் தந்து விளக்குக.

12. (அ) மஞ்ஞைப் பத்துப் பேசும் செய்திகளை விவரிக்க.

(அல்லது)

(ஆ) தலைவன் தன் நெஞ்சிற்குரைத்த குறுந்தொகைப் பாடல்களைச் சுட்டுக.

13. (அ) சிலப்பதிகாரச் சாயல் தரும் நற்றிணைப் பாடலைப் புலப்படுத்துக.

(அல்லது)

(ஆ) கிள்ளி வளவனை நப்பசலை எங்ஙனம் புகழ்ந்துரைக்கிறார்?

14. (அ) தூக்கமின்மை குறித்து நான்மணிக்கடிகை பேசுமாற்றை எழுதுக.

(அல்லது)

(ஆ) விமலாதித்தன் பாத்திரத்தின் முக்கியத்துவத்தைப் புலப்படுத்துக.

15. (அ) நாவலில் கதைப்பின்னல் அமையுமாற்றை விளக்குக.

(அல்லது)

(ஆ) சுவடுகள் நாவலின் 'ராசத்தி' பாத்திரப் படைப்பை விவரிக்க.

பகுதி இ — (3 × 10 = 30 மதிப்பெண்கள்)

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. முல்லைப்பாட்டு உரைக்கும் பாசறை நிகழ்வுகளைக் கட்டுரைக்க.

17. அகநானூற்றுச் சேந்தன்பூதனார் பாடல்களை எடுத்துரைக்க.

18. திருக்குறள் சிறப்புகளை நும் பாடப் பகுதியால் கருத்துரைக்க.

19. இராசராசசோழன் நாடகத்தின் கதைக்கோப்பை விவரிக்க.

20. சுவடுகள் நாவல் பேசும் சமூக அவலங்களைத் தொகுத்துரைக்க.

———————

D–4079

Sub. Code
31B

DISTANCE EDUCATION

Common for B.A./B.Sc./B.C.A. DEGREE EXAMINATION, MAY 2024.

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 the questions.

1. Name five types of Human skills.

2. Define 'Interpersonal Behaviour'.

3. What is positive approach?

4. Why interruption is kind of irritative behaviour?

5. Why is feed back in social life is necessary?

6. Who told about the power of concentration on duties in The Bhagavat Geeta?

7. Who is an Introvert?

8. Define Self Efficacy.

9. Explain Decision-making skills.

10. Define Stress.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Is self-respect important to achieve one's goal?

Or

(b) Define the power of advanced thinking.

12. (a) Is maintaining relationship important in life? Why?

Or

(b) Define non-verbal communication and its importance.

13. (a) Bring out the benefits of time management in goal setting.

Or

(b) Is decision-making an important skill in life?

14. (a) What are the strategies found in negotiation skill?

Or

(b) What are the basic qualities of a leader?

15. (a) What are the ways to develop relationship with others?

Or

(b) Is counseling necessary against stress complaint?

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Discuss various methodologies of strategies to cope up with conflict.

17. Describe the various types of attitudes.

18. Elaborate all types of telephone etiquettes.

19. Discuss the importance of duty, consciousness in life.

20. Describe mind level and its functions.

———————

D–4080

Sub. Code
132/13732

DISTANCE EDUCATION

Common for B.A./B.Sc./B.C.A. DEGREE EXAMINATION,
MAY 2024.

Third Semester

Part II — ENGLISH PAPER – III

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

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. How does Swami try to escape from sleeping alone in the office?

2. What is the Manager's advice to Foreman?

3. Why does Lomove want to get married?

4. How was Eddie killed?

5. Who is responsible for Sergeant Smith's death?

6. How does Mita bring change in Yassin?

7. Define conjunction with example.

8. Do as directed :

Sam is more intelligent than Peter (Into positive).

9. Define Minutes.

10. State the purposes of notice.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Comment on the end of the story "The Post Master".

Or

(b) How do the Loisels manage to replace the necklace?

12. (a) How does Philip threaten Uncle James in dream?

Or

(b) What do you learn from the play "The Silver Idol"?

13. (a) Describe the pathetic condition of Pierre and Jean.

Or

(b) Why did the captain kill the girl's husband?

14. (a) Why do the friends deviate from the promise in "Reunion"?

Or

(b) What is Gupta's attitude towards refugees in the beginning?

15. (a) Write short notes on adverb.

Or

(b) Describe your happy memory.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Examine the relationship between the post master and Ratan.

17. The Verger is a great opportunist – Discuss.

18. Discuss "Progress" as a an anti-war play.

19. How does Asif Currimbhoy picturise the pathetic condition of the refugees?

20. Do as directed :

(a) Gold is the most expensive of all the metals. (Into positive)

(b) Chennai is bigger than many other cities. (Into Superlative)

(c) No other animal is as dangerous as the man. (Into comparative)

(d) Raju is one of the best batsman in the team. (Into positive)

(e) The train runs faster than cars. (Into positive)

———————

D–4169	Sub. Code
	11333

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2024

Third Semester

DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS

(CBCS 2018 – 19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions

1. Define exact differential equation.

2. Solve : $\frac{dy}{dx} = \frac{2x}{x^2 + y^2 - 2y}$.

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

4. Solve $x = y^2 + \log p$.

5. Solve $(D^2 - 5D + 4)y = 0$

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

7. Solve $p^2 + q^2 = 4$.

8. Find the complete integral of $z = px + qy + pq$.

9. Solve : $p = y^2 q^2$.

10. Solve : $p^2 + q^2 = z^2 (x^2 + y^2)$.

PART B — ($5 \times 5 = 25$ marks)

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

11. (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 $xyp^2 + p(3x^2 - 2y^2) - 6xy = 0$.

12. (a) Solve $(D^2 - 13D + 12) y = e^{-2x}$.

Or

(b) Solve $(D^2 + 5D - 6) = \sin 4x \sin x$.

13. (a) Solve $x^2 \frac{d^2 y}{dx^2} + 7x \frac{dy}{dx} + 13y = \log x$.

Or

(b) Solve the equation $\frac{dx}{-y^2 - z^2} = \frac{dy}{dx} = \frac{dz}{xz}$.

14. (a) Solve

(i) $(D^2 - 3)x - 4y = 0$

(ii) $(D^2 + 1)y + x = 0$

Or

(b) Obtain a complete integral of $xp^2 - ypq + y^3 q - y^2 z = 0$

15. (a) Solve : $x(y^2+z)p - y(x^2+z)q = z(x^2-y^2)$.

Or

(b) Obtain a complete integral of $xp^2 - ypq + y^3q - y^2z = 0$

PART C — (3 × 10 = 30 marks)

Answer any THREE questions

16. Solve $(D^2 - 4D - 5)y = e^{2x} + 3\cos 4x$.

17. Solve $x^2 \frac{d^2y}{dx^2} + (4x^2+6x)\frac{dy}{dx} + (3x^2+12x+6)y = 0$

18. Verify the condition of integrability of
$(y-z)(y+z-2x)dx + (z-x)(z+x-2y)dy + (x-y)(x+y-2x)dz = 0$, and hence solve it.

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

20. Solve $(D^3 - 7DD'^2 - 6D'^3)z = x^2y + \sin(x-y)$

———————

D–4170

Sub. Code
11334

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2024.

Third Semester

MECHANICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. State triangle law of forces.

2. Show that a force has no resolved part in a direction perpendicular to itself.

3. Write short note on 'Moment of a force'.

4. If three parallel forces are in equilibrium, then prove that each is proportional to the distance between the other two.

5. Define moment of the couple.

6. With the usual notation, prove that $\tan\lambda = \mu$.

7. Show that $s = c\tan\psi$.

8. What is mean by line of impact?

9. Define frequency of a SHM.

10. What is Central orbit?

PART B — ($5 \times 5 = 25$ marks)

Answer ALL the 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 polygon law of forces.

12. (a) Find the resultant of two unlike and unequal parallel forces acting on a rigid body.

Or

(b) Prove that a couple and a single force acting on a body cannot be in equilibrium but they are equivalent to the single force acting at some other point parallel to its original direction.

13. (a) Show that repose of a rough inclined plane is equal to the angle of friction.

Or

(b) Three coplanar forces acting on a rigid body keep it in equilibrium, prove that they must be concurrent or be all parallel.

14. (a) Find the greatest distance of the projectile from the inclined plane and show that is attained in half the total time of flight.

Or

(b) A ball of mass 8 gm. Moving with a velocity of 10 cm. per sec. impinges directly on another of mass 24 gm., moving at 2 cm per sec. in the same direction. If $e = 1/2$, find the velocities after impact. Also calculate the loss in kinetic energy.

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

Or

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

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. State the prove Lami's theorem.

17. OA, OB, OC are the lines of action of two forces P and Q and their resultant R respectively. Any transversal meets the lines in L, M and N respectively, Prove that $\frac{P}{OL} + \frac{O}{OM} = \frac{R}{ON}$.

18. Derive the Cartesian equation of catenary.

19. Prove that the path of the projectile is parabola and find its time of flight.

20. Find the law of force towards the pole under which the curve $r^n = a^n \cos n\theta$ can be described.

———————

D–4081

Sub. Code
41A/13741

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION,
MAY 2024.

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 விடையளிக்கவும்.

1. குற்றியலுகரம் என்றால் என்ன?
2. தளையின் வகைகள் யாவை?
3. கலிப்பாவின் உறுப்புகளைக் கூறுக.
4. அகப்பொருளின் பாகுபாடுகள் யாவை?
5. வஞ்சினக் காஞ்சி என்றால் என்ன?
6. பொருள் அணிகள் எத்தனை வகைப்படும்?
7. சொல் அணிகள் எத்தனை வகைப்படும்?
8. அகநானூற்றைத் தொகுத்தவர் யார்?
9. சேர மன்னர்களின் சிறப்பைக் கூறும் எட்டுத் தொகை நூல் எது?
10. சீவக சிந்தாமணி எத்தனை இலம்பகங்களைக் கொண்டது?

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

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

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

(அல்லது)

(ஆ) கண்ணி இலக்கண வகைமையைச் சான்றுடன் விளக்குக.

12. (அ) சீர் என்றால் என்ன? விளக்குக.

(அல்லது)

(ஆ) ஆசிரியப்பாவில் பயின்று வரும் தளைகள் குறித்து எழுதுக.

13. (அ) வரைவு கடாதலின் வகைகளை விளக்குக.

(அல்லது)

(ஆ) குறிப்பு வேற்றுமை அணி குறித்து எழுதுக.

14. (அ) அகநானூற்றின் சிறப்பினை விவரி.

(அல்லது)

(ஆ) ஆற்றுப்படை நூல்களின் செவ்வியல் தன்மையை விளக்குக.

15. (அ) திருக்குறளின் பொதுமைக் கோட்பாட்டை விவரி.

(அல்லது)

(ஆ) மௌன மயக்கங்கள் காவியம் உணர்த்தும் சமூகச் செய்திகளைக் கூறுக.

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

பின்வரும் வினாக்களுள் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. புதுக்கவிதையில் படிமத்தின் பங்களிப்பு குறித்து எழுதுக.

17. கற்புக் காலப் பிரிவுகள் குறித்து எழுதுக.

18. உவமை அணியின் விளக்கம் கூறி வகைகளை விளக்குக.

19. எட்டுத்தொகையில் அகம் பற்றிய நூல்களை எழுதி அதன் சிறப்பியல்புகளை விவரிக்க.

20. பாண்டியன் பரிசு காவியத்தில் வெளிப்படும் புரட்சிகரமான கருத்தினை எழுதுக.

———————

D–4082	Sub. Code
	41B

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION, MAY 2024.

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 the questions.

1. What are the types of communication?

2. What is WIIFM?

3. What is the role of critical thinking?

4. What are Soft Skills?

5. Give the definition for 'Motivation'.

6. Mention any two steps used to develop vision of a leader.

7. Define Technical Communication.

8. Give the meaning of Managerial Skill.

9. What do you mean by Multi-Tasking?

10. What is emotional discomfort?

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) What are the common barriers to communication?

Or

(b) What is the importance of Bloom's taxonomy of thinking?

12. (a) Write a note on Democratic Style of leadership.

Or

(b) Write a note on Bureaucratic Style of a leader

13. (a) What are the components you should have to get a positive and healthy personality?

Or

(b) What are the types of organisational skills?

14. (a) Discuss the skills involved in handling the problems.

Or

(b) Write a note on problems solving skills.

15. (a) Write a short note on Time Management Skills.

Or

(b) Write some of the behavioural changes that could be observed in a person who is affected with stress.

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

Answer any THREE questions.

16. Discuss the role of a counsellor.

17. Write a model for a speech on orientation.

18. Elucidate the differences between Hard and Soft Skills.

19. Explain Cooperative Learning Skills.

20. Discuss the importance of Problem Solving Skills.

———————

D–4083

Sub. Code
42/13742

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION, MAY 2024.

Fourth Semester

Part II — ENGLISH PAPER – IV

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

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What happened to the partner when Lalajee returned after his journey?

2. How was the boy suffering in 'A Day's Wait'?

3. Why does the crowd hiding from the rain get so upset with Higgins for taking notes of the Flower Girl's speech?

4. Why is Romeo exiled?

5. What is the story, *Swami* and *Friends* about?

6. Who are Polixenes and Leontes in *The Winter's Tale*?

7. What reason does Antonio give for being sad in the opening scene of the play, *The Merchant of Venice*?

8. What does the Nurse advise Juliet to do after Romeo is exiled?

9. Add Tag Questions :

(a) Everyone has come, ————————.

(b) Let's go home, ————————.

10. Correct the following sentences :

(a) A crate of apples and organs have been delivered.

(b) Either the husband or the wife have to go.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Describe Jim Corbett's experience with Lalajee.

Or

(b) Write a short summary of 'Little Girls Wiser than Men'.

12. (a) Describe the Stoic nature of the boy in 'A Day's Wait'.

Or

(b) What is the Pygmalion Myth?

13. (a) How does Swami navigate his desires for community and for freedom?

Or

(b) Discuss and analyse Leontes's jealousy.

14. (a) Discuss the relationship between Jessicac and Shylock.

Or

(b) Apart from clashing with Tybalt, what role does Mercutio play in the story, *Romeo and Juliet*?

15. (a) How does Toynbee glorify Nehru?

Or

(b) Expand – 'Pen is mightier than sword'.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Analyse 'Two Old Men' by Leo Tolstoy.

17. Sketch the character of Swami.

18. Discuss the relationships between parents and children in *Romeo and Juliet*.

19. Examine the courtroom scene in *The Merchant of Venice*. How does it illuminate the play's major themes?

20. Build a dialogue between father and son. Son requests father to allow him to go abroad for higher studies.

———————

D–4171	Sub. Code
	11343

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2024.

Fourth Semester

ANALYSIS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL questions.

1. Define uncountable set with an example.
2. Prove that, for a convergent sequence (x_n), the limit is unique.
3. Define deuse subset.
4. Prove that the metric space [0, 1] and $[0, 2]$ with usual metrics are homeomorphic.
5. Define uniform continuity.
6. State the fundamental theorem of calculus.
7. State the intermediate value theorem.
8. Prove that $M = [1, 2] \upsilon [3, 4]$ is disconnected with usual metric.
9. Define compact metric space.
10. When will you say that a compact metric space is totally bounded?

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Prove that in any metric space the intersection of finite number of open sets is open.

Or

(b) In any metric space, prove that every closed ball is a closed set.

12. (a) Prove that $\mathbb{R}^n$ with usual metric is complete.

Or

(b) State and prove Baire category theorem.

13. (a) Prove that composition and addition of two continuous functions is continuous.

Or

(b) Prove that the function $f:(0,1)\to R$ defined by $f(x)=\frac{1}{x}$ is not uniformly continuous.

14. (a) Prove that the set of all components of a metric space M forms a partition of M.

Or

(b) If $f:R\to R$ is defined as

$$f(x)=\begin{cases}0 & \text{if } x \text{ is irrational}\\ 1 & \text{if } x \text{ is rational}\end{cases}$$

show that f is not continuous.

15. (a) Prove that any compact subset A of a metric space M is bounded.

Or

(b) Prove that a metric space (M,d) is totally bounded if and only if every sequence in M contains a Cauchy subsequence.

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

Answer any THREE questions.

16. Let M be the set of all sequences in R. Let $x, y \in M$, $x = (x_n)$, $y = (y_n)$ and $d(x, y) = \sum_{n=1}^{\infty} \frac{|x_n - y_n|}{2^n(1 + |x_n - y_n|)}$. Prove that d is a metric on M.

17. State and prove Cantor's intersection theorem.

18. Prove that f is continuous if and only if the inverse image of every open set is open.

19. Prove that a subspace of is connected if and only if it is an interval.

20. State and prove Heine-Borel theorem.

———————

D–4172

Sub. Code
11344

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2024.

Fourth Semester

STATISTICS

(CBCS 2018-19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Define arithmetic mean.

2. Write the formula for standard deviation.

3. Write down the second moment about the origin.

4. Define negative correlation.

5. Write down the regression equation of y on x .

6. Write down the normal equations of fit a straight line.

7. Define Interpolation.

8. Write down the Lagrange's formula.

9. Mention the limitations of Index number.

10. Write down the formula for Bowley's index number.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Calculate the Arithmetic mean from the following data

Weight in kgs (x) :	50	48	46	44	42	40
Number of persons (y) :	12	14	16	13	11	09

Or

(b) The first four moments of a distribution about $x = 2$ are 1, 2.5, 5.5 and 16. Calculate the four moments about the mean.

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

x :	1	3	5	8	9	10
y :	3	4	8	10	12	11

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 :	2.1	3.5	5.4	7.3	8.2

Or

(b) Find a third degree polynomial which passes through the points $(0, -1), (1, 1), (2, 1)$ and $(3, -2)$ using Newton's forward interpolation formula.

14. (a) Check whether the attributes A and B are independent given that

$(AB)=256,(\alpha B)=768,(A\beta)=48,(\alpha\beta)=144.$

Or

(b) Explain briefly the various methods of determining Trend in the analysis of Time series.

15. (a) Use the method of least squares and fit a straight line trend to the following data give from 82 to 92. Hence estimate the trend value for 1993.

Year :	82	83	84	85	86	87	88	89	90	91	92
Production :	45	46	44	47	42	41	39	42	45	40	48

Or

(b) From the following Chain base Index numbers given below, prepare Fixed Base index number.

Year :	1981	1982	1983	1984	1985
Index :	110	160	140	200	150

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Find :

(a) Mean

(b) Range

(c) S.D

(d) Mean deviation about the mean and

(e) Coefficient of variation for the following marks of 10 students

20, 22, 27, 30, 40, 48, 45, 32, 31, 35.

17. Calculate Karl Pearson's coefficient of Skewness for the following data

Class :	0-6	6-12	12-18	18-24	24-30	30-36
Frequency :	5	12	18	38	20	7

18. The following data relate to the marks of 10 students in the internal test and the University examination for the maximum of 50 in each

Internal Marks :	25	28	30	32	35	36	38	39	42	45
University Marks :	20	26	29	30	25	18	26	35	35	46

(a) Obtain the two regression equations.

(b) Determine the mostly internal mark for the university mark of 25.

(c) Determine the likely university mark for the internal mark of 30.

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's

(b) Paashes'

(c) Fishers' index numbers for the following data given below. Hence or otherwise find Edgeworth and Bowley's index numbers.

Commodities	Base year 1990		Current year 1992	
	Price	Quantity	Price	Quantity
A	2	10	3	12
B	5	16	6.5	11
C	3.5	18	4	16
D	7	21	9	25
E	3	11	3.5	20

D–4173	Sub. Code
	11351

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2024.

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 symmetric difference of two sets.

2. Define function. Give an example.

3. Define a group. Give an example.

4. Define a cyclic group with an example.

5. Define a normal subgroup of a group.

6. Define the right coset with an example.

7. Prove that every subgroup of an abelian group is a normal subgroup.

8. Let R be a ring and $a, b \in R$. Prove that $a(-b) = (-a)b = -(ab)$.

9. Define quotient field.

10. Define inner product space.

PART B — (5 × 5 = 25 marks)

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

11. (a) If A, B, C are any three finite sets, prove that $|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |B \cap C| - |C \cap A| + |A \cap B \cap C|$.

Or

(b) Prove that a set x is infinite if and only if there exists a bijection between x and a proper subset A of x.

12. (a) Prove that $(Z_n, \oplus)$ is a group.

Or

(b) Show that any permutation can be expressed as a product of transpositions.

13. (a) If H is a subgroup of G and N is a normal subgroup of G, then prove that HN is a subgroup of G.

Or

(b) Prove that any two infinite cyclic groups are isomorphic to each others.

14. (a) State and prove Eisenstein criterion theorem.

Or

(b) Let R be a ring with identity. Prove that the set of all units in R is a group under multiplication.

15. (a) Prove that $L(S)$ is a subspace of V.

Or

(b) Prove that $\|x+y\| \leq \|x\| + \|y\|$.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Prove that $A \Delta (B \Delta C) = (A \Delta B) \Delta C$, for any three sets A, B, C.

17. State and prove the fundamental theorem of homomorphism on groups.

18. State and prove Euler's theorem.

19. Let V be a finite dimensional vector space over a field F. Let W be a subgroup of V. Prove that

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

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

20. Let V be a finite dimensional inner product space. Let W be a subspace of V. Prove that $V = W \oplus W^{\perp}$

———————

D–4174	Sub. Code
	11352

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2024.

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 the questions.

1. What is the scope of O.R.?

2. Define slack variable.

3. Write down the primal dual relationship.

4. State the necessary and sufficient condition for the existence of a feasible solution to a transportation problem.

5. Define unbalanced assignment problem.

6. Define idle time on machines.

7. Define saddle points.

8. What types of games are solved by graphically?

9. Define dummy activity.

10. Expand PERT.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Explain the role of computers in O.R.

Or

(b) A firm manufacturers two types of products A and B and sells them at a profit of Rs.2 on type A and Rs.3 on type B. Each product is processed on two machines M_1 and M_2. Type A requires 1 minute of processing time on M_1 and 2 minutes on M_2. Type B requires 1 minute on M, and minute on M_2 Machine M_1 is available for not more than 6 hours and 40 minutes while machine M_2 is available for 10 hours during any working day. Formulate the problem as a LPP so as to maximize the profit.

12. (a) Solve the following LPP by Big –M method.

Maximize $Z = 3x_1 + 2x_2$

Subject to the constraints $2x_1 + x_2 \leq 2$

$3x_1 + 4x_2 \geq 12$

$x_1, x_2 \geq 10$

Or

(b) Solve graphically

Maximize $Z = 6x_1 + 9x_2$

Subject to the constraints

$x_1 + x_2 \leq 12$

$x_1 + 5x_2 \leq 45$

$3x_1 + x_2 \leq 30$

$x_1, x_2 \geq 0$

13. (a) Find the initial basic feasible solution for the following transportation problem by Vogel's Approximation Method.

1	2	6	7
0	4	2	12
3	1	5	11
10	10	10	

Or

(b) Write the Dual simplex method algorithm.

14. (a) Consider the problem of assigning five jobs to five persons. The assignment costs are given as follows.

		Job				
		1	2	3	4	5
Person	A	8	4	2	6	1
	B	0	9	5	5	4
	C	3	8	9	2	6
	D	4	3	1	0	3
	E	9	5	8	9	5

Determine the optimum assignment schedule.

Or

(b) Explain the procedure of solving a sequencing problem of n jobs on 2 machines.

15. (a) Construct the network for the project whose activities and their relationships are as given below :

Activities : A, D, E can start simultaneously.

Activities : $B, C > A; G, F > D, C; H > E, F$.

Or

(b) In a game of matching coins two players, suppose A wins one unit value when there are two heads, wins nothing when there are two tails and looses $\frac{1}{2}$ unit value when there are one head and one tail. Determine the payoff matrix, the best strategy for each player, and the value of the game.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Solve the following LPP by simplex method

Minimize $Z = 8x_1 - 2x_2$

Subject to

$$-4x_1 + 2x_2 \leq 1$$
$$5x_1 - 4x_2 \leq 3$$
$$and\ x_1,\ x_2 \geq 0$$

17. Solve the transportation problem.

		Destination				
		D1	D2	D3	D4	Demand
Source	S1	6	1	9	3	70
	S2	11	5	2	8	55
	S3	10	12	4	7	70
	Supply	85	35	50	45	

18. Solve the assignment problem for maximization given the profit matrix (profit in Rupees)

		Machines			
		P	Q	R	S
Job	A	51	53	54	50
	B	47	50	48	50
	C	49	50	60	61
	D	63	64	60	60

19. Find the sequence that the machines the total elapsed time required to complete the following tasks on the machines in the order 1-2-3. Find also the minimum total time (hours) and the idle times on the machines.

Task	A	B	C	D	E	F	G
Machine 1	3	8	7	4	9	8	7
Machine 2	4	3	2	5	1	4	3
Machine 3	6	7	5	11	5	6	12

20. Calculate the total float, free float and independent float for the project whose activities are given below:

Activity :	1-2	1-3	1-5	2-3	2-4	3-4	3-5	3-6	4-6	5-6
Duration : (in weeks)	8	7	12	4	10	3	5	10	7	4

———————

D–4175	Sub. Code
	11353

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2024.

Fifth Semester

NUMERICAL 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. Compute the root of the equation $x^2 - x - 0.1 = 0$ which lies in (1, 2) correct to five significant figures.

2. State the backward difference.

3. Define interpolating polynomials using finite difference.

4. Define the first order forward difference.

5. State the Stirling's formula.

6. Write Newton's forward difference interpolation formula.

7. What do you understand by the numerical integration?

8. How are Euler's method and Taylor's method related?

9. Define the Euler's method.

10. State the Milne's Predictor - corrector method.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Find by Newton-Raphson methods, the real root of $3x - \cos x - 1 = 0$, correct to three significant figures.

Or

(b) Given the table of values of $y = f(x)$, form the

x	1	3	5	7	9
y	8	12	21	36	62

Diagonal difference table and find the values of $\Delta f(5), \Delta^2 f(3), \Delta^3 f(1)$.

12. (a) Compute the following differences :

(i) $\Delta^n e^x$

(ii) $\Delta^n x^n$

Or

(b) Referring to the following table, find the value of $f(x)$ at point $x = 4$.

x	1.5	3	6
$f(x)$	–0.25	2	20

13. (a) Compute the solution of the following initial value problem for $x = 0.2$, using Taylor series solution method of order 4. $\frac{d^2y}{dx^2} = y + x\frac{dy}{dx}, y(0)=1, y'(0)=0$.

Or

(b) Find the unique polynomial $P(x)$ of degree 2 such that, P (1) = 1, P (3) = 27, P (4) = 64. Use the Lagrange's method of Interpolation.

14. (a) Compute the integral $I = \int_0^4 (x^3 - 2x^2 + 1)\, dx$, using Simpson's one third rule taking h = 1 and show that the computed value agrees with the exact value.

Or

(b) Find the successive approximate solution of the initial value problem, $y' = xy + 1$, with y (0) = 1, by Picard's method.

15. (a) Use modified Euler's method to compute y (0.02) for the initial value problem, $\frac{dy}{dx} = x^2 + y$, with $y(0) = 1$, taking h = 0.01. Compare the result with the exact solution.

Or

(b) Using Milne's predictor corrector method, find $y(0.4)$, for the differential equation $\frac{dy}{dx} = 1 + xy,\ y(0) = 2$.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Solve the following system by Gauss elimination method:

$x_1 + 2x_2 + x_3 = 0$

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

$-x_1 - 3x_2 = 2$

Show that the computations by augmented matrix representation.

17. Solve the following equations using Jacobi's iteration method, $3x + 4y + 15z = 54.8$; $x + 12y + 3z = 39.66$; $10x + y - 2z = 7.74$.

18. Find the value of f (41) using Gauss's forward formula from the following data.

x	30	35	40	45	50
$f(x)$	3678.2	2995.1	2400.1	1876.2	1416.3

19. Given $xy' = x - y^2$, $y(2) = 1$, evaluate y (2.1), y (2.2) and y (2.3) correct to four decimal places using Taylor series method.

20. Use Runge-Kutta methods of order 4 to evaluate y (1.1) and y (1.2) by taking step length h = 0.1 for the initial value problem, $\frac{dy}{dx} = x^2 + y^2$, $y(1) = 0$.

D–4176

Sub. Code
11354

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION, MAY 2024.

Fifth Semester

Mathematics

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 $L[\cos hat]$.

2. Find $L[t^3 - 3t^2 + 2]$.

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

4. What is $L\left[t^n f(t)\right]$?

5. Define fourier series.

6. Define odd and even functions.

7. State the fourier sine integral.

8. Show that $F_e[f(ax)] = \frac{1}{a} F_e\left(\frac{s}{a}\right)$.

9. Define z-transform.

10. State the convolution theorem.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Show that $L\left[t^n\right]=\frac{\sqrt{(n+1)}}{s^{n+1}}$.

Or

(b) Evaluate $\int_0^\infty \frac{e^{-t}-e^{-2t}}{t}\,dt$.

12. (a) If $L[f(t)]=f(s)$, then prove that $L[t\,f(t)]=-F'(s)$.

Or

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

13. (a) Solve $\frac{d^2y}{dt^2}+2\frac{dy}{dt}+5y=4e^{-t}$ given that $y=\frac{dy}{dt}=0$ when $t=0$.

Or

(b) Obtain the fourier sine series for the function $f(x)=x^2$ in $0\le x\le\pi$.

14. (a) Find the fourier cosine transform of $f(x)=5e^{-2x}+2e^{-5x}$.

Or

(b) Prove that:

$F[f(x)\cos ax]=\frac{1}{2}[f(s+a)+f(s-a)]$ where $f(s)=F[f(x)]$.

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

Or

(b) Find $z^{-1}\left[\frac{1}{1+4z^{-2}}\right]$ by long division method.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Find

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

(b) $L^{-1}\left[\frac{1}{s(s-a)}\right]$

17. Solve the simultaneous equations.

$\frac{dx}{dt}-\frac{dy}{dt}-2x+2y=1-2t \quad \frac{d^2x}{dt^2}+2\frac{dy}{dt}+x=0$.

18. Find the fourier series for the function $f(x)=x+x^2$, $-\pi<x<\pi$.

19. Using Parseval's identity calculate $\int_0^\infty \frac{x^2}{(x^2+a^2)^2}dx$.

20. Solve the equation $y_{n+2}-7y_{n+1}+12y_n=2^n$, given that $y_0=y_1=0$.

D–4177	Sub. Code
	11361

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2024.

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 $P \vee \neg P$.

2. Find the truth table $(P \vee Q) \wedge \neg P$.

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

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

5. Write down the rules of Inference.

6. Define lattice.

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

8. Define paths and circuit.

9. Define tree and forest.

10. Define pendent vertices in a tree.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Show that $Q \vee (P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$ is a tautology.

Or

(b) Prove that $P \to (Q \vee R)$ is equivalent to $(P \to Q) \vee (P \to R)$.

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

Or

(b) Find the principle disjunctive normal form of the formula $P \vee (\neg P \to (Q \vee (\neg Q \to R)))$.

13. (a) Prove that $(\exists x) M(x)$ follows logically from the premises $(x)(H(x)) \to M(x)$ and $(\exists x)\ H(x)$.

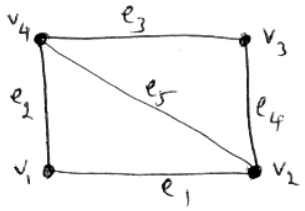
Or

(b) Prove that any chain is modular.

14. (a) Explain the Konigsberg bridge problem.

Or

(b) Find the adjacency matrix of the following graph G.



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

Or

(b) Define spanning tree of a graph G and prove that any given edge of a connected graph G is a branch of some spanning tree.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Show that from

(a) $(\exists x)\,(P(x) \wedge Q(x)) \rightarrow (y)(R(y) \rightarrow S(y))$

(b) $(\exists y)\big(R(y) \wedge \neg S(y)\big)$

the conclusion $(\forall x)\big(P(x) \rightarrow \neg Q(x)\big)$ follows.

17. Obtain the principal conjunctive and principal disjunctive normal forms for the following, which of the formulas are Tautologies?

(a) $Q \wedge \big(P \vee \neg Q\big)$

(b) $(Q \rightarrow P) \wedge \big(\neg P \wedge Q\big)$

(c) $\big(\neg P \rightarrow R\big) \wedge (Q \leftrightarrow P)$.

18. (a) Let $x = 1001,\ y = 0100,\ z = 1000$, find the minimum distance between these code words.

(b) Prove that an (m, n) encoding function $e : B^m \rightarrow B^n$ can detect k or fewer errors if and only if its minimum distance is at least $k+1$.

19. Prove that an undirected graph G is Eulerian if and only if it is connected and has either zero or two vertices of odd degree. If no vertex has an odd degree then show that the graph has a Euler circuit.

20. (a) Prove that G is a tree if and only if one elementary path between every pair of vertices.

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

D–4178

Sub. Code
11362

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2024.

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. Define strong α – cut of a fuzzy set with an example.

2. Define subnormal fuzzy set.

3. Write down the standard fuzzy operations.

4. What is meant by fuzzy complement?

5. State first decomposition theory.

6. Define image fuzzy set. Give an example.

7. Define an anti reflexive with an example.

8. State the Shannon entropy.

9. State the axiom of monotonocity.

10. Explain pragmatic.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Find the scalar cardinality and fuzzy cardinality of the fuzzy set $\subset(x) = \frac{x}{1+x}, x \in \{0, 1, 2, ..., 10\} = x$.

Or

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

12. (a) Let $A, B \in \mathfrak{H}(x)$. Prove that

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

(ii) $^{\alpha}(A \cup B) = {}^{\alpha}A \cup {}^{\alpha}B$

Or

(b) Determine which fuzzy sets defined by the following functions are fuzzy numbers.

(i) $A(x) = \begin{cases} \sin(x) & for \quad 0 \le x \le \pi \\ 0, & \text{otherwise} \end{cases}$

(ii) $B(x) = \begin{cases} x, & for \quad 0 \le x \le 1 \\ 0, & \text{otherwise} \end{cases}$

(iii) $C(x) = \begin{cases} 1, & for \quad 0 \le x \le 10 \\ 0, & \text{otherwise} \end{cases}$

(iv) $D(x) = \begin{cases} \min(1, x) & for \quad x \ge 0 \\ 0, & for \ x < 0 \end{cases}$

13. (a) Prove that the max-min composition and min join are associative operations on binary fuzzy relations.

Or

(b) Solve the fuzzy relation equation

$$\begin{bmatrix} .9 & .6 & 1 \\ .8 & .8 & .5 \\ .6 & .4 & .6 \end{bmatrix} = [.6 \quad .6 \quad .5]$$

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

Or

(b) Explain the different measures of fuzziness and Shannon entropy.

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

Or

(b) Calculate $U(\gamma)$ for the possibility distribution.

$\gamma = (1, 1, \cdot 8, \cdot 7, \cdot 7, \cdot 7, \cdot 4, \cdot 3, \cdot 2, \cdot 2)$

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

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

(b) Explain why we need fuzzy set theory.

17. State and prove characterization theorem of t-norms.

18. Let $M_p = \begin{bmatrix} 0.3 & 0.5 & 0.8 \\ 0 & 0.7 & 1 \\ .0.4 & 0.6 & 0.5 \end{bmatrix}$ and $M_Q = \begin{bmatrix} 0.9 & 0.5 & 0.7 & 0.7 \\ 0.3 & 0.2 & 0 & 0.9 \\ 1 & 0 & 0.5 & 0.5 \end{bmatrix}$.

(a) Compute $M_{P.Q}$.

(b) Draw the Sagittal diagram and also find $P \circ Q$.

19. Derive the Boltzmann entropy.

$$B(q(x) / x \in [a,b]) = -\int_a^b q(x) \log_2 q(x)\ dx .$$

Where q denotes a probability density function on $[a,\ b]$.

20. Consider two joint probability distributions on $X \times Y$.

($X = \{a,\ b,\ c\}$, $Y\ \mathbb{N}_5$) defined by the matrices.

$$\begin{array}{c} \\ a \\ b \\ c \end{array} \begin{array}{c} \begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \end{array} \\ \begin{pmatrix} 0.1 & 0 & 0 & 0.05 & 0 \\ 0 & 0.3 & 0.1 & 0 & 0.2 \\ 0.05 & 0 & 0 & 0.1 & 0.1 \end{pmatrix} \end{array} \quad \text{and} \quad \begin{array}{c} \\ a \\ b \\ c \end{array} \begin{array}{c} \begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \end{array} \\ \begin{pmatrix} 0.25 & 0.05 & 0.05 & 0.05 & 0 \\ 0 & 0 & 0 & 0 & 0.05 \\ 0.1 & 0.15 & 0.1 & 0.1 & 0.1 \end{pmatrix} \end{array}$$

Calculate $H(X)$, $H(Y)$,, $H(X,Y), H(X / Y)$, $H(Y / X)$ and $T(X,Y)$ for both of the distributions.

D–4179	Sub. Code
	11363

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2024.

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 an analytic function.

2. Define harmonic conjugate.

3. Define the bilinear transformation.

4. Find the invariant points of the transformation $w = \dfrac{1}{z - 2i}$.

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

6. Evaluate $\int_c \dfrac{1}{z} dz$ where c is the circle $|z| = \gamma$.

7. Evaluate $\int_c \dfrac{\sin z}{(z - \pi/2)^2} dz$; $c : |z| = 2$.

8. Write down the Maclaurin's series expansion of $\log(1+z)$.

9. Define singularity of a function.

10. Determine and classify the singular points of $\frac{1}{(2\sin z - 1)^2}$.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Let $f(z) = u(x, y) + iv(x, y)$ be differentiable. Prove that the $C-R$ equations can be written the form $f_x = -if_y$.

Or

(b) Prove that an analytic function with constant real part is constant.

12. (a) State and prove Abel's limit theorem.

Or

(b) Find the analytic function $f(z) = u + iv$ if $u = e^x \cos y$.

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

Or

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

14. (a) Evaluate $\int_c \frac{e^z}{z^2+4} dz$ where c is positively oriented circle $|z-i|=2$.

Or

(b) State and prove Morera's theorem.

15. (a) Find the poles and residue of $f(z)=\frac{z^2+4}{z^3+2z^2+2z}$.

Or

(b) State and prove Argument theorem.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

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

17. Find the analytic function $f(z)=u+iv$

if $u-v=\frac{\cos x+\sin x-e^{-y}}{2\cos x-e^{y}-e^{-y}}$.

18. Prove that any bilinear transformation which maps the unit circle $|z|=1$ onto the unit circle $|w|=1$ can be written in the form $w=e^{i\lambda}\left[\frac{z-\alpha}{\overline{\alpha}\, z-1}\right]$ where λ is real. Further this transformation maps the circular disk $|z|\le 1$ onto the circular disc $|w|\le 1$ if and only if $|\alpha|<1$.

19. State and prove Taylor's theorem.

20. Evaluate $\int_0^{2\pi} \frac{d\theta}{1+a\sin\theta}$, $-1<a<1$.

———————

D–4180

Sub. Code
11364

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2024.

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 combination.

2. State the Fibonacci sequence.

3. Give a recursive definition of $f(n) = n!$.

4. Find the generating function for the sequence 1,1,1,…

5. Find the recurrence relation for the function $f : \mathbb{N} \to \mathbb{Z}$ defined by $f(x) = 2x$ for all $x \in \mathbb{N}$.

6. What is the order of the recurrence relation
$F_n = F_{n-2} + F_{n-1}$; $n \geq 2$, $F_0 = 0$, $F_1 = 1$.

7. Find the number of integers between 1 and 600, inclusive, which are not divisible by 6.

8. Define permutation group.

9. Define even and odd permutation.

10. Let $f=\begin{pmatrix}1&2&3&4\\3&2&4&1\end{pmatrix}$ and $g=\begin{pmatrix}1&2&3&4\\2&4&3&1\end{pmatrix}$ be the permutations in S_4, find $g\circ f$ and $f\circ g$.

PART B — ($5\times 5 = 25$ marks)

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

11. (a) If $p\geq 1$ then prove that $B_p=\binom{p-1}{0}B_o+\binom{p-1}{1}B_1+\ldots+\binom{p-1}{p-1}B_{p-1}$.

Or

(b) Find the sum of the fourth powers of the first n positive integers by considering $h_n=n^4$.

12. (a) Show that the function $x!$ is primitive recursive, where $0!=1$ and $n!=n*(n-1)!$.

Or

(b) Find the recurrence relation satisfying $y_n=A3^n+B(-4)^n$.

13. (a) Form the recurrence relation given $f_n=3.5^n$, $n\geq 0$.

Or

(b) Solve the recurrence relation.

$C_n=-3C_{n-1}-3C_{n-2}-C_{n-3}$ for $n\geq 3$ with initial conditions $C_0=1$, $C_1=-2$ and $C_2=1$.

14. (a) Solve $a_\gamma+5a_{\gamma-1}=9$ with initial condition $a_0=6$.

Or

(b) Find the particular solution of the recurrence relation $f(n)-2f(n-1)=3.2^n$.

15. (a) Prove that the set S_n of all permutations on n symbols form a group.

Or

(b) How many ways are there to arrange $n \geq 3$ differently coloured heads in a necklace?

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Find the generating function (in closed form) of the Fibonacci sequence f_n defined by $f_n = f_{n-1} + f_{n-2}$; $f_0 = 0$, $f_1 = 1$.

17. Using generating functions, show the difference equation $y_{n+2} - 4y_{n+1} + 3y_n = 0$; $y_0 = 2$, $y_1 = 4$.

18. Determine the number of integers between 1 and 250 that are divisible by any of the integers 2, 3, 5 and 7.

19. Prove that the number of ways to place n non attacking, indistinguishable rooks on an n-by-n board with forbidden portions equals.

$$n! - \gamma_1 (n-1)! + \gamma_2 (n-2)! \ldots + (-1)^k \gamma_k (n-k)! + \ldots + (-1)^n \gamma_n$$

20. State and prove Burnside's theorem.

———————