D–6071

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

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.B.A./B.B.A.(Banking)/ B.C.A./M.B.A.(5 YEAR INTEGRATED) DEGREE EXAMINATION, DECEMBER 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 — ($10 \times 2 = 20$ மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் ஓரிரு வரிகளில் விடையளிக்க.

1. கண்ணதாசன் யாரை மானசீகக் குருவாகக் கருதினார்?
2. மக்கள் கவிஞர் எனப் போற்றப்பட்டவர்?
3. பாரதமாதவிற்கு, 'திருப்பள்ளி எழுச்சி' பாடியவர்?
4. நாமக்கல் கவிஞர் எழுதிய புதினங்கள் இரண்டினைச் சுட்டுக.
5. மீரா எக்கல்லூரியில் பேராசிரியராகப் பணியாற்றினார்?
6. 'தோழர் மோசிகீரனார்' என்னும் கவிதையை எழுதியவர்?
7. 'வயிறு' என்னும் கவிதையின் பொருளைத் தருக.
8. சிலப்பதிகாரம் உரைக்கும் முப்பெரும் உண்மைகளை எழுதுக.
9. கம்பராமாயணம் எத்தனைக் காண்டங்களால் ஆனது?
10. சீறாப்புராணம் என்பதன் பொருள் யாது?

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

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) மாயக்கண்ணன் துயில் கொள்வதைக் கண்ணதாசன் எங்ஙனம் பாடுகிறார்?

(அல்லது)

(ஆ) செய்யும் தொழிலே தெய்வமென பட்டுக்கோட்டையார் பாடுமாற்றை விவரிக்க.

12. (அ) பாரதியார் கூறும் இந்தியாவின் பழம்பெருமைகள் குறித்து எழுதுக.

(அல்லது)

(ஆ) 'நோயற்ற வாழ்வு' என்னும் கவிதையின் கருத்துக்களை எடுத்துரைக்க.

13. (அ) மீராவின் வாழ்க்கை வரலாற்றைச் சுருக்கி வரைக.

(அல்லது)

(ஆ) குழலோசை கேட்ட ராதையின் நோக்கமாகக் கு.ப.ரா. கூறுமாற்றை எழுதுக.

14. (அ) ஞானக்கூத்தனுக்கு மோசினீரனார் மேல் அன்பு தோன்ற காரணம் யாது?

(அல்லது)

(ஆ) அப்துல் ரகுமானின் 'கண்ணும் எழுதேம்' கவிதையின் கருத்துக்களை வரைக.

15. (அ) மந்திர ஆலோசனையின் நோக்கத்தைக் கட்டுரைக்க.

(அல்லது)

(ஆ) சீறாப்புராண நூல் குறிப்புகளைச் சுருக்கி எழுதுக.

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

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. ராதையின் பெருமிதப் பேச்சுக்களைக் கண்ணதாசன் பாடுமாற்றை விளக்கிடு.

17. கண்ணனின் குறும்புத் தனங்களைப் பாரதியார் பாடல் வழி விவரிக்க.

18. உலகப்பன் பாட்டுப் பேசும் பொதுவுடைமைக் கருத்துக்களைச் சுட்டியுரைக்க.

19. கண்ணகியின் வரவும் வாயிற்காப்போன் உரையும் குறித்துக் கட்டுரைக்க.

20. இறைவனை ஆயர்கள் வழிப்பட்டமையைத் தேம்பாவணி வழிப் புலப்படுத்துக.

D–6072

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 2024.

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 the questions.

1. Define visual communication.

2. Give two examples for written communication.

3. Define "communication gap".

4. I couldn't understand what you said.

   (Replace the underlined word with a phrasal verb)

5. Ram wrote a letter. (Analyse this sentence)

6. Define a paragraph.

7. Define an example for a complex sentence.

8. Give a technical report.

9. Explain the different types of letters.

10. Explain the importance of e-mail.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Use the following phrasal verbs in sentences.

(i) make out

(ii) put up with

(iii) cut down

(iv) call for

(v) suffer from.

Or

(b) Write a letter of complaint to the corporation commissioner about bad condition of roads in your locality.

12. (a) Mention different ways of expressing an opinion in a group discussion.

Or

(b) Prepare a report about the independence day celebrations held in your college.

13. (a) Discus non-verbal communication with examples.

Or

(b) Explain 'Curriculum vitae'.

14. (a) Write a paragraph on "Importance of sports in education".

Or

(b) Discuss Barriers to communication.

15. (a) What is the function of intonation?

Or

(b) How will you prepare yourself to deliver a speech?

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

Answer any THREE questions.

16. Describe various types of communication with examples.

17. Discuss the technique of writing an effective e-mail.

18. Write an essay on "Reading makes a full man".

19. Prepare a report on a festival held in your city.

20. Describe the principles of effective oral communication.

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D–6073

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 2024.

First Semester

PART II — ENGLISH PAPER - I

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

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Write the significance of water in agriculture as discussed by C.V. Raman in *Water – the Elixir of life.*

2. What is Mrs. Packletide's reason for wanting to hunt a tiger in *Mrs. Packletide's Tiger?*

3. Mention Carl Sagan's view on the connection between modern humans and our ancestors.

4. What is the central theme of B.R. Nanda's essay *A Hero on Probation.*

5. Fill in the blanks with suitable articles :

(a) I spoke to ———— (a/the) manager of the store.

(b) I have ———— (a/the) idea than will help solve this problem.

6. Fill in the blanks with correct form of Gerund :

(a) She finished ———— (to clean/cleaning) the house before noon.

(b) ———— (Run/Running) every morning helps him stay fit.

7. What does C.E. Foad criticize about modern technology in *Our Civilization?*

8. Briefly explain the connection between food and evolution as discussed by J.B.S. Haldane in *Food.*

9. What is the setting of Jim Corbett's tiger hunting encounter in *A Deed of Bravery.*

10. What social issues does Shaw critique in *Pygmalion?*

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Describe the significance of water conservation as presented by C.V. Raman in *Water – the Elixir of Life.*

Or

(b) Explore how Saki uses satire to critique social class and vanity in *Mrs. Packletide's Tiger.*

12. (a) Explain J.B.S. Haldane's perspective on the relationship between food production and human progress in *Food*.

Or

(b) Describe how Carl Sagan integrates scientific curiosity with historical analysis in *Our Ancestors*.

13. (a) Fill in the blanks with suitable articles :

(i) I saw ———— (a/the) cat sitting on ———— (a/the) roof.

(ii) She is ———— (a/an) excellent dancer.

(iii) ———— (A/An/The) Earth revolves around ———— (a/the) Sun.

(iv) He wants to buy ———— (a/the) car that he saw yesterday.

(v) They live in ———— (a/the) small house near (a/the) river.

Or

(b) Change direct speech into indirect speech.

(i) He said, "I am going to the market".

(ii) She said, "I will call you later".

(iii) They said, "We have completed our homework".

(iv) John Said, "I am planning a trip to London".

(v) The teacher said, "You must submit".

14. (a) Precise the following paragraph :

In a remote village named Niranjan, life had remained unchanged for decades. The villagers lived simply, relying on traditional farming methods. Over time, however, challenges arose. The once-fertile land became barren due to climate change, and the river supplying water dried up. Many young villagers left for the city, leaving the village struggling.

Rohan, a young man who had studied in the city, returned to Niranjan with the hope of improving conditions. He proposed modernizing their farming techniques by introducing irrigation, planting drought-resistant crops, and building a road to connect the village with nearby towns. At first, the elders resisted, reluctant to change their age-old ways. But Rohan persisted, and gradually, the village transformed. The new methods revived the land, and the road allowed for trade with neighboring towns.

As the village prospered, those who had left returned. Niranjan, once isolated and struggling, became a thriving community while maintaining its traditions. Rohan's efforts not only saved the village but also made it a model for other villages in the region.

Or

(b) Write a paragraph on the importance of recycling in modern society.

15. (a) Analyse the depiction of bravery in Jim Corbett's *A Deed of bravery* and its impact on the narrative.

Or

(b) What are the primary concerns raised by C.E. Foad regarding technological advancements in *Our Civilization?*

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain the use of anthropomorphism in Catharine M. Willson's *The Cat.*

17. Analyse the concept of probabtion and its effects on the protagonist in B.R. Nanda's *A Hero on probation.*

18. Fill in the correct form of Gerund :

(a) She enjoys ———— (to cook/cooking) in her free time.

(b) ———— (Swim/Swimming) is good exercise.

(c) He suggested ———— (to go/going) to the park.

(d) I can't stand ———— (to wait/waiting) for long periods.

(e) They talked about ———— (to visit/visiting) Japan.

(f) She is interested in ———— (to learn/learning) French. ———— (Drive/Driving) too fast is dangerous.

(g) He's good at ———— (to play/playing) chess.

(h) I don't mind ———— (to help/helping) you with your homework.

(i) She avoided ———— (to speak/speaking) about the problem.

19. Write a letter to the editor of a newspaper expressing your concern about increasing traffic congestion in your city.

20. How does Hardin B. Fones address the prevention and treatment of drug abuse in *Dangers of Drug Abuse?*

D–6164

Sub. Code
11313

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION,
DECEMBER 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. Write down the expansion of $(3x+5y)^5$.

2. Form a rational cubic equation which shall have for roots $1, 3, -\sqrt{-2}$.

3. Multiple the roots of the equation $3x^3 - 2x^2 - x + 1 = 0$ by 4.

4. Find the quotient and remainder when $3x^3 + 8x^2 + 8x + 12 = 0$ is divided by $x - 4$.

5. Define standard reciprocal equation.

6. State Rolle's theorem.

7. Show that $n^n > 1.3.5....(2n-1)$.

8. Define singular matrix.

9. Find the characteristic equation of $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$.

10. Find the sum and product of the eigen values of the matrix $\begin{pmatrix} 3 & -4 & 4 \\ 1 & -2 & 4 \\ 1 & -1 & 3 \end{pmatrix}$.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Find the coefficient of x^n in the expansion of $\dfrac{1+3x+2x^2}{(1-x)^4}$ is ascending power of x.

Or

(b) Show that the sum of the eleventh powers of the roots $x^7+5x^4+1=0$ is zero.

12. (a) Solve : given that it has two pairs of equal roots.

Or

(b) Show that $x^3+3x-1=0$ has only one real root and calculate it correct to two places of decimals by Newton's method.

13. (a) State and prove Weierstrass inequality.

Or

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

14. (a) Find the inverse of the matrix $\begin{pmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{pmatrix}$.

Or

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

15. (a) Show that the equations $x + y + z = 6$; $x + 2y + 3z = 14$; $x + 4y + 7z = 30$ are consistent and solve them.

Or

(b) Verify Cayley Hamilton theorem for the matrix $A = \begin{pmatrix} 1 & 2 & -1 \\ 1 & 1 & 2 \\ 2 & 4 & -2 \end{pmatrix}$.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Find the sum to infinity of the series $1 + \frac{3}{4}. + \frac{3}{4}.\frac{5}{8} + \frac{3}{4}\cdot\frac{5}{8}\cdot\frac{7}{12} + \cdots$

17. Solve $6x^5 + 11x^4 - 33x^3 + 33x^2 + 11x + 6 = 0$.

18. Find all the rational $4x^3 + 20x^2 - 23x + 6 = 0$ roots of the equation.

19. Show that $(x^m + y^m)^n < (x^n + y^n)^m$ if $m > n$.

20. Find the eigen values and eigen vectors of the matrix $A = \begin{pmatrix} 8 & 2 & -2 \\ 3 & 3 & -1 \\ 24 & 8 & -6 \end{pmatrix}$.

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D–6165

Sub. Code
11314

DISTANCE EDUCATION

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

First Semester

CALCULUS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours　　　　Maximum : 75 marks

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

Answer ALL the questions.

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

2. If $xy = ae^{x} + be^{-x}$, then prove that $x\frac{d^2y}{dx^2} + y\frac{dy}{dx} - xy = 0$.

3. State the Euler's theorem.

4. Write the Cartesian formula for radius of curvature.

5. Define involute.

6. Find the x-coordinate of the centre of curvature of the curve $xy = 2$ at the point (2, 1).

7. Define Beta function.

8. Evaluate $\int_0^1 \int_0^1 dx dy$.

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

10. Find $L^{-1}\left[\frac{12}{s^2+36}\right]$.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Find the maxima and minima of the function $y = 2x^3 - 3x^2 - 36x + 10$.

Or

(b) Find the radius of curvature for the curve $\sqrt{x} + \sqrt{y} = 1$ at $(1/4, 1/4)$.

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

Or

(b) Evaluate $\int_0^1 \int_0^{\sqrt{1+x^2}} \frac{1}{\sqrt{1+x^2y^2}} dy\, dx$.

13. (a) Prove that $\beta(m,n) = \beta(m,n+1) + \beta(m+1,n)$.

Or

(b) Evaluate $\int \frac{dx}{x^2+8x-7}$.

14. (a) Prove that $\beta(m,n) = \beta(n,m)$.

Or

(b) Evaluate $\int_0^{\pi/2} \sin^7 \theta \cos^5 \theta \; d\theta$.

15. (a) Find $L\left[\frac{\sin at}{t}\right]$.

Or

(b) Find $L^{-1}\left[\frac{s-3}{s^2+4s+13}\right]$.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Verify Euler's theorem for $u = \sin^{-1}\left(\frac{x}{y}\right) + \tan^{-1}\left(\frac{y}{x}\right)$.

17. Find the evolute of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.

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

19. Solve the equation $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} - 3y = \sin t$ given that $y = \frac{dy}{dt} = 0$ when $t = 0$.

20. Solve : $(x^2 + y^2 + yz)p + (x^2 + y^2 - xz)q = z(x + y)$.

D–6074

Sub. Code
21A/0321A

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.B.A./B.B.A.(Banking)/ B.C.A./M.B.A.(5 YEAR INTEGRATED) DEGREE EXAMINATION, DECEMBER 2024.

Second Semester

PART I — TAMIL PAPER - II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

பகுதி அ — (10 × 2 = 20 மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் ஓரிரு வரிகளில் விடையளிக்க.

1. ‘தேம்பா அணியான் வாடா அருள் மகன்’ யார்?

2. ‘வான வீதியில்’ தொகுதியிலுள்ள சிறுகதைகளின் எண்ணிக்கை?

3. தும்பைப் போர் - குறிப்பு வரைக.

4. வினா எத்தனை வகைப்படும்?

5. அல்வழிப்புணர்ச்சி என்றால் என்ன?

6. சிறுகதை முன்னோடிகள் இருவரைக் குறிப்பிடுக.

7. சிறுவர் இதழ்களுக்குச் சான்றுகள் தருக.

8. சிம்பொனி இசையமைத்த தமிழர் யார்?

9. ‘நாமார்க்கும் குடியல்லோம்’ எனப் பாடி அரசன் ஆணையை மறுத்தவர்?

10. பெரியபுராணம் நூல் குறிப்பு வரைக.

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

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) குழந்தை ஏசுவை ஆயர்கள் போற்றுமாற்றை விவரிக்க.

(அல்லது)

(ஆ) சாந்தி கேட்ட வேத உரையைப் புலப்படுத்துக.

12. (அ) 'விமோசனம்' கதை உரைக்குப் பெண்ணியக் கருத்துக்களை எழுதுக.

(அல்லது)

(ஆ) தாடகையின் ஆற்றலையும் தறுகண்மையும் எடுத்துரைக்க.

13. (அ) ஆகுபெயரின் வகைகளைச் சான்றுகளுடன் விளக்குக.

(அல்லது)

(ஆ) ஒற்றெழுத்து மிகுமிடங்கள் குறித்து விவரிக்க.

14. (அ) பாரதியின் நாட்டுப்பற்றை எடுத்துரைக்க.

(அல்லது)

(ஆ) தமிழ் நாவல் வரலாற்றைச் சுருக்கி வரைக.

15. (அ) ஆண்டாளின் பக்தித்திறத்தைப் புலப்படுத்துக.

(அல்லது)

(ஆ) தமிழ் வளர்ச்சியில் இதழ்களின் பங்கு பற்றி எழுதுக.

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

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. சாந்தி உள்ளம் மகிழ்ந்து குழந்தை ஏசுவைப் போற்றுமாற்றை விவரிக்க.

17. கருணை மனு சிறுதையின் பொருண்மையைப் புலப்படுத்துக.

18. போர்க்களத்தில் செய்தித் தொடர்பின் முக்கியத்துவத்தைச் சுட்டியுரைக்க.

19. மொழிமுதல் எழுத்துக்களைச் சான்றுகளுடன் கட்டுரைக்க.

20. இணையத்தில் தமிழ்ப் பெற்றிருக்கும் வளர்ச்சியை எடுத்துரைக்க.

D–6075

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,
DECEMBER 2024.

Second Semester

PART - I — COMMUNICATION SKILLS - II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. What do good communication skills involve?

2. List the skills required in oral communication.

3. What is demeanour?

4. How are vowels classified?

5. What is a thesaurus?

6. What is passive learning?

7. What is tone?

8. What is a proposal?

9. Who publishes newsletters?

10. What responsibility does the chairperson of the interviews?

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Explain non-verbal communication.

Or

(b) List the skills required in written communication.

12. (a) Write a short note on word power.

Or

(b) Write about the delivery methods of presentation.

13. (a) Write a short note on consonant clusters.

Or

(b) Describe the language skills.

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

Or

(b) What are the characteristics of technical writing?

15. (a) State the indicators of a badly written letters.

Or

(b) Write a short note on new letters.

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

Answer any THREE questions.

16. Explain the various elements of communication skills.

17. Explain the chief places of articulation of consonants.

18. Examine the process of listening.

19. Write a letter requesting for opening of bank account.

20. Write about the essentials of a good resume.

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D–6076

Sub. Code
22/13722/ 0122/0322

DISTANCE EDUCATION

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

Second Semester

PART - II — ENGLISH PAPER - II

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

Time : Three hours Maximum : 75 marks

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

Answer ALL the questions.

1. Who is the author of the prescribed poem 'The Coromandel fishers'?

2. What is symbolized by the Westminster Bridge?

3. How does Tagore treat the concept of death in his *Gitanjali?*

4. What does the Second Part of *Gitanjali* sing about?

5. What is the conclusion of 'The Road Not Taken'?

6. Why does the speaker in 'Ode on a Grecian Urn' deem the Urn a Historian?

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

8. Why does the Prince of Morocco fear that Portia will dislike him?

9. What is comprehension?

10. Write any five words that should be avoided in report writing.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Who is the author of the prescribed poem *The Coromandel fishers?*

Or

(b) Analyse Shakespeare as a sonneteer.

12. (a) Examine the view that the songs of *Gitanjali* have a deep connection with nature.

Or

(b) How does Wordworth describe the beauty of London when viewed from Westminster Bridge?

13. (a) "The Road Not Taken" is about the journey of life. Elucidate.

Or

(b) Write a short summary of the poem, 'The coromandel fishers'.

14. (a) Discuss the relationship between shylock and Jessica.

Or

(b) Explain the court room scene in *The Merchant of Venice*. How does it illuminate the play's major themes?

15. (a) Write a report on the free medical camp held in a village by your N.S.S. unit.

Or

(b) Read the following passage and answer the questions that follows.

Sir. Winston Churchill was saved from drowning by a gardener when he was a small boy. The grateful parents of Churchill offered to educate the son of the gardener. When Sir. Winston became the prime minister, he was stricken by pneumonia. Greatly concerned, the king summoned the best physician and soon Churchill became well. The doctor was Sir. Alexander Fleming who developed penicillin. He was also the son of that gardener who saved Churchill from drowning. Sir Winston said, rarely has one man owed his life twice to the same person.

(i) What happened to Churchill when he was a small boy?

(ii) How did Churchill's parents show their gratitude?

(iii) Who was summoned by the king?

(iv) How did doctor save Churchill's life?

(v) Why did Churchill say that he owed his life twice to the same person?

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Critically appreciate the poem, 'The Grecian Urn' by John Keats.

17. Examine 'Andrea del Sarto' as a Dramatic monologue.

18. Analyse Portia's character in *The Merchant of Venice.*

19. Write an essay on the given topic.

'Pleasures of Reading'.

20. Read the following passage and answer the questions that follow.

In the middle of it all, Tom Sawyer walked slowly out to footpath in front of Aunt Polly's. In his hands were a bucket of paint and a big brush. He looked at the tall fence and sadness filled his heart. It must be closed to half a mile long, he was thinking. Life was empty and living was pain. He put his brush in the paint and moved it across the top of fence. He did this again and then looked at how little was painted and how much more needed to be painted before he could be free. He rested on a box, feeling discouraged.

Jim came out of the house with a water bucket. In the past Tom never liked to go to the well for water. But now it looked like a better job than painting the fence. Children were always at the wall waiting for water. As they waited, they played, had fights, rested and talked. Jim always stayed for more than an hour.

(a) What was Tom asked to do?

(b) Why did he think life was empty?

(c) What looked like a better job than painting? Why?

(d) What did Tom ask him for? What was the reply?

(e) Who had ordered Tom to paint?

D–6166

Sub. Code
11323

DISTANCE EDUCATION

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

Second Semester

ANALYTICAL GEOMETRY AND VECTOR CALCULUS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Define orthogonal circles.

2. Find the distance between the points $P(-1, \pi/8)$ and $Q(\sqrt{2}, 3\pi/8)$.

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

4. Show that the origin and (2, –3, 7) lie on the same side of the plane $2x - 3y + 2z + 8 = 0$.

5. Find the equation of the plane which passes through the point (3, –2, 4) and is perpendicular to the line joining the points (2, 3, 5) and (1, –2, 3).

6. Find the equation of the plane through the intersection of the planes $3x - y + 2z - 4 = 0$ and $x + y + z - 2 = 0$ and passing through the point (2, 2, 1).

7. Define sphere.

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

9. Show that $\nabla(a \,.\, r) = a$ for any constant vector a.

10. Define irrotational vector.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Find the equation of the straight line through $(2, \pi/6)$, parallel to $\frac{3}{r} = 4\cos\theta - 3\sin\theta$.

Or

(b) Find the direction cosines of the line which is equally inclined to the axes.

12. (a) Prove that the angle θ between the planes $ax + by + cz + d = 0$ and $a_1x + b_1y + c_1z + d_1 = 0$ is $\cos\theta = \pm\left[\frac{aa_1 + bb_1 + cc_1}{\sqrt{\Sigma a^2}\,\sqrt{\Sigma a_1^2}}\right]$.

Or

(b) Show that the lines $\frac{x-2}{1} = \frac{y-4}{2} = \frac{z-5}{2}$ and $\frac{x-5}{2} = \frac{y-8}{3} = \frac{z-7}{2}$ are coplanar and find the equation of the plane determined by the lines.

13. (a) Prove that the equation of two skew lines in a simple form is given by $y = mx, z = c$ and $y = -mx$, $z = -c$.

Or

(b) Find the equation of the sphere passing through the points (0, 0, 0), (1, 0, 0), (0, 1, 0) and (0, 0, 1).

14. (a) Find the unit normal to the surface $x^3 - xyz + z^3 = 1$ at (1, 1, 1).

Or

(b) Prove that $curl\, grad\, \phi = \nabla \times (\times \phi) = 0$.

15. (a) If $f = x^2\bar{i} - xy\bar{j}$ and c is the straight line joining (0, 0) and (1, 1), then find $\int_c \bar{f} \,.\, d\bar{r}$.

Or

(b) If $\bar{r}$ is the position vector of any point $P(x, y, z)$, then prove that $grad\, r^n = n.r^{n-2}\bar{r}$.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Prove that the equation of the tangent at the point whose vertical angle α is $\frac{1}{r} = e\cos\theta + \cos(\theta - \alpha)$.

17. Find the bisector of the acute angle between the planes $3x + 4y - 5z + 1 = 0,\ 5x + 12y - 13z = 0$.

18. Prove that the two spheres

$S_1 = x^2 + y^2 + z^2 - 2x + 4y - 4z = 0$ and

$S_2 = x^2 + y^2 + z^2 + 10x + 2z + 10 = 0$

touch each other and find the point of contact.

19. Prove that $div(r^n \bar{r}) = (n+3) r^n$. Deduce that $r^n \bar{r}$ is solenoidal if and only if $n = -3$.

20. Verify stokes theorem for the vector function $\bar{f} = y^2 \bar{i} + y \bar{j} - xz \bar{k}$ and S is the upper half of the sphere $x^2 + y^2 + z^2 = a^2$ and $z \geq 0$.

D–6167

Sub. Code
11324

DISTANCE EDUCATION

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

Second Semester

SEQUENCES AND SERIES

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL the questions.

1. Define bounded sequence. Give an example.

2. Define oscillating sequence. Given an example.

3. Show that the constant sequence 1, 1, 1.... Converges to 1.

4. Define Cauchy sequence.

5. Show that $\lim_{n\to\infty} \frac{x^n}{n!} = 0$.

6. Define limit point of a sequence.

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

8. Show that the series $\Sigma \frac{1}{2^n}$ converges.

9. Define absolute convergent of a series.

10. Define conditionally convergent of a series. Give an example.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Show that the sequence $\left((-1)^n\right)$ is not convergent.

Or

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

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

Or

(b) If $(a_n) \to l$ then prove that $\left(\frac{a_1 + a_2 + \cdots + a_n}{n}\right) \to l$.

13. (a) Show that $\lim_{n\to\infty}\frac{1}{n}\left(1+\frac{1}{2}+\cdots+\frac{1}{n}\right)=0$.

Or

(b) Prove that every bounded sequence has at least one real number as a limit point.

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

Or

(b) Test the convergence of the series $1+\frac{x^2}{2}+\frac{x^4}{4}+\frac{x^6}{6}+\cdots\cdots\cdots\cdots$ where x is any positive real number.

15. (a) Show that every absolute convergence series is convergent.

Or

(b) Given $\Sigma\left(1/n^2\right) = s$. Prove that $1 + \frac{1}{3^2} + \frac{1}{5^2} + \cdots = \frac{3}{4}s$.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Show that the sequence $\left(\left(1 + \frac{1}{n}\right)^n\right)$ converges.

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

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

19. State and prove Cauchy's root test.

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

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D–6077

Sub. Code
31A/13731/ 0131

DISTANCE EDUCATION

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

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 × 2 = 20 மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் ஓரிரு வரிகளில் விடையளிக்க.

1. ஐங்குறுநூறு - நூல் குறிப்பு வரைக.

2. ஆற்றுப்படை நூல்களைப் பட்டியலிடுக.

3. வரைவு கடாதல் என்றால் என்ன?

4. மஞ்ஞைப்பத்து - விளக்கம் தருக.

5. அகநானூற்று நூலின் எண் பகுப்புகளுக்கான திணைகளைக் குறிப்பிடுக.

6. புறநானூற்றுப் பாடல்களின் அடி வரையறை யாது?

7. 'வாயுறை வாழ்த்து' எனப் போற்றப்படும் அற நூல் யாது?

8. நான்மணிக்கடிகை எந்நூல் கருத்துக்களை ஒத்திருக்கின்றது?

9. குந்தவையின் காதலன் பெயரைக் குறிப்பிடுக.

10. 'சுவடுகள்' நாவலின் கதைமாந்தர்களில் இருவரைக் கூறுக.

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

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) பாசறை அமைப்புக் குறித்து முல்லைப்பாட்டு விவரிக்குமாற்றை எழுதுக.

(அல்லது)

(ஆ) 'குறிஞ்சிக்குக் கபிலர்' என்பார் கருத்தைப் புலப்படுத்துக.

12. (அ) நற்றிணையிலுள்ள மணிமணியான கருத்துக்களைத் தொகுத்துரைக்க.

(அல்லது)

(ஆ) வரைவு நீட்டித்த வழித் தலைமகள் தோழிக்குச் சொல்லியது யாது? விவரிக்க.

13. (அ) நப்பசலையார் பாடிய ஆனந்தப்பையுள் துறையமைந்த பாடலை விளக்குக.

(அல்லது)

(ஆ) அகநானூற்று நூல் அமைப்பின் சிறப்புகளை எடுத்துரைக்க.

14. (அ) வாழ்க்கைத் துணைநலம் குறித்த வள்ளுவரின் கருத்துக்களைப் புலப்படுத்துக.

(அல்லது)

(ஆ) யார் யாருக்குத் தூக்கம் வராது? நான்மணிக்கடிகை கூறுமாற்றை எழுதுக.

15. (அ) இராசராசசோழன் நாடகத்தின் கதைமாந்தர்களைப் பட்டியலிடுக.

(அல்லது)

(ஆ) 'சுவடுகள்' நாவலில் வரும் ரகுபதி பாத்திர இயல்பை விவரிக்க.

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

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. பரணர் பாடல்கள் வழி அறியலாகும் சங்க வரலாற்றைத் தொகுத்துரைக்க.

17. மஞ்ஞைப்பத்தில் இடம்பெற்றுள்ள அகக்கருத்துக்களைச் சுட்டியுரைக்க.

18. நப்பசலை சோழன் கிள்ளிவளவனைப் புகழுமாற்றை விவரிக்க.

19. வள்ளுவர் உரைக்கும் ‘அறிவுடைமை’ கருத்துக்களைத் தொகுத்துரைக்க.

20. இராசராசர்சோழன் நாடகத்தின் கதைக்கோப்பைக் கட்டுரைக்க.

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D–6078

Sub. Code
31B

DISTANCE EDUCATION

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

Third Semester

PART - I — HUMAN SKILL DEVELOPMENT - I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL the questions.

1. Define ‘Self Esteem’.

2. Define psychoanalysis.

3. Give an example for ‘forced commitment’.

4. Who is an extrovert?

5. Is dress code important to develop our personality?

6. Define "Time management".

7. What is mental pollution?

8. Define attitudes.

9. What is materialistic life?

10. How honesty is important in building relationship?

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Discuss various methods to find the background reasons behind conflict.

Or

(b) What are the general factors behind stress?

12. (a) Explain "Look Before You Leap" concept in Anger management.

Or

(b) How to overcome inner conflict in personal life?

13. (a) Briefly explain the types of negotiations.

Or

(b) Write short notes on interpersonal relationship.

14. (a) Mention the basic qualities of a leader.

Or

(b) Why is the contribution skill more important than knowledge?

15. (a) Discuss business negotiation skill.

Or

(b) Explain the power of advanced thinking.

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

Answer any THREE questions.

16. Assess the mind levels and its functions.

17. Enumerate the major influential factors in developing personality.

18. Describe how will you over come stress.

19. Describe leadership styles.

20. Describe ‘coping with the change’ concept.

D–6079

Sub. Code
32/13732/0132

DISTANCE EDUCATION

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

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 × 2 = 20 marks)

Answer ALL questions.

1. What are Mathilde's expectations to attend the party?
2. What does the author talk about 'false hopes' in "The Post Master"?
3. Why does Philip want to sell his revolver?
4. Why did the old man give the silver idol to Jack?
5. How has Gaultier been outwitted by Pierre?
6. Who is the only character left alive in the play "A kind of Justice"? Why?
7. Define abstract noun with example.
8. Why is Agenda important?
9. What are Minutes?
10. Identify the adverb in the following sentence.

    We should always speak the truth.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) How does Swami get rid of his fear?

Or

(b) Discuss the role of fate in the verger's life.

12. (a) Describe the attitude of Natalya towards Lomov.

Or

(b) Comment on Mrs. Meldon's opinion about war.

13. (a) Comment on the theme of the play "Reunion".

Or

(b) Describe the incident that leads to Yassin's transformation.

14. (a) Compare and contrast the characters of Jean and Pierre.

Or

(b) In what way does the lieutenant try to help the girl?

15. (a) As a sports secretary of your college, draft a notice asking the students to give their names for participation in various events to be held on the Annual Sports Day.

Or

(b) Describe your favourite hobby.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Trace the elements of humour in R.K. Narayan's "A Hero".

17. Consider "The proposal" as a comedy.

18. How do you prove that personal ambition leads to selfishness?

19. How does the play "A kind of justice" gain a universal appeal?

20. Do as directed

    (a) Riya looks happier than Diya. (into positive)

    (b) Shiva is one of the most intelligent students in the class. (into comparative)

    (c) Gold is more precious than any other metal. (into superlative)

    (d) No other poet is as great as Wordsworth. (into comparative)

    (e) John is not so smart as James. (into comparative)

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D–6168

Sub. Code
11333

DISTANCE EDUCATION

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

Third Semester

DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Define degree of a differential equation.

2. Solve $e^x \tan y dx + (1 - e^x) \sec^2 y dy = 0$.

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

4. Find the particular integral of $(D^2 + 2D + 1)y = 2e^{3x}$.

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

6. Verify the condition of integrability in the equation $(y+z)dx+(z+x)dy+(x+y)dz=0$.

7. Eliminate a and b *from* $z = ax + by + a$.

8. Solve : $p^2 + q^2 = 4$.

9. Find the complete integral of $z = px + qy + \sqrt{1 + p^2 + q^2}$.

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

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Solve : $(x^2 + y^2)(x\,dx + ydy) = a^2(xdy - ydx)$.

Or

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

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

Or

(b) Solve $(x^2y - 2xy^2)dx - (x^3 - 3x^2y)dy = 0$.

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

Or

(b) Solve $(D^2 + 4)y = x \sin x$.

14. (a) Eliminate f and ϕ from $z = f(x + ay) + \phi(x - ay)$.

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 : $(1 - x)p + (2 - y)q = 3 - z$.

Or

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

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

Answer any THREE questions.

16. Solve :

(a) $x - yp = ap^2$

(b) $p^2 y + p(x - y) - x = 0$.

17. Solve : $(D^3 - 2D + 4)y = e^x \cos x$.

18. Solve : $x^2 \frac{d^2y}{dx^2} + 4x\frac{dy}{dx} + 2y = e^x$.

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

20. Obtain the complete integral of

(a) $xp^2 - ypq + y^3 q - y^2 z = 0$

(b) $2xz - px^2 - 2qxy + pq = 0$.

D–6169

Sub. Code
11334

DISTANCE EDUCATION

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

Third Semester

MECHANICS

(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 parallelogram law of forces.

2. Define like and unlike force.

3. Define couples.

4. Define moment of a force.

5. Define passive force.

6. Write the necessary and sufficient conditions that a system of coplanar force acting on a rigid body may be in equilibrium.

7. Define span and sag.

8. Define projectile.

9. Define simple harmonic motion.

10. Define centre of the force.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) The resultant of two forces P, Q acting at a certain angle is X and that of P, R acting at the same angle is also X. The resultant of Q, R again acting at the same angle is Y. Prove that $P = (X^2 + QR)^{\frac{1}{2}} = \dfrac{QR(Q+R)}{Q^2 + R^2 - Y^2}$.

Or

(b) ABC is a triangle G is its centroid and P is any point in the plane of the triangle. Show that the resultant of forces represented by $\overline{PA}, \overline{PB}, \overline{PC}$, is $3\overline{PG}$ and find position of P, if the three forces are in equilibrium.

12. (a) Forces acting at a point are represented in magnitude and direction by $\overline{AB}, \overline{2BC}, \overline{2CD}, \overline{DA}$ and $\overline{DB}$ where $ABCD$ is a square. Show that the force are in equilibrium.

Or

(b) Prove that if three parallel forces are in equilibrium, each is proportional to the distance between the other two.

13. (a) Forces of magnitude 1, 2, 3, 4, $2\sqrt{2}$ act respectively along the sides AB, BC, CD, DA and the diagonal AC of the square $ABCD$. Show that their resultant is a couple and find its moment.

Or

(b) Forces 3, 2, 4, 5 Kg wt. act respectively along the sides AB, BC, CD and DA of a square. Find the magnitude of their resultant and the points where its line of action meets AB and AD.

14. (a) Find the range on the horizontal plane through the point of projection.

Or

(b) A jet of water leaves a nozzle of 3 cm. diameter at a speed of 2 m/sec. and impinges normally on a plane inelastic wall so that the velocity of the water is destroyed on reaching the wall. Calculate in gm. Weight the thrust on the wall.

15. (a) A particle of map m gms. Moves on a smooth horizontal table and is connected by a string of length 1 cm. with a fixed point on the table : if the greatest weight that the string can support be that of a mass of M gms, find the greatest number of revolutions per second that the particle can make without breaking the string.

Or

(b) If the displacement of a moving point at any time be given by an equation of the form $x = a\cos wt + b\sin wt$, show that the motion is a simple harmonic motion. If $a = 3, b = 4, w = 2$ determine the period, amplitude, maximum velocity and maximum acceleration of the motion.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. State and prove the Lami's theorem.

17. If any number of forces acting on a rigid body be represented in magnitude, direction and line of action by the sides of a polygon taken in order. Prove that they are equivalent to a couple whose moment is twice the area of the polygon.

18. A smooth circular table is surrounded by a smooth rim whose interior surface is vertical. Show that a ball projected along the table form a point A on the rim in a direction making an angle a with the radius through A will return to the point of projection after two impacts if $\tan\alpha = \dfrac{e^{(3/2)}}{\sqrt{1+e+e^2}}$.

19. A smooth sphere of mass m_1 impinges directly with velocity u_1 on another smooth sphere of mass m_2, moving in the same direction with velocity u_2; if the coefficient of restitution is e, find their velocities after the impact.

20. Derive the pedal equation of the central orbit.

D–6080

Sub. Code
41A/13741

DISTANCE EDUCATION

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

Fourth Semester

Part I — TAMIL PAPER - IV

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

Time : Three hours Maximum : 75 marks

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

அனைத்து வினாக்களுக்கும் ஓரிரு வரிகளில் விடை தருக.

1. செய்யுள் உறுப்புகள் எத்தனை? அவை யாவை?
2. கீர்த்தனை என்றால் என்ன?
3. குறியீடு என்றால் என்ன?
4. எட்டுத் தொகையில் புற நூல்கள் எத்தனை? அவை யாவை?
5. வரைவு என்றால் என்ன?
6. காஞ்சி என்றால் என்ன?
7. அணிகளுக்கு எல்லாம் தாயாக விளங்கும் அணி எது?
8. பின்வருநிலை என்றால் என்ன?
9. சீவக சிந்தாமணியின் ஆசிரியர் பெயர் யாது?
10. பதினெண்கீழ்கணக்கில் அக நூல்கள் எத்தனை? ஏதேனும் இரண்டினை கூறுக.

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

அனைத்து வினாக்களுக்கும் ஒரு பக்க அளவில் விடை தருக.

11. (அ) ஆசிரியப்பா குறித்து எழுதுக?

(அல்லது)

(ஆ) படிமம் - விளக்குக.

12. (அ) கையறுநிலை - விளக்குக.

(அல்லது)

(ஆ) உடன் போக்கு - விளக்குக.

13. (அ) தற்குறிப்பேற்ற அணியைச் சான்றுடன் விளக்குக.

(அல்லது)

(ஆ) பிறிது மொழிதல் அணியைச் சான்றுடன் விளக்குக.

14. (அ) பாஞ்சாலி சபதத்தில் இடம் பெறும் சபதங்கள் குறித்து எழுதுக.

(அல்லது)

(ஆ) இயேசுவின் பன்னிரு சீடர்கள் குறித்து எழுதுக.

15. (அ) புதிய யாப்பு வடிவங்கள் குறித்து எழுதுக.

(அல்லது)

(ஆ) கலிப்பா குறித்து விளக்குக.

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

பின்வரும் வினாக்களுக்கு மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. பாவகைகளுள் ஆசிரியப்பா பெறுமிடம் குறித்து கட்டுரைக்க.

17. தொடை குறித்து கட்டுரைக்க.

18. உருவக அணியின் வகைகளைச் சான்றுடன் விவரி.

19. அறத்தொடு நிற்றல் - விவரி.

20. மௌன மயங்கங்களில் சிற்பி கூறும் கருத்துக்களை விவரி.

D–6081

Sub. Code
41B

DISTANCE EDUCATION

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

Fourth Semester

Part I — HUMAN SKILLS DEVELOPMENT - II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Why is counseling important?

2. Name the types of managerial skills.

3. Write the difference between technical skill and human skill.

4. What is presentation?

5. How do you define organization skills?

6. What makes a good leader?

7. State the importance of understanding skills.

8. Why is it important to understand individuals in an organization?

9. How do you handle a problem at workplace?

10. What is social responsibility?

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Explain the purpose of guidance and counselling.

Or

(b) How can communication strengthen the human relationship?

12. (a) Write notes on conceptual skills.

Or

(b) What do you to improve your technical skills?

13. (a) How do you grab the attention of the audience in a presentation?

Or

(b) What are the essential multi-tasking skills?

14. (a) Identify the major interactions between community and society?

Or

(b) Explain the role of an individuals in an organization.

15. (a) How do you handle a social problem?

Or

(b) Examine the importance of cooperative learning skills.

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

Answer any THREE questions.

16. Explain the importance and techniques of counselling.

17. How do you plan and prepare for a presentation?

18. Describe the different types of organization skills.

19. Elaborate on understanding skills.

20. List out the merits and demerits of social responsibilities.

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D–6082

Sub. Code
42/13742

DISTANCE EDUCATION

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

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 × 2 = 20 marks)

Answer ALL questions.

1. Write about the character of Lalajee in Jim Corbett's story *Lalajee.*

2. What is the central theme of Hemingway's *A Day's Wait?*

3. Mention Eliza Doolittle's transformation in *Pygmalion* by G.B. Shaw.

4. How does R.K. Narayan portray childhood in *Swami and Friends?*

5. What is the theme of redemption in *The Winter's Tale?*

6. Write the significance of fate in *Romeo and Juliet.*

7. What were Nehru's contributions to India's independence, according to A.J. Toynbee?

8. What does grammar skills contribute to effective communication in academic writing?

9. What lesson do the two old men learn in Tolstoy's *Two Old Men?*

10. What social issues does Shaw critique in *Pygmalion?*

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Describe how Jim Corbett portrays the socio-economic background of Lalajee in *Lalajee.*

Or

(b) Explore the significance of the relationship between father and son in Hemingway's *A Day's wait*.

12. (a) Describe the significance of class distinctions in G.B. Shaw's *Pygmalion.*

Or

(b) Explore the theme of colonialism and identity in R.K. Narayan's *Swami and Friends.*

13. (a) Describe the concept of mercy versus justice in *The Merchant of Venice.*

Or

(b) Explore the role of free will in Shakespeare's *Romeo and Juliet.*

14. (a) Analyze Jawaharlal Nehru's vision for modern India as portrayed by A.J. Toynbee.

Or

(b) Delineate Martin Luther King Jr.'s vision for racial equality as described by R.N. Roy.

15. (a) What does Tolstoy suggest about human resilience and faith in *Two Old Men?*

Or

(b) Analyse the role of education and its transformative power in *Swami and Friends*.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Examine the moral lesson conveyed in Tolstoy's *Little Girls Wiser Than Men*.

17. What does Shaw suggest about gender roles through the characters of Eliza and Higgins in *Pygmalion?*

18. Analyze the roles of secondary characters such as Mercutio, Tybalt, and the Nurse in *Romeo and Juliet*.

19. Examine how Martin Luther King Jr.'s Christian beliefs influenced his approach to civil rights activism as portrayed by R.N. Roy.

20. What does the Winter's tale suggest about forgiveness and reconciliation?

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D–6170

Sub. Code
11343

DISTANCE EDUCATION

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

1. Define countably infinite set. Give an example.

2. Define metric space.

3. Show that $B(a, \gamma)$ is a bounded set.

4. Define continuous function.

5. Define homoeomorphism.

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

7. Define monotonic function.

8. Define contraction mapping.

9. Show that {0, 1} is not a connected subset of $\mathbb{R}$ with discrete metric.

10. Show that $\mathbb{R}$ with usual metric is not compact.

SECTION B — $(5 \times 5 = 25$ marks)

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

11. (a) Prove that (0, 1] is uncountable.

Or

(b) Determine whether $d(x,y)$ defined on $\mathbb{R}$ by $d(x,y) = (x-y)^2$ is a metric or not.

12. (a) In any metric space (M,d), prove that each open ball is an open set.

Or

(b) Let (M,d) be a metric space. Let $A, B \subseteq M$. Prove that $\overline{A \cup B} = \overline{A} \cup \overline{B}$.

13. (a) Prove that f is continuous if and only if inverse image of every open set is open.

Or

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

14. (a) Let $f : [a,b] \to \mathbb{R}$ be a continuous function. Prove that f is integrable.

Or

(b) Let f and g be integrable on $[a,b]$. If $f(x) \leq g(x)$ for all $x \in [a,b]$, then prove that $\int_a^b f\,dx \leq \int_a^b g\,dx$.

15. (a) State and prove that intermediate value theorem.

Or

(b) Prove that the continuous image of a compact metric space is compact.

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

Answer any THREE questions.

16. State and prove Holder's inequality.

17. Let (M, d) be a metric space. Define $\delta(x, y) = \dfrac{d(x, y)}{1 + d(x, y)}$.
Prove that d and δ are equivalent metrics on M.

18. State and prove Taylor's theorem.

19. State and prove that first mean value theorem.

20. Prove that a metric space M is compact if and only if any family of closed sets with finite intersection property has non-empty intersection.

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D–6171

Sub. Code
11344

DISTANCE EDUCATION

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

Fourth Semester

STATISTICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL the questions.

1. Define arithmetic mean.

2. Define median of a frequency distribution.

3. Define percentile.

4. Find the value of c for the probability density function $f(x) = c\left[\frac{1}{3}\right]^x$; $x = 1,2,\ldots$

5. Show that $E = 1 + \Delta$.

6. Find the first order difference for the function e^x, by taking $h = 1$.

7. Define attributes.

8. Check whether the attributes A and B are independent given that $(A) = 30, (B) = 60, (AB) = 12, N = 150$.

9. Define ideal index number.

10. Explain cylindrical variation.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Prove that the algebraic sum of the deviation of a set of n values from their arithmetic means is zero.

Or

(b) Find the median and quartile marks of 10 students in statistics test whose marks are given as

40, 90, 61, 68, 72, 43, 50, 84, 75, 33.

12. (a) Given $\Sigma x_i = 99$; $n = 9$; $\Sigma(x_i - 10)^2 = 79$. Find Σx_i^2. Hence find σ^2.

Or

(b) Prove that $\sigma^2 = S^2 - d^2$ where $d = \overline{x} - A$.

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) Prove that the correlation coefficient is independent of the change of origin and scale.

14. (a) Find $\Delta^n \sin x$ taking $h = 1$.

Or

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

15. (a) From the following data, construct the aggregate index number for 1991 taking 1990 as the base :

Commodities	Price in 1990 Rs.	Price in 1991 Rs.
A	50	70
B	40	60
C	80	90
D	110	120
E	20	20

Or

(b) From the fixed base index numbers given below prepare a chain base index numbers.

Year	1975	1976	1977	1978	1979	1980
Fixed base index number	90	105	102	98	120	125

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

Answer any THREE questions.

16. The following table gives the monthly wages of workers in a factory. Computer (a) standard deviation (b) quartile deviation and (c) coefficient of variation.

Monthly wages	No. of workers	Monthly wages	No. of workers
125-175	2	375-425	4
175-225	22	425-475	6
225-275	19	475-525	1
275-325	14	525-575	1
325-375	3	Total	72

17. Fit a second degree parabola to the following data taking x as the independent variable.

x	1	2	3	4	5	6	7	8	9
y	2	6	7	8	10	11	11	10	9

18. Ten students obtained the following percentage of marks in the college internal test (x) and in the final university examination (y). Find the correlation coefficient between the marks of the two tests.

x	51	63	63	49	50	60	65	63	46	50
y	49	72	75	50	48	60	70	48	60	56

19. Population was recorded as follows in a village.

Years	1941	1951	1961	1971	1981	1991
Population	2500	2800	3200	3700	4350	5225

Estimate the population for the year 1945.

20. Construct, with the help of data given below, Fisher's index number and show that it satisfies both factor reversal test and time reversal test.

Commodity	A	B	C	D
Base year price in rupees	5	6	4	3
Base year quantity in quintals	50	40	120	30
Current year price in rupees	7	8	5	4
Current year quantity in quintals	60	50	110	35

D–6172

Sub. Code
11351

DISTANCE EDUCATION

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

Fifth Semester

MODERN 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. Define power set of a set. Give an example.

2. Define equivalence relation. Give an example.

3. Show that in a group G, $x^2 = x$ if and only if $x = e$.

4. Define normal subgroup. Give an example.

5. Show that $(Z, +) \cong (2Z, +)$.

6. Show that $(nZ, +, \cdot)$ is a ring.

7. Define field. Give an example.

8. Define ideal of a ring R.

9. Show that R is not a vector space over C.

10. Define inner product space.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) For any three sets A, B and C, prove that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$.

Or

(b) If A, B, C are any three finite sets, then prove that

$$|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |B \cap C| - |C \cap A| + |A \cap B \cap C|.$$

12. (a) Let G be a group in which $(ab)^m = a^m b^m$ for three consecutive integers and for all $a, b \in G$. Prove that G is abelian.

Or

(b) Let H he a subgroup of G. Then prove that any two left cosets of H are either identical or disjoint.

13. (a) Prove that the intersection of two normal subgroups of a group G is a normal subgroup of G.

Or

(b) Prove that any unit in a ring R cannot be a zero-divisor.

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

Or

(b) Prove that any Euclidean domain R is a principal ideal domain.

15. (a) Let $T:V \to W$ be a linear transformation. Prove that $T(V) = \{T(V) / v \in V\}$ is a subspace of W.

Or

(b) Let V be a finite dimensional inner product space and let W be a subspace of V. Prove that $(W^{\perp})^{\perp} = W$.

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

Answer any THREE questions.

16. Prove that any permutation can be expressed as a product of disjoint cycles.

17. State and prove Euler's theorem.

18. State and prove Cayley's theorem.

19. State and prove the fundamental theorem of homomorphism on rings.

20. Let V be a finite dimensional vector space over a field F. Let A and B be subspaces of V. Prove that $\dim(A+B) = \dim A + \dim B - \dim(A \cap B)$.

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D–6173

Sub. Code
11352

DISTANCE EDUCATION

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

Fifth Semester

OPERATIONS RESEARCH

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL the questions.

1. Define an optimum value.

2. What are the situations, where operations research techniques will be applicable?

3. Define primal variables.

4. Define dual constraints.

5. What is meant by cycling?

6. Define feasible solution.

7. What is meant by balanced transportation problem?

8. Discuss about traveling salesman problem.

9. Define saddle point.

10. Define network.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Use simplex method to solve the LPP :

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

$10x_1 + 8x_2 \leq 800$
$x_1 \leq 60$
$x_2 \leq 75$
$x_1, x_2 \geq 0.$

Or

(b) Solve graphically the LPP

Maximize $z = 15x_1 + 10x_2$ subject to

$4x_1 + 6x_2 \leq 360$; $x_1 \leq 60$; $x_2 \leq 40$; $x_1 . x_2 \geq 0$.

12. (a) Use simplex method to find the inverse of the matrix $A = \begin{pmatrix} 2 & 1 \\ 3 & 2 \end{pmatrix}$.

Or

(b) Form the dual of the following primal LPP

Maximize $z = 4x_1 + 10x_2 + 25x_3$ subject to

$2x_1 + 4x_2 + 8x_3 \leq 25$
$4x_1 + 9x_2 + 8x_3 \leq 30$
$x_1, x_2, x_3 \geq 0.$

13. (a) Write down the dual of the following LPP and solve it. Hence write down the optimum solution of the primal if exists.

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

$$x_1 - x_2 \le 1$$
$$x_1 + x_2 \le 3\,.$$
$$x_1 + x_2 \ge 0$$

Or

(b) Using dual simplex method to solve the LPP

Maximize $z = -x_1 - x_2$ subject to

$$2x_1 + x_2 \ge 2$$
$$-x_1 - x_2 \ge 1$$
$$x_1, x_2 \ge 0.$$

14. (a) Prove that the optimal solution to the assignment problem remains the same if a constant is added or subtracted to any row or column of the cost matrix.

Or

(b) Given the cost matrix for traveling the cities A, B, C, D by a traveling salesman.

	A	B	C	D
A	∞	46	16	40
B	41	∞	50	40
C	82	32	∞	60
D	40	40	36	∞

Find the assignment schedule of the traveling salesman so as to minimize the traveling cost.

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

		Player B		
		B_1	B_2	B_3
	A_1	1	3	1
Player A	A_2	0	–4	–3
	A_3	1	5	–1

Or

(b) A and B play game in which each has three coins, a 5 p; a 10 p and a 20 p. Each select a coin without the knowledge of the other's choice. If sum of the choice. If sum of the coins is an odd amount, A wins B's coin, if the sum is even, B wins A's coin. Find the best strategy for each player and the value of the game.

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

Answer any THREE questions.

16. Solve the problems using Simplex method.

Maximize $z = 6x_1 + 9x_2$ subject to

$2x_1 + 2x_2 \le 24;\ x_1 + 5x_2 \le 44;\ 6x_1 + 2x_2 \le 60,\ x_1, x_2 \ge 0.$

17. Using Big-M method, solve the following LPP

Minimize $z = 4x_1 + x_2$ subject to

$3x_1 + x_2 = 3$ ....(1)

$4x_1 + 3x_2 \geq 6$ ....(2)

$x_1 + 2x_2 \leq 4$ ....(3)

$x_1, x_2 \geq 0$.

18. Solve the following TP.

	C	D	E	Availability
A	3	7	3	6
B	2	3	9	8
Requirement	4	7	3	14 / 14

19. Solve the assignment problem

	A	*B*	*C*	*D*
a	3	6	2	6
b	7	1	4	4
c	3	8	5	8
d	6	4	3	7
e	5	2	4	3
f	5	7	6	2

20. Construct the network diagram comprising activities $B, C, ...Q$ and N such that the following constraints are satisfied : $B < E, F; C < G, L; E, G < H; L, H < I; L < M;$ $H, M < N; H < J; I, J < P; P < Q$. The notation $X < Y$ means that activity X must be finished before Y can begin.

D–6174

Sub. Code
11353

DISTANCE EDUCATION

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

Fifth Semester

NUMERICAL ANALYSIS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. What is the order of convergence of Newton – Raphson method?

2. Find $\Delta(\cos 2x)$.

3. Show that $\Delta = E - 1$.

4. State the Newton's backward difference interpolation formula.

5. Write Bessel's formula.

6. Solve : $y_{x+2} - 4y_{x+1} + 4y_x = 0$.

7. Define Weddle's rule.

8. What are the merits and demerits of Taylor's method?

9. Write the formula for second order R-K method.

10. Give the formula for Milne's predictor corrector method.

SECTION B — (5 × 5 = 25 marks)

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

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

Or

(b) Find the root of $2\sin x = x$ by Newton's – Raphson method.

12. (a) Solve the using Gauss – Jordan method :

$10x + y + z = 12$

$2x + 10y + z = 13$

$x + y + 5z = 7.$

Or

(b) Prove that :

(i) $\Delta + \nabla = \frac{\Delta}{\nabla} - \frac{\nabla}{\Delta}$

(ii) $hD = \log(1+\Delta) = -\log(1-\nabla) = \sin^{-1} h(\mu\delta)$.

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

x	2	3	5	8	13
y	24	32	84	108	208

Or

(b) Find the Newton's forward interpolation polynomial from its following table :

x	4	6	8	10
$f(x)$	1	3	8	16

14. (a) Evaluate $\int_0^{10} \frac{dx}{1+x^2}$ using Simpson's 1/3rd rule.

Or

(b) Solve $y_{n+1} = \sqrt{y_n}$.

15. (a) Using Taylor's method, find $y(0.1)$ from $\frac{dy}{dx} + 2xy = 1$, $y(0) = 0$.

Or

(b) Discuss the Euler's method for solving differential equations.

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

Answer any THREE questions.

16. Find the root of $xe^x - 3 = 0$ by Regula Falsi method correct to three decimal places.

17. Find the inverse of the matrix $A = \begin{bmatrix} 2 & 1 & 1 \\ 3 & 2 & 3 \\ 1 & 4 & 9 \end{bmatrix}$ using Gaussian method.

18. Using Bessel's formula find $f(25)$ given $f(20) = 2854$, $f(24) = 3162$, $f(28) = 3544$ and $f(32) = 3992$.

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

20. By applying the fourth order Runge – Kutta method find $y(0.2)$ from $y' = y - x$, $y(0) = 2$ taking $h = 0.1$.

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D–6175

Sub. Code
11354

DISTANCE EDUCATION

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

Fifth Semester

TRANSFORM TECHNIQUES

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Show that $L(e^{-at}) = \frac{1}{s+a}$.

2. Find $L[t.e^{-at}]$.

3. Find $L^{-1}\left[\frac{s}{s^2+2s+5}\right]$.

4. Find a_0 of the Fourier series expansion of $f(x) = k$ in $(0, 2\pi)$.

5. If $f(x)$ is an even function then prove that $\int_{-a}^{a} f(x)\,dx = 2\int_{0}^{a} f(x)\,dx$.

6. Prove that $F[af(x) + b\phi(x)] = aF[f(x)] + bF[\phi(x)]$.

7. Prove that $F_c[f(ax)] = \frac{1}{a} F_c(s/a)$.

8. If $f(x) = 1, -1 \le x \le 1$, find the Fourier cosine transform.

9. Define z-transform.

10. Find the inverse z-transform of $\frac{z}{z-a}$.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Prove that $L[t^n] = \frac{\Gamma(n+1)}{s^{n+1}}$, if $s > 0$ and $n > -1$.

Or

(b) Find $L[\cosh at \cos at]$.

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

Or

(b) Solve $3\frac{dx}{dt} + \frac{dy}{dt} + 2x = 1, \frac{dx}{dt} + 4\frac{dy}{dt} + 3y = 0$ where $x(0) = 0, y(0) = 0$.

13. (a) Obtain the Fourier series expansion to represent the functions $f(x) = e^{-x}$ in $-\pi < x < \pi$.

Or

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

14. (a) Find the Fourier sine transform of the function $f(x) = xe^{-ax}$.

Or

(b) State and prove Parserval's identity in Fourier transform.

15. (a) Prove that $Z\left(ka^k\right) = \frac{az}{(z-a)^2}$.

Or

(b) Find $Z\{n(n-1)\}$.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. State and prove initial and final value theorem on Laplace transform.

17. Solve $y''+2y'-3y = \sin t;\ y = y' = 0$ when $t = 0$.

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

19. Find the Fourier transform of $f(x) = \begin{cases} \cos ax, & if \quad |x| < 1 \\ 0, & if \quad |x| > 1 \end{cases}$.

20. Solve $u_{n+2} + 2u_{n+1} + u_n = n$, with $u_0 = u_1 = 0$, by using z-transform.

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D–6176

Sub. Code
11361

DISTANCE EDUCATION

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

Sixth Semester

DISCRETE MATHEMATICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours　　　　　　　　Maximum : 75 marks

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

Answer ALL the questions.

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

2. Define tautology.

3. Define conjuctive normal form.

4. Define equivalence relation. Give an example.

5. Define lattice homomorphism.

6. Define hamming distance. Give an example.

7. Define bipartile graph. Give an example.

8. What is meant by chromatic number of a graph?

9. Define acyclic graph and a tree.

10. Define connectivity of a graph.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Construct the truth table for

$$((P \wedge \neg Q) \rightarrow R) \rightarrow (P \rightarrow (Q \vee R)).$$

Or

(b) Show the following equivalence

$(P \rightarrow Q) \wedge (R \rightarrow Q) \Leftrightarrow (P \vee R) \rightarrow Q$.

12. (a) Obtain disjunctive normal forms of $\neg(P \vee Q) \rightleftarrows (P \wedge Q)$.

Or

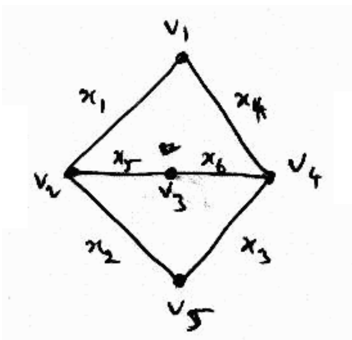
(b) Show that $(x)(H(x) \rightarrow M(x)) \wedge H(s) \Rightarrow M(s)$.

13. (a) Show that $\neg(P \wedge Q)$ follows from $\neg P \wedge \neg Q$.

Or

(b) Let $(L, \leq)$ be a lattice. For any $a, b \in L$, prove that $a \leq b \Leftrightarrow a \wedge b = a$.

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



Or

(b) Show that $K_p - v = K_{p-1}$ for any vector v of K_p.

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

Or

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

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

Answer any THREE questions.

16. Construct the truth tale for $((P \to Q) \wedge (Q \to R)) \to (P \to R)$.

17. Obtain the principal conjunctive normal form of $(P \to (Q \wedge R) \wedge (\urcorner P \to (\urcorner Q \wedge \urcorner R))$.

18. Show that in a complemented distributive lattice, the following are equivalent :

(a) $a \leq b$

(b) $a \wedge b' = 0$

(c) $a' \vee b = 1$

(d) $b' \leq a'$.

19. For any graph G, the chromatic number $\subset (G) \leq 1 + \max \delta(G')$, where the maximum is taken over all induced subgraphs G' of G.

20. If G is a graph with $p \geq 3$ vertices and $\delta \geq p/2$ then prove that G is Hamiltonian.

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D–6177

Sub. Code
11362

DISTANCE EDUCATION

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

Sixth Semester

FUZZY 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. Define indexed set.

2. Define characteristic function.

3. Define the range of a crisp binary relation.

4. Define equivalence relation.

5. Define α – cut of a fuzzy set.

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

7. Define Hamming fuzziness.

8. State the principle of minimum cross-entropy.

9. Define a principle of indifference.

10. Define R-norm entropy.

SECTION B — ($5 \times 5 = 25$ marks)

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

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

Or

(b) Prove that $i(a,b) = \min(a,b)$ is the only continuous and idempotent fuzzy set intersection.

12. (a) Prove that for all $a,b \in [0, 1]$, $u(a,b) \leq u_{\max}(a,b)$.

Or

(b) Prove that the surgeon complements are monotonic non increasing for all $\lambda \in (-1, \infty)$.

13. (a) Solve the following fuzzy relation equation

$$P \circ \begin{bmatrix} .5 & .7 & 0 & .2 \\ .4 & .6 & .1 & 0 \\ .2 & .4 & .5 & .6 \\ 0 & .2 & 0 & .8 \end{bmatrix} = \begin{bmatrix} .5 & .5 & .4 & .2 \end{bmatrix}.$$

Or

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

14. (a) Prove that the conditional entropy $H(X/Y) \leq H(X)$.

Or

(b) Explain the two conditional entropies defined in terms of weighted averages and a joint entropy defined in terms of joint probability distribution on $X \times Y$.

15. (a) Prove that the V – uncertainty is subadditive.

Or

(b) Show that the measures of fuzziness defined by both equations $f(A) = -\sum_{x \in X} (\mu_A(x) \log_2 \mu_A(x) + [1 - \mu_A(x)]$ $\log_2[1 - \mu_A(x)])$ and $f_c(A) = |x| - \sum_{x \in X} |\mu_A(x) - c(\mu_A(x)|$ express fuzziness in bits.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Prove that the fuzzy set operations of union, intersection and continuous complement that satisfy the law of excluded middle and the law of contradiction are not idempotent or distributive.

17. Prove that the max-min composition and min join are associative operations on binary fuzzy relations.

18. (a) Prove that for all $a, b \in [0, 1]$, $u(a, b) \geq \max(a, b)$.

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

19. Prove that the joint entropy $H(X, Y) \leq H(X) + H(Y)$.

20. Consider the subsets $A \cap B$, $A \cap C$, $B \cap C$ and $A \cap B \cap C$ of the universal set X. Estimate $m(A \cap B)$, $m(A \cap C)$, $m(B \cap C)$, $m(A \cap B \cap C)$ and $m(X)$ from $m(A \cap B) + m(A \cap B \cap C) = .2$, $m(A \cap C) + m(A \cap B \cap C) = 0.5$ and $m(B \cap C) + m(A \cap B \cap C) = .1$.

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D–6178

Sub. Code
11363

DISTANCE EDUCATION

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

Sixth Semester

COMPLEX 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. Find one value of arg z when $z = i$.

2. Show that the function $f(z) = \text{Re}\, z$ is nowhere differentiable.

3. Define harmonic function.

4. Write the general form of Fibonacci numbers.

5. Find the invariant point of $w = z + 3$.

6. Define bilinear transformation.

7. Define essential singularity.

8. Find the pole of $f(z) = \dfrac{e^z}{z}$.

9. Find the residue of $\cot z$ at $z = 0$.

10. State the fundamental theorem of algebra.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Find the radius of convergence of the series $\sum_{n=1}^{\infty} \frac{z^n}{n^2}$.

Or

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

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

Or

(b) Find the bilinear transformation which maps $z = -1, 1, \infty$ to $w = -i, -1, i$ respectively.

13. (a) Prove that the transformation given by $\overline{a}wz - bw - \overline{b}z + a = 0$ maps unit circle $|z| = 1$ onto the unit circle $|w| = 1$ if $|b| \neq |a|$.

Or

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

14. (a) Evaluate using Cauchy's integral formula $\frac{1}{2\pi i}\int_c \frac{z^2+5}{z-3}\,dz$ where c is $|z| = 4$.

Or

(b) State and prove Morera's theorem.

15. (a) State and prove argument theorem.

Or

(b) Using residue theorem evaluate $\int_c \frac{2z^2+4}{z^2-1} dz$ where c is $|z| = 2$.

SECTION C — (3 × 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 $u + v = \frac{\sin 2x}{\cosh 2y - \cos 2x}$.

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 show that this transformation maps the circular disc $|z| \le 1$ onto the circular disc $|w| \le 1$ if and only if $|\infty| < 1$.

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

20. Using contour integration evaluate $\int_0^{2\pi} \frac{d\theta}{2 + \cos\theta}$.

D–6179

Sub. Code
11364

DISTANCE EDUCATION

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

Sixth Semester

COMBINATORICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. What is the coefficient of x^2y^4 in $(x+y)^6$?

2. Define generating function.

3. Find the sequence corresponding to the generating function $(3+x)^3$.

4. How many permutations are there in the set $\{r, s, t, u\}$?

5. Define the exponential generating function.

6. Define the conjugate ordering.

7. Define Euler function.

8. Define chromatic polynomial of a graph G.

9. Define cycle permutation.

10. Let A and B be polynomials in the indeterminates $s_1, s_2, ...$ Then, what is meant by plethysm of A by B?

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Prove that the number of surjections of the n-set into m-set A is $m!S_n^m$.

Or

(b) In how many ways can 5 men and 5 women be seated in a round table if no two women may be seated side by side?

12. (a) Let n be a positive integer. Prove that the ordinary enumerator for the partitions of n into unequal parts is $(1-t)(1-t^2)(1-t^3)\cdots$

Or

(b) Prove that $\sum_{\phi \in R^D} W(\phi) = \left[\sum_r W(r)\right]^{|D|}$.

13. (a) Find the coefficient of x^5 in $(a+bx+cx^2)^9$.

Or

(b) For $m,n,p \geq 1$ with $m+p \geq p$, prove that $\binom{m+p}{n} = \sum_{k=0}^{n} \binom{m}{k}\binom{p}{n-k}$.

14. (a) In how many ways can 5 married couples be seated at a circular table (with labeled seats) such that men and women alternate, but no husband sits next to his wife?

Or

(b) Define G – equivalents function and prove that G – equivalence is an equivalence relation on the set R^D of all functions from D to R.

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

Or

(b) Fine the number of different octahedral molecules of the type MABCDEF, where M is the metal atom at the center.

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

Answer any THREE questions.

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

17. Prove that $\phi_{\lambda\mu}$ is the number of metrices of non-negative integers with column totals $\lambda_1, \lambda_2, ...,$ and row totals $\mu_1, \mu_2, ...$ Also show that the matrix ϕ is symmetric.

18. State and prove multinomial theorem.

19. How many non-equivalent ways are there to colour the corners of a square with the colours red, white and blue?

20. State and prove Burnside's theorem.

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