D–1118

Sub. Code
11A

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./ B.B.A./B.B.A. (BANKING)/ B.C.A./ M.B.A. (5 Years Integrated) DEGREE EXAMINATION, DECEMBER 2021.

First Semester

Part I – TAMIL PAPER I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

அனைத்து வினாக்களுக்கும் விடையளிக்க.

1. மூடிவைத்த பாத்திரத்தில் எத்தனைப் படி நெய் இருந்தது?
2. கோபாலனின் குழலைக் கேட்டப் பசுக்கள் என்ன செய்தன?
3. கோபத்தில் ஆழ்ந்திருந்த ராதாவிடம் கண்ணன் தந்தது என்ன?
4. பட்டுக்கோட்டை கல்யாண சுந்தரம் பிறந்த ஊர் யாது?
5. ‘கண்ணன் என் விளையாட்டுப் பிள்ளை’ எனப் பாடியவர்?
6. ‘சிறுகதை ஆசான்’ எனப் போற்றப்படுபவர் யார்?
7. ‘குடிமக்கள் காப்பியம்’ எனப்படும் காப்பியம் எது?
8. கம்பராமாயணத்தின் எக்காண்டத்தில் மந்திரப் படலம் அமைந்துள்ளது?
9. ‘சீறத்’ - பெயர்காரணம் தருக.
10. தேம்பாவணி ஆசிரியரின் இயற்பெயரைக் குறிப்பிடுக.

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

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) ஆயர்பாடி மாளிகையில் கண்ணன் செய்தனவற்றை எழுதுக.

(அல்லது)

(ஆ) தொழிலின் சிறப்புகளைப் பட்டுக்கோட்டை கல்யாணசுந்தரம் உரைக்குமாற்றை விளக்குக.

12. (அ) ஏழை மற்றும் செல்வந்தரைப் பற்றிப் பாரதிதாசன் உரைப்பனவற்றை எழுதுக.

(அல்லது)

(ஆ) நோய்க்கு அறிகுறிகளாக நாமக்கல் கவிஞர் கூறுவனவற்றை விளக்குக.

13. (அ) பாரதத்தின் பெருமைகளைச் சிதைக்கும் நோய்கள் என நாமக்கல் கவிஞர் எவற்றைக் கூறுகிறார்?

(அல்லது)

(ஆ) வயிறு ஜீவனாக விளக்குவதைக் கவிஞர் ஷண்முக சுப்பையா எவ்வாறு விளக்குகிறார்?

14. (அ) கண்ணகி வாயில் காவலர்க்குத் தன்வரவினை உரைக்குமாற்றை எழுதுக.

(அல்லது)

(ஆ) இராமன் வருகையையும் நகரில் நடந்தனவற்றையும் கம்பர் எங்ஙனம் பாடுகிறார்?

15. (அ) சாந்தியின் வினாக்களுக்குத் தாய் மேரி அளித்த விடை யாது? விளக்குக.

(அல்லது)

(ஆ) 'இறைவனின் தூதன்' என்று சான்று காட்டிய நபிகளின் செயல்களை விவரிக்க.

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

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. கண்ணன் - என் விளையாட்டுப் பிள்ளை எனப் பாரதியார் பாடுமாற்றை விவரிக்க.

17. பாரதிதாசன் உலகப்பன் பாட்டு வழிக் கூறும் உண்மைகளை எடுத்துரைக்க.

18. மோசிகீரனார் வரலாற்றை ஞானக்கூத்தன் எடுத்துரைக்குமாற்றை விவரிக்க.

19. பாண்டிமாதேவி கண்ட கனவினால் விளைந்தவைகளை விளக்கி எழுதுக.

20. அறபியை நபிகள் நாயகம் ஆட்கொண்ட திறத்தை விரித்துரைக்க.

D–1119

Sub. Code
11B

DISTANCE EDUCATION

Common for B.A. /B.Sc. /B.B.A. /B.B.A (Banking)/
B.C.A./M.B.A. (5 Year Integrated) DEGREE EXAMINATION,
DECEMBER 2021.

First Semester

Part I – COMMUNICATION SKILLS – I

(CBCS 2018 – 19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Define Communication and its types.

2. Write the Principle of Effective Communication.

3. What are Preparation for speech in Oral Communication?

4. Write a few lines about Layout.

5. What is mean by sentence for motion?

6. Write the types of non-Verbal Communication.

7. What are the essential qualities of a Good Report?

8. Define Behavioural Skills.

9. Write the quality of content.

10. Explain the Purpose of Meeting.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Write the Barriers of Effective Communication.

Or

(b) What are the Importance of communication?

12. (a) Write about the Principles of Effective Oral Communication.

Or

(b) Define Intonation and its Function.

13. (a) Write the Characteristics of an effective sentences.

Or

(b) What are the advantages and uses of Words and Phrases?

14. (a) What are steps involved in the Essay writing?

Or

(b) Define Outline and Layout.

15. (a) Write the Quality of Content.

Or

(b) Explain the purpose of the meeting.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Write the barriers and principles of Effective Communication.

17. What are the Importance of Oral Communication?

18. Define Sentence Formation. Write the Characteristics of effective sentence.

19. Explain Non-Verbal Communication.

20. Write the Format of Report Writing.

D–1120

Sub. Code
12

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.B.A./
B.B.A. (Banking)/B.C.A./M.B.A. (5 Yrs Integrated) DEGREE
EXAMINATION, DECEMBER 2021.

First Semester

Part – II

ENGLISH PAPER-I

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

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. 'Alpha of the Plough' is the pseudonym of___________

2. What is the main theme of *Water the elixir of life*?

3. List out some main drawbacks of *Our Civilization*.

4. What are the causes and remedies of drug abuse?

5. Write a short note on *Minerals in Food*.

6. Define - Participles with examples.

7. Turn the sentence into Indirect Speech.

   Kumar said, "I have not been able to finish my work this evening".

8. What is the purpose of précis writing?

9. State the importance of letter writing.

10. Develop the following

Ramu : Hello, How are you?

Somu : Hi, ________________

____

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Write a paragraph on conversation of water.

Or

(b) Write a short note on *Minerals in Food*.

12. (a) Explain - Art of letter writing.

Or

(b) Bring out the significance of the title '*Food*'.

13. (a) What are sensual drugs and dangers of the abuse of sensual drugs?

Or

(b) Write a paragraph on Our *Ancestors*.

14. (a) Fill in the blanks using suitable prepositions.

(i) Kathir goes ————school every morning ———— nine.

(ii) The seedling grew ———— a tree ———— just three years.

(iii) King Lear was written ———— Shakespeare who was born ————1564.

(iv) _____ the morning, father goes ———— a walk.

(v) I begin my day ——— a cup of coffee prepared ———— my mother.

Or

(b) Modal Auxiliary verbs

(i) My grandmother eighty-five, but she still reads and writes without glasses.

(ii) _____ I come with you?

(iii) _____ you help me with the housework, please?

(iv) There was a time when I ———— stay up very late.

(v) You ———— not lose any more weight. You are already slim.

15. (a) Write a paragraph on the major features of a computer.

Or

(b) Write a story using the hints given below:

Young man-riding a horse to town - on the way-lame beggar - "Please take me to town"- they reach town - "horse is mine" says beggar-they go to King's Officer - young man covers horse's head - "horse blind in one eye. Which one?". "left", says beggar - horse not blind-beggar punished.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. How does J.B.S. Haldane discuss the necessity and function of food?

17. Explain the process of evolution of mankind according to Carl Sagan.

18. Write a critical appreciation of C. E. Foad's *Our Civilization*.

19. Fill in the blanks with the appropriate forms of the verbs given in brackets: (Use the simple present or the present continuous or the simple past).

    (i) I ———(grow) a beard now.

    (ii) I_____(forget) to wind the clock last night.

    (iii) Every year he_____(spend) his holidays in Kashmir.

    (iv) It ——————— (rain), take your umbrella.

    (v) Keep quiet, we ———(listen) to the music.

    (vi) That silly fool always_____(make) stupid remarks.

    (vii) She_____(hate) cats.

    (viii) My friend_____(come) to see me yesterday.

    (ix) Who____(discover) America?

    (x) What a noise! What on earth ————(happen)?

20. Write a conversation of your own using the expressions "greeting and introducing yourself".

D–1199

Sub. Code
11313

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION, DECEMBER 2021.

First Semester

Mathematics

CLASSICAL ALGEBRA

(CBCS 2018 – 19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Prove that $\lim_{n\to\infty} \frac{2n+3}{3n-4} = \frac{2}{3}$.

2. Prove that if $(a_n) \to a$ and $(b_n) \to b$ then $(a_n + b_n) \to a + b$

3. Discuss the convergence of the series $\sum \frac{1}{2^n + 3^n}$.

4. State Cauchy's root test.

5. Show that $\left(\frac{1+x}{1-x}\right)^n = 1 + n\left(\frac{2x}{1+x}\right) + \frac{n(n+1)}{2!}\left(\frac{2x}{1+x}\right)^2 + \ldots$

6. Prove that $2\left[1 + \frac{(\log n)^2}{2!} + \frac{(\log n)^4}{4!} + \ldots\right] = n + \frac{1}{n}$

7. Find the roots of the polynomial $x^4 - 4$

8. If α, β, γ are the roots of the equation $x^3 + ax + b = 0$, find the value of $\sum \frac{\alpha}{\beta\gamma}$.

9. If $A = \begin{pmatrix} -2 & -4 \\ 3 & 6 \end{pmatrix}$, Show that $A^2 = 4A$.

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

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) If $(a_n) \to a$ and $(b_n) \to b$ then prove that $(a_n\, b_n) \to ab$.

Or

(b) Show that the series $\sum \frac{1}{n^p}$ converges if $p > 1$ and diverges if $p \leq 1$.

12. (a) Test the convergence of the series whose n^{th} term is $\frac{2^n n!}{n^n}$.

Or

(b) Sum of the following series $1 + \frac{1}{6} + \frac{1.4}{6.12} + \frac{1.4.7}{6.12.18} + ...$

13. (a) Solve the equation $x^4 + 4x^3 + 5x^2 + 2x - 2 = 0$ of which one root is $-1 + i$.

Or

(b) Solve the equation $x^3 - 4x^2 - 3x + 18 = 0$ given that two of its roots are equal.

14. (a) Solve $n^4 - 8x^3 + 19^2 - 12x + 2 = 0$ by removing the second term.

Or

(b) State and prove Weierstress inequality.

15. (a) Find the inverse of $A = \begin{pmatrix} 1 & 2 & -1 \\ 3 & 8 & 2 \\ 4 & 9 & -1 \end{pmatrix}$.

Or

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

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. State and prove D' Alembert's Ratio test.

17. Find the coefficient of x^n in the expansion of $\dfrac{x+1}{(x-1)^2(x-2)}$.

18. Solve $x^6 - 4x^5 - 11x^4 + 40x^3 + 11x^2 - 4x - 1 = 0$ if one of its roots is $\sqrt{2} + \sqrt{3}$.

19. For what values of a,b, the equations $x + y + z = 6$, $x + 2y + 3z = 10$, $x + 2y + az = b$ have

(a) no solution

(b) unique solution and

(c) an infinite solution.

20. Find the characteristic roots and characteristic vectors of the matrix $A = \begin{pmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ 7 & 2 & -3 \end{pmatrix}$.

D–1200

Sub. Code
11314

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION, DECEMBER 2021.

First Semester

Mathematics

CALCULUS

(CBCS 2018 – 19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Define extreme value of the function.

2. Find the nth derivative of $(ax+b)^m$.

3. Find the critical point for $f(x,y)=x^2+xy$.

4. Write the formula for radius of convergence in parametric form.

5. Evaluate $\int \sin^2 3x \, dx$.

6. Evaluate $\int \log x \, dx$.

7. State Bernoulli's formula.

8. Solve : $(1-x)dy-(1+y)\,dx=0$.

9. Evaluate $\int_0^1 \int_1^2 (x^2 + y^2)\, dy\, dx$.

10. Prove that $\Gamma(n+1) = n!$

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Find y_n for $y = \log(ax + b)$.

Or

(b) Find the points on the curve $y = x^3 - 3x^2 - 9x + 5$ at which the tangent are parallel to $x-$axis.

12. (a) Find the pedal equation of $r^2 = a^2 \cos 2\theta$.

Or

(b) Find the equation of tangent at the point $(1,-1)$ to the curve $x^3 - xy^2 - 4x^2 - xy + 5x + 3y + 1 = 0$.

13. (a) Find l for the curve $x^3 + y^3 = 3axy$ at $\left(\frac{3a}{2}, \frac{3a}{2}\right)$.

Or

(b) Evaluate $\int \frac{dx}{(1 + x^2)^2}$.

14. (a) Derive reduction formula for $\int \sin^n x\, dx$ where n being a positive integer.

Or

(b) Evaluate $\int_0^1 \int_1^2 xy^2\, dy\, dx$.

15. (a) Evaluate $\int_0^{\pi}\int_0^{\sin\theta} r\,dr\,d\theta$.

Or

(b) Prove that $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Find the maximum and minimum values of $u = xy(a - x - y)$.

17. Find the radius of convergence of $x = a(\cos\theta + \theta\sin\theta)$; $y = a(\sin\theta - \theta\cos\theta)$.

18. Deduce that $\int_0^{\pi/4} \log(1 + \tan\theta)\,d\theta = \frac{\pi}{8}\log 2$.

19. Using the method of variation of parameters solve $\frac{d^2y}{dx^2} + 4y = \tan 2x$.

20. Evaluate

(i) $\int_0^{\pi/2} \sin^7\theta\cos^5\theta\,d\theta$

(ii) $\int_0^{\pi/2} \sin^8\theta\,d\theta$.

D–1121

Sub. Code

21A

DISTANCE EDUCATION

Common for B.A./ B.Sc./B.B.A./B.B.A.(Banking)/B.C.A./ M.B.A. (5 Year Integrated) DEGREE EXAMINATION, DECEMBER 2021.

Second Semester

Tamil

Part I – TAMIL – Paper – II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

அனைத்து வினாக்களுக்கும் விடையளிக்க

1. தேம்பாவணி என்ற சொல்லின் பொருளைத் தருக.

2. 'வான வீதியில்' தொகுதியில் இடம்பெற்றுள்ள சிறுகதைகளின் எண்ணிக்கை?

3. மதிற்போர் - குறிப்பு வரைக.

4. முதலெழுத்துக்கள் என்றால் என்ன?

5. அன்மொழித் தொகை - விளக்கம் தருக.

6. 'ஆறில் ஒரு பங்கு' என்னும் சிறுகதையை எழுதியவர்?

7. தமிழில் வெளிவரும் 'வார இதழ்கள்' இரண்டினைக் குறிப்பிடுக.

8. சிம்பொனி இசையமைத்த தமிழர் யார்?

9. பண்பலை வானொலி என்றால் என்ன?

10. ‘தாண்டக வேந்தர்’ எனப் போற்றப்படும் சைவக் குரவர்?

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

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) சாந்தி உள்ளம் மகிழ்ந்து குழந்தை ஏசுவைப் போற்றுமாற்றை விவரிக்க.

(அல்லது)

(ஆ) வீரமாமுனிவர் வெளிப்படுத்தியுள்ள தமிழ்மரபுகளை எடுத்துரைக்க.

12. (அ) நீலபத்மநாபனின் ‘வானவீதியில்’ சிறுகதைச் சுருக்கத்தை எழுதுக.

(அல்லது)

(ஆ) இராமன் புரிந்த கன்னிப் போர் குறித்து விவரிக்க.

13. (அ) சார்பெழுத்துக்களின் வகைகளை விளக்கி வரைக.

(அல்லது)

(ஆ) விடைகள் எத்தனை வகைப்படும்? அவற்றை விளக்கி வரைக.

14. (அ) புதுக்கவிதையின் வளர்ச்சி வரலாற்றைச் சுருக்கி எழுதுக.

(அல்லது)

(ஆ) பாரதிதாசனின் தமிழ்ப்பற்றை விளக்கி வரைக.

15. (அ) திருஞானசம்பந்தரின் பக்தித் திறத்தைப் பாராட்டியுரைக்க.

(அல்லது)

(ஆ) மக்கள் வாழ்வியலில் இணையம் பெறும் முக்கியத்துவத்தை எடுத்துரைக்க.

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

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. குழந்தை ஏசுவை ஆயர்கள் எங்ஙனம் போற்றினர்? விளக்குக.

17. கம்பன் உரைக்கும் போர்க்களச் செய்திகளைத் தொகுத்துரைக்க.

18. தமிழ்ச் சொல்லமைப்பின் சிறப்புக்களை நும் பாடப் பகுதியால் விரிந்துரைக்க.

19. நாவல்கள் திரையாக்கம் பெறும் முறையை எடுத்துக்காட்டுகளுடன் விவரிக்க.

20. தமிழர்தம் இல்லற மாண்பினை பெரியபுராணம் வழிக் கட்டுரைக்க.

D–1122

Sub. Code
21B

DISTANCE EDUCATION

Common for B.A. /B.Sc. /B.C.A. /B.B.A. /B.B.A (Banking)/M.B.A. (5 Year Integrated) DEGREE EXAMINATION, DECEMBER 2021.

Second Semester

PART I – COMMUNICATION SKILLS – II

(CBCS 2018 – 19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. How do you define a code in communication?
2. What is known as the encoding process in communication?
3. What is the function of intonation?
4. What do you mean by brevity in a speech?
5. What do you mean by 'Emphatic listening'?
6. What is the significance of the profile of the audience in presentation?
7. What do you mean by stress interview?
8. What do you mean by probing questions in an interview?
9. What is the use of visual aids in a presentation?
10. What is the purpose of a circular?

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Examine the different codes that we use in communication.

Or

(b) Write a note on non-verbal communication.

12. (a) What are the guiding principles that make a speech successful?

Or

(b) Draw a phonetic chart with illustrations.

13. (a) Write a note on the strategies to be followed in effective listening.

Or

(b) Examine the importance of presentation skills in the present day scenario.

14. (a) What are the contents of a good Resume?

Or

(b) Write a note on the advantages of telephonic interview.

15. (a) Write a note on the function of a memo.

Or

(b) What are the characteristics of a good report?

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE of the following.

16. Discuss the strategies to develop communication skills.

17. Attempt an essay on the pronunciation etiquette in communication skills.

18. Listening helps you to speak better – Comment.

19. Bring out the use of appropriate visual aids in a presentation.

20. Discuss the modalities to be followed in effective business writing.

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D–1123

Sub. Code
22

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.B.A./ B.B.A. (Banking)/B.C.A./M.B.A. (5 Years Integrated) DEGREE EXAMINATION, DECEMBER 2021.

Second Semester

English

PART – II ENGLISH PAPER – II

(CBCS 2018 – 19 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 a note on the city of London as Word worth describes it in Poem “Lines Composed upon Westminster Bridge”?

2. How John Keats establish the connection with ancient art?

3. What does the express train symbolize in the poem the Express?

4. What does Gitanjali mean?

5. Why the sea is called mother in the poem Coromandel fishers?

6. Who is Tubal in The Merchant of Venice?

7. Is shylock is Villain or Victim?

8. How does Portia get back her ring?

9. Write the importance of Essay Writing

10. What is a Report?

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Write the dramatic Monologue in Robert Brownings Andrea del Sarto.

Or

(b) Why does words worth invoke God in his poem? What does he mean by "that mighty heart"?

12. (a) Write the symbolism used in the Poem "The Road Not taken".

Or

(b) Write the critical appreciation of the Poem Coromandel Fisher.

13. (a) Explain the Indian Philosophical aspects and the theme of Devotion in Tagore's Gitanjali.

Or

(b) Write a note on "Titanic wars" as referred is Wilfred Owen's Strange Meeting.

14. (a) Explain the relationship between compassion and Justice in the play "The Merchant of Venice".

Or

(b) Justify – Is shylock a villain?

15. (a) What is Note Making? What are the Advantages of Note Making?

Or

(b) What are the processes of Report Writing?

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Elaborate various themes used in the Poem 'Ode on a Grecian Urn'.

17. How Tagore's philosophy of life is reflected in the Gitanjali?

18. What are the Poetic Devices used in 'The Road not Taken'?

19. Describe the circumstances that led to the signing of the bond by Antonio and its consequences.

20. Distinguish the difference between the Report writing and essay writing.

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D–1201

Sub. Code
11323

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, DECEMBER 2021.

Second Semester

ANALYTICAL GEOMETRY AND VECTOR CALCULUS

(CBCS 2018 – 19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Find the angle between the lines whose direction ratio's are 2, 3, –1 and 3, 4, 2.

2. If $A(-3,2,5)$, $B(4, 1, 6)$, $C(-1,-2,-3)$, $D(13,-4,-1)$. Prove that AB is parallel to CD.

3. Find the distance between the parallel planes
$2x - 2y + z + 3 = 0$ and $4x - 4y + 2z + 5 = 0$.

4. Find the direction cosines of the line $\frac{2x+1}{3} = \frac{4y-3}{1} = \frac{2z-3}{0}$. Also find a point on it.

5. Write the formula for angle between the line $\frac{x-x_1}{l} = \frac{y-y_1}{m} = \frac{z-z_1}{n}$ and the plane $ax + by + cz + d = 0$.

6. Define: Right circular cone.

7. Find the equation of the sphere with centre $(-1, 2, -3)$ and radius 3 units.

8. Prove that $\vec{f} = (x^2 - yz)\,\vec{i} + (y - zx)\,\vec{j} + (z^2 - xy)\vec{k}$ is irrotational.

9. Define: Solenoidal vector.

10. State Gauss Divergence theorem.

PART B — $(5 \times 5 = 25$ marks)

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

11. (a) If l, m, n are the direction cosines of a line then prove that $l^2 + m^2 + n^2 = 1$.

Or

(b) Show that the points $(3, 1, 3)$; $(9, 1, -3)$; $(1, -1, -5)$ form an equilateral triangle.

12. (a) Find the equation of the plane passing through $(2, 2, 1)$ and $(9, 3, 6)$ and perpendicular to the plane $2x + 6y + 6z = 9$.

Or

(b) Find the image of the point $(2, 3, 4)$ under the reflection in the plane $x - 2y + 5z = 6$.

13. (a) Find the equation of a 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 sphere having the circle $x^2 + y^2 + z^2 - 2x + 4y - 6z + 7 = 0$, $2x - y + 2z = 5$ as a great circle.

14. (a) If $\vec{r}$ is the position vector of any point $p(x, y, z)$. Prove that grad $(r^n) = nr^{n-2}\,\vec{r}$

Or

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

15. (a) Find the work done by the force $\vec{F} = 3xy\,\vec{i} - 5z\,\vec{j} + 10x\,\vec{k}$ along the curve $C : x = t^2 + 1;\ y = 2t^2,\ z = t^3$ from $t = 1$ to $t = 2$.

Or

(b) Evaluate $\iint \vec{f}.\hat{n}ds$ where $\vec{f} = (x^3 - yz)\vec{i} - 2x^2y\vec{j} + 2\,\vec{k}$ and S is the surface of the cube bounded by $x = 0,\ y = 0,\ z = 0,\ x = a,\ y = a$ and $z = a$.

PART C — $(3 \times 10 = 30$ marks)

Answer any THREE questions.

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

17. Find the equation of the plane passing through $(1,1,0)$, $(1,2,1)$ and $(-2,2,-1)$.

18. Find the shortest distance between the lines $\frac{x-3}{-1}=\frac{y-4}{2}=\frac{z+2}{1}$; $\frac{x-1}{1}=\frac{y+7}{3}=\frac{z+2}{2}$

19. Find $div\,\vec{f}$ and curl $\vec{f}$ where $\vec{f}=x^2z\,\vec{i}-2y^3z^2\,\vec{j}+xy^2z\,\vec{k}$ at the point $(1,-1,1)$.

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

D–1202

Sub. Code
11324

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION,
DECEMBER 2021.

Second Semester

SEQUENCES AND SERIES

(CBCS 2018 – 19 Academic Year Onwards)

Time : 3 hours   Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define least upper bound.

2. What do you meant by monotonic sequence? Give an example.

3. Prove that the constant sequence 1,1,1,...... converges to 1.

4. Prove that the sequence $\left((-1)^n\right)$ is not a Cauchy sequence.

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

6. Prove that every bounded sequence has a convergent subsequence.

7. If $\sum a_n$ be a convergent series converging to the sum s, then prove that $\lim_{n\to\infty} a_n = 0$.

8. What is a conditionally convergent series?

9. State Abel's test.

10. Define Derangement.

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

(b) If $(a_n) \to a$ and $(b_n) \to b$ then prove that $(a_n\, b_n) \to ab$.

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

Or

(b) If (a_n) and (b_n) are two sequences of positive terms such that $a_{n+1} = \frac{1}{2}(a_n + b_n)$ and $b_{n+1} = \sqrt{(a_n\, b_n)}$, prove that (a_n) and (b_n) converge to the same limit.

13. (a) State and prove comparison test.

Or

(b) State and prove Cauchy's condensation test.

14. (a) State and prove Leibnitz's test.

Or

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

15. (a) State and prove Dirichlet's test.

Or

(b) If $\sum \frac{1}{n^2} = s$ then prove that $1 + \frac{1}{3^2} + \frac{1}{5^2} + ... = \frac{3}{4} s$.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

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

17. Prove that $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + ... + (-1)^n \frac{1}{n}$ is convergent.

18. State and prove Cauchy's integral test.

19. State and prove Kummer's test.

20. State and prove Abel's theorem on multiplication of series.

D–1124

Sub. Code
31A

DISTANCE EDUCATION

Common for B.A./B.Sc./B.C.A. DEGREE EXAMINATION, DECEMBER 2021.

Third Semester

Tamil

Part I – TAMIL – Paper – III

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

அனைத்து வினாக்களுக்கும் விடையளிக்க

1. ஐங்குறுநூற்றின் குறிஞ்சிப் பாடல்களைப் பாடியவர் யார்?
2. 'நெஞ்சாற்றுப்படை' என அழைக்கப்படும் எட்டுத்தொகை நூல் யாது?
3. பட்டினப்பாலை யாரால் பாடப்பட்டுள்ளது?
4. பரணர் பாடியப் பாடல்களின் எண்ணிக்கையைத் தருக.
5. அறத்தொடு நிற்றல் என்றால் என்ன?
6. கையறு நிலை - சிறுகுறிப்பு வரைக.
7. திருக்குறளை முதன்முதலில் ஆங்கிலத்தில் மொழிபெயர்த்தவர்?
8. அகில் எதன் வயிற்றில் பிறக்கும்?
9. வேங்கி நாட்டு இளவரசனின் பெயரைக் குறிப்பிடுக.
10. சுவடுகள் நாவலில் வரும் கணக்குப்பிள்ளையின் பெயர் என்ன?

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

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) பாசறை அமைப்புக் குறித்து முல்லைப்பாட்டின் வழி விளக்குக.

(அல்லது)

(ஆ) ஐங்குறுநூற்றைத் தொகுத்தோன், தொகுப்பித்தோன் வரலாற்றைச் சுருக்கி எழுதுக.

12. (அ) குறிஞ்சித்திணையின் முப்பொருட்களைப் பட்டியலிடுக.

(அல்லது)

(ஆ) நற்றிணையின் சிறப்புகளை நும் பாடப்பகுதியால் விளக்கி வரைக.

13. (அ) அகநானூற்று நூல் பகுப்பின் சிறப்புகளை எடுத்துரைக்க.

(அல்லது)

(ஆ) மாறோகத்து நப்பசலையார் பற்றிக் குறிப்பு வரைக.

14. (அ) வள்ளுவர் உரைக்கும் வாழ்க்கைத் துணை நலம் குறித்த செய்திகளை எழுதுக.

(அல்லது)

(ஆ) நல்லார் பிறக்கும் குடியை அறிவார் யார்? விளம்பிநாகனார் தரும் விளக்கம் யாது?

15. (அ) இராசராசசோழன் நாடகத்தில் இடம்பெற்றுள்ள பாத்திரப் படைப்புகள் குறித்து விவரிக்க.

(அல்லது)

(ஆ) சுவடுகள் என்னும் நாவலின் கதைச் சுருக்கத்தை எழுதுக.

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

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. 'குறிஞ்சிக்குக் கபிலர்' என்பார் கூற்றை நும் பாடப் பகுதியால் விளக்குக.

17. வினைமுற்றி மீளும் தலைவன் மழையை வாழ்த்துமாற்றைப் பெருங்கௌசிகனார் எங்ஙனம் புலப்படுத்துகிறார்?

18. தலைமகன் பாசறையிலிருந்து சொல்லிய செய்திகளைச் சேந்தம்பூதனார் வழி விவரிக்க.

19. அறிவுடையார் அறிவிலார் குறித்து வள்ளுவர் உரைக்குமாற்றை எடுத்துரைக்க.

20. சுவடுகள் நாவலின் 'இராசாத்தி' பாத்திரப் படைப்பை விரிந்துரைக்க.

D–1125

Sub. Code
31B

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION, DECEMBER 2021.

Third Semester

PART – I – HUMAN SKILLS DEVELOPMENT – I

(CBCS 2018 – 19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Define Interpersonal Behaviour.

2. Write the merits of good habits.

3. What is mean by Self-Esteem?

4. How to build the Positive Personality?

5. Define Dias Etiquette.

6. Write the structure of Negotiating Skills.

7. How to manage the Stress?

8. What is the importance of Change Resistance?

9. Write the characteristics of Leadership.

10. Define Counselling.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) What is Human Skills? Explain its Types.

Or

(b) Write the importance of Interpersonal Relationship.

12. (a) What are the ways for developing personality?

Or

(b) Distinguish between Self Concept and Self- Esteem.

13. (a) What is Goal Setting? Write the importance of Goal Setting.

Or

(b) Explain Decision Making Skills.

14. (a) Define Negotiating skills and its structure.

Or

(b) Write the canons of good human relations.

15. (a) What is stress? Write the cause and effect of Stress?

Or

(b) Write the consequences of Anger Management.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Define interpersonal Relationship and Interpersonal Behaviour.

17. What is Personality? Write the Needs and Factors of influencing Personality.

18. Define Decision Makings Skills with its types.

19. Explain the attitudes and its importance with types.

20. What is conflict? Write the cause and effects of Conflicts?

D–1126

Sub. Code
32

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION, DECEMBER 2021.

Third Semester

Part – II – ENGLISH PAPER – III

(CBCS 2018 – 19 Academic Year Onwards)

Time : Three hours　　　　Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What was the talent of the new Vicar?

2. Write about swami's father?

3. Who is Ivan Vassiliyitch Lomov?

4. What is the main problem of Philip?

5. What was the invention of Prof. Corrie?

6. What is pathos?

7. Note on Gaultier's Dinner with Mayor in 'The Pie and the Tart".

8. Who are four friends in the Reunion?

9. Define Refugee.

10. Define Adjective.

PART B — (5 × 5 = 25 marks)

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

11. (a) Write the conflict between swami and his father.

Or

(b) Describe how a verger gets success after his dismissal from the church.

12. (a) What is the theme of the proposal by Anton Chekhov?

Or

(b) What is the importance of dream in the play "The Boy Comes Home"?

13. (a) What are the features of Carrie's new invention?

Or

(b) Sketch the characters of Mr. and Mrs. Pryde in 'The Silver Idol'.

14. (a) Explain the Gamier's Dinner with Mayor.

Or

(b) Write the Ideological Conflict in Asif Currimbhoy's The Refugee.

15. (a) Briefly explain verb and its types.

Or

(b) How do you write minutes for a meeting?

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. How loneliness is depicted in The Postmaster?

17. Write a critical appreciation of 'The Silver Idol'.

18. Sketch the characters of Gaultier and Marion in 'The Pie and the Tart'.

19. Write an essay on Margaret Wood's 'A Kind of Justice'.

20. What are the formats for a descriptive writing?

D–1203

Sub. Code
11333

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION, DECEMBER 2021.

Third Semester

Mathematics

DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS

(CBCS 2018 – 19 Academic Year Onwards)

Time : Three hours　　　　Maximum : 75 marks

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

Answer ALL questions.

1. Solve $\frac{dy}{dx}+\frac{1+y^2}{1+x^2}=0$.

2. Verify whether the following differential equation is exact or not.
   $(x^2-y)dx+(y^2-x)dy=0$.

3. Solve $4p^2-8p+3=0$.

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

5. Form the partial differential equation by eliminating the arbitrary constants a,b,c from $z=ax+by+ab$.

6. Solve $p\sqrt{x}+q\sqrt{y}=\sqrt{z}$.

7. Find the complete integral of $p+q=pq$.

8. Find the particular integral of $(D^2+1)y=x$.

9. State the tautochronous property of the cycloid.

10. Find the orthogonal trajectories of the family of circles $x^2+y^2=a^2$.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Solve $(1+y^2)dx+(x-\tan^{-1}y)dy=0$.

Or

(b) Solve $\frac{dy}{dx}=\frac{y^2}{1-xy}$.

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

Or

(b) Solve $3x-y+\log p=0$.

13. (a) Solve $(D^2-4)y=e^{2x}+e^{-4x}$

Or

(b) Solve $(D^2+D+1)y=\sin 2x$.

14. (a) Form a partial differential equation by eliminating arbitrary function from $\varphi(x+y+z, x^2+y^2-z^2)=0$.

Or

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

15. (a) Solve $Pe^{y} = qe^{x}$.

Or

(b) Find the complete integral for $z = px + qy + p^2 + q^2$.

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

Answer any THREE questions.

16. Solve $\left(x^3 - 3xy^2\right)dx - \left(y^3 - 3x^2 y\right)dy = 0$.

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

18. Solve $y'' + y = \operatorname{cosec} x$ by the method of variation of parameters.

19. Solve $\dfrac{dx}{dt} + 4x + 3y = t$.

$\dfrac{dy}{dt} + 2x + 5y = e^{t}$.

20. Solve $\left(p^2 + q^2\right)y = qz$ by Charpits method.

D–1204

Sub. Code
11334

DISTANCE EDUCATION

B.Sc. (MATHEMATICS) DEGREE EXAMINATION,
DECEMBER 2021.

Third Semester

MECHANICS

(CBCS 2018 – 19 Academic Year Onwards)

Time : 3 hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. State the parallelogram law of forces.
2. Define like and unlike parallel forces.
3. Define coplanar forces.
4. Define Angle of friction.
5. What is a couple?
6. Define span and sag.
7. Define Impulsive force.
8. State the principle of conservation of momentum.
9. What do you meant by oblique impact?
10. Define simple Harmonic motion.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) State and prove the triangle law of forces.

Or

(b) Forces P, 2P, 3P, 4P and $2\sqrt{2P}$ act at a point in the directions of AB, BC, CD, DA and AC where ABCD is a square then show that they are in equilibrium.

12. (a) Derive the resultant of two like parallel forces acting on a rigid body.

Or

(b) State the laws of friction.

13. (a) Derive the equation of common catonary.

Or

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

14. (a) Explain Newton's experimental law.

Or

(b) Discuss the oblique impact of two smooth spheres.

15. (a) Solve the differential equation of a SHM.

Or

(b) Derive the (p, r) equation to the central orbit.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. If three forces acting at a point are in equilibrium then prove that each force is proportional to the sine of the angle between the other two.

17. Prove that the algebraic sum of the moments of two forces about any point in their plane is equal to the moment of their resultant about that point.

18. Explain the impact of a smooth sphere on a fixed smooth plane.

19. Derive the loss of kinetic energy due to direct impact of two smooth spheres.

20. Derive the differential equation of central orbit.

D–1127

Sub. Code
41A

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION, DECEMBER 2021.

Fourth Semester

PART – I : TAMIL PAPER IV

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

அனைத்து வினாக்களுக்கும் விடையளிக்க

1. அடி எத்தனை வகைப்படும்? யாவை?

2. படிமம் - சிறுகுறிப்பு வரைக.

3. உடன்போக்கு எத்திணைக்குரிய துறை?

4. வரைவு கடாதல் என்றால் என்ன?

5. தற்குறிப்பேற்ற அணியை விளக்குக.

6. திருமுருகாற்றுப்படையை இயற்றியவர் யார்?

7. திருக்குறளுக்கான சிறப்புப் பெயர்கள் இரண்டினைத் தருக.

8. பெரிய புராணத்தின் ஆசிரியர் யார்?

9. 'பாண்டியன் பரிசு' காப்பியத்தின் கதைத் தலைவன்?

10. பாஞ்சாலி சபதம் - ஆசிரியர் குறிப்பு வரைக.

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

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) தளை என்றால் என்ன? அதன் வகைகளை விளக்கி வரைக.

(அல்லது)

(ஆ) ஆசிரியப்பாவின் இலக்கணத்தைச் சான்று காட்டி விளக்குக.

12. (அ) களவில் ‘அறத்தொடு நிற்றல்’ பெறும் முக்கியத்துவத்தை நிறுவுக.

(அல்லது)

(ஆ) கையறுநிலை என்பதை விளக்கிச் சான்று காட்டுக.

13. (அ) சிலேடை அணி இலக்கணத்தை வகைகளுடன் விளக்குக.

(அல்லது)

(ஆ) மொழி நடையில் காற்புள்ளி எவ்வெவ்விடங்களில் பயன்படுத்த வேண்டும்?

14. (அ) ஐங்குறுநூறு குறித்த செய்திகளைத் தொகுத்துரைக்க.

(அல்லது)

(ஆ) திருக்குறள் நூல் பகுப்புமுறைகளை விளக்கி எழுதுக.

15. (அ) கம்பராமாயணத்தின் தனிச்சிறப்புகளைப் புலப்படுத்துக.

(அல்லது)

(ஆ) சிற்பியின் ‘மௌன மயக்கங்கள்’ கவிதைகளை மதிப்பிடுக.

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

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. தொடை வகைகளைச் சான்றுகளுடன் கட்டுரைக்க.

17. புறத்திணையை வகைகளுடன் தொகுத்துரைக்க.

18. செய்யுள் படைப்பில் அணி இலக்கணம் பெறுமிடத்தை எடுத்துரைக்க.

19. வள்ளுவரின் கவித்திறத்தைச் சான்றுகளுடன் விரிந்துரைக்க.

20. பாஞ்சாலி சபதத்தின் படைப்பு நோக்கத்தைப் புலப்படுத்துக.

D–1128

Sub. Code
41B

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION, DECEMBER 2021.

Fourth Semester

PART – I — HUMAN SKILL DEVELOPMENT – II

(CBCS 2018 – 19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Who need counselling?

2. How can you create attention among people?

3. Mention the importance of conceptual skills.

4. What are the procedures for technical skills?

5. What is the role of planning in presentation skills?

6. Who is known as leader?

7. What is the basic structure of group discussion?

8. Define understanding skills.

9. How do we face society in a difficult situation?

10. Why do we co-up with community?

PART B — $(5 \times 5 = 25$ marks)

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

11. (a) Write a short note on techniques of counselling.

Or

(b) Discuss the need of managerial skill.

12. (a) What are the tools used in technical skills? Explain briefly.

Or

(b) Write a note on planning and preparation in presentation skills.

13. (a) Write some multi-tasking skills for handling the organization properly.

Or

(b) What are the qualities of a community group?

14. (a) Mention some do's to be followed by a member in a group interaction.

Or

(b) What are the important techniques in problem solving skills?

15. (a) Write a short note on cooperative learning skills.

Or

(b) Write some causes for making social responsibilities.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Write an essay on role and importance of counsellor.

17. List out the types of technical skills.

18. What are the qualities of a good leader? Explain.

19. Explain the different ways of interactions in undertaking skills.

20. Explain the role of handling and facing in problem solving skills.

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D–1129

Sub. Code
42

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION, DECEMBER 2021.

Fourth Semester

PART – II ENGLISH PAPER – IV

(CBCS 2018 – 19 Academic Year Onwards)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Why did Lalajee come to Mokameh Ghat?

2. Write about the two old men in Leo Tolstoy's 'Two Old Men'.

3. Who is Van Bommel in 'Boy who wanted more Cheese'?

4. Who is Swaminathan?

5. Does Eliza improve her Self-Confidence in 'Pygmalion'?

6. How is Romeo affected by Balthazar's news?

7. Note on Antonio.

8. What was the role of Proserpina in Shakespeare's 'The Winter's Tale'?

9. Who is Martin Luther King?

10. Expand the proverb: Covert all, Lose all.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) What are the literary elements found in 'A Day's Wait'?

Or

(b) Sketch the character of Klaas Van Bommel.

12. (a) Write about the innocence of youth in Swami and Friends.

Or

(b) Explain the Higgins' attitude towards Eliza's feeling.

13. (a) What are the main differences in spoken English between the upper and lower class in Pygmalion?

Or

(b) What is the main theme of Romeo and Juliet?

14. (a) Who is Antagonist in the play 'The Merchant of Venice"? Explain his Characteristics.

Or

(b) What sort of discrimination did Luther King fight against?

15. (a) Differentiate Phrase and Clause.

Or

(b) Write a short note Group discussion.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Write an essay on the theme of 'Little Girls Wiser than Men' by Tolstoy.

17. Summarize the short story 'Boy Who wanted more cheese'.

18. How does Bernard Shaw represent transformation of a poor and uneducated girl into a daiches in Pygmalion?

19. Explain theme of Jealousy in Shakespeare's 'The Winter's Tale'.

20. Expand the following proverbs:

    (a) Where there is a will there is a way.

    (b) Trust Yourself to get success.

D–1205

Sub. Code
11343

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION,
DECEMBER 2021.

Fourth Semester

ANALYSIS

(CBCS 2018 – 19 Academic Year Onwards)

Time : 3 hours   Maximum : 75 marks

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

Answer ALL questions.

1. Prove that a subset of a countable set is countable.

2. Define metric space.

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

4. Define interior of a set.

5. What do you mean by homeomorphism?

6. State Daurboux's theorem on derivatives.

7. Prove that $\left[0, \frac{1}{3}\right] \to \left[0, \frac{1}{3}\right]$ is a contraction mapping.

8. Prove that any discrete metric space with more than one point is disconnected.

9. Define sequentially compact metric space.

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

SECTION B — $(5 \times 5 = 25$ marks)

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

11. (a) If d is a metric on M. Prove that $\sqrt{d}$ is a metric on M.

Or

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

12. (a) Give an example of a set E such that both E and E^C are dense in $\mathbb{R}$.

Or

(b) Let M be a metric space and $A \subseteq M$. Then prove that $x \in \overline{A}$ if and only if there exists a sequence (x_n) in A such that $(x_n) \to x$.

13. (a) Prove that any discrete metric space is complete.

Or

(b) Let f be a continuous real valued function defined on a metric space M. Let $A = \{x \in M / f(x) \geq 0\}$. Prove that A is closed.

14. (a) Prove that the functions $f : \mathbb{R} \to \mathbb{R}$ defined by $f(x) = \sin x$ is uniformly continuous on $\mathbb{R}$.

Or

(b) Prove that any continuous image of a connected set is connected.

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

Or

(b) Prove that a subset A of $\mathbb{R}$ is compact if and only if A is closed and bounded.

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

Answer any THREE questions.

16. State and prove Holder's inequality.

17. Prove that $\mathbb{R}^n$ with usual metric is complete.

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

19. State and prove contraction mapping theorem.

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

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D–1206

Sub. Code
11344

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION, DECEMBER 2021.

Fourth Semester

Mathematics

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. Find median of 66, 65, 64, 70, 61, 60, 56, 63, 60 67,62.

2. Define kurtosis.

3. Write the principle of least squares.

4. What is bivariate data?

5. Write the regression line of y on x.

6. Define the operator Δ.

7. Write Newton's formula for forward interpolation.

8. Define class frequency of order n.

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

10. What is fisher's index number?

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Show that the variance of first n natural numbers is $\frac{1}{12}\left(n^2 - 1\right)$.

Or

(b) For the following data calculate the coefficient of skewness.

Wages in Rs.	10	11	12	13	14	15
Frequency	2	4	10	8	5	1

12. (a) Prove that $-1 \leq \gamma \leq 1$ where γ is the correlation coefficient.

Or

(b) Calculate rank correlation coefficient for the following data.

x	10	12	18	18	15	40
y	12	18	25	25	50	25

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

Or

(b) Prove that $E = 1 + \Delta$.

14. (a) Find the limits of (BC) for the following data N=125, (A) =48, (B)=62, (C)=45, $(A\beta)$= 7, $(A\gamma)$=18.

Or

(b) Write notes on weighted index numbers.

15. (a) Find the cost of living index number for 1992 on the base of 1991 by family budget method.

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

Or

(b) Write notes on seasonal variation.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Given $\sum x_i = 99$, $n = 9, \sum (x_i - 10)^2 = 79$ find $\sum x_i^2$ hence find σ^2.

17. Find correlation coefficient for the following data.

x	10	12	18	24	23	27
y	13	18	12	25	30	10

18. Estimate the missing term in the following table.

x	0	1	2	3	4
y	1	3	9	-	81

19. Find the greatest and least values of (ABC) if $(A) = 50, (B) = 60, (C) = 80, (AB) = 35, (AC) = 45$ and $(BC) = 42$.

20. From the following data of the whole sale price of rice for the 5 years construct the index numbers taking 1987 as the base.

Years	1987	1988	1989	1990	1991	1992
Price of rice per kg	5.00	6.00	6.50	7.00	7.50	8.00

D–1207

Sub. Code
11351

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION,
DECEMBER 2021.

Fifth Semester

MODERN ALGEBRA

(CBCS 2018 – 19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Define equivalence relation.
2. Prove that an identity element of a group G is unique.
3. Define cyclic group with an example.
4. Show that any cyclic group is abelian.
5. Prove that any unit in a ring R cannot be a zero–divisor.
6. State Fermat's theorem.
7. Define vector space over a field F.
8. Define automorphism of a group G and give an example.
9. Define Prime ideal.
10. Let $T : V \to W$ be a linear transformation. Prove that dim $V = rank\ T + nullity\ T$.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Prove that any permutation can be expressed as a product of disjoint cycles.

Or

(b) If A, B, C are any three finite sets. Prove that $|A \cup B \cup C| = |A| + |B| + |C| -$

$$|A \cap B| - |B \cap C| - |C \cap A| + |A \cap B \cap C|$$

12. (a) Let H be a subgroup of G. Prove that the number of left cosets of H is the same as the number of right cosets of H.

Or

(b) Prove that a non-empty subset H of a group G is a subgroup of G, iff $a, b \in H \Rightarrow ab^{-1} \in H$.

13. (a) Show that a subgroup N of G is normal iff the product of two right cosets of N is again a right coset of N.

Or

(b) Prove that any finite commutative ring R without zero–divisors is a field.

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

Or

(b) Show that any euclideas domain R is a unique factorization domain.

15. (a) Show that any two bases of a finite dimensional vector space V have the same number of elements.

Or

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

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

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

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

18. State and prove Eienstein criterion.

19. Let V be a vector space over a field F. Let $S = \{v_1, v_2, ...v_n\} \subseteq V$. Prove that the following are equivalent .

(a) S is a basis for V .

(b) S is a maximal linearly independent set.

(c) S is a minimal generating set.

20. State and prove Gram–Schmidt orthogonalisation process.

D–1208

Sub. Code
11352

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION,
DECEMBER 2021.

Fifth Semester

OPERATIONS RESEARCH

(CBCS 2018 – 19 Academic Year Onwards)

Time : 3 hours Maximum : 75 marks

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

Answer ALL questions.

1. Define research phase.
2. Define optimum solution.
3. Define pseudo–optimal solution.
4. What is branch and bound method?
5. State the maximization in assignment problem.
6. How many steps are there in Hungarian method?
7. Define two-person zero sum game.
8. Define the term strategy combination.
9. Explain the dominance property.
10. What is a redundant activity or redundancy?

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Explain the various types of operations research techniques.

Or

(b) Use graphical method to solve the following LPP.

Maximize : $Z = 6x_1 + 4x_2$

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

$x_1 - x_2 \leq 2$

$3x_1 + 2x_2 \leq 9$

$x_1, x_2 \geq 0$

12. (a) Elaborate on the strong duality theorem.

Or

(b) Explain dual simplex algorithm.

13. (a) Obtain the initial basic feasible solution of a transportation problem whose cost and rim requirement table is as follows:

Origin/Destintion	D_1	D_2	D_3	Supply
O_1	2	7	4	5
O_2	3	3	1	8
O_3	5	4	7	7
O_4	1	6	2	14
Demand	7	9	18	34

Or

(b) Explain Vogel's approximation method.

14. (a) Explain the Hungarian method to solve the assignment problem.

Or

(b) Explain the basic characteristics of job sequencing.

15. (a) Solve the following game and determine its value.

$$\begin{array}{cc} & B \\ A & \begin{pmatrix} 4 & -4 \\ -4 & 4 \end{pmatrix} \end{array}$$

Or

(b) Write the rules of network construction.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Solve the LPP

Max $Z = 3x_1 + 2x_2$

Subject to $4x_1 + 3x_2 \leq 12$

$4x_1 + x_2 \leq 8$

$4x_1 - x_2 \leq 8$

$x_1, x_2 \geq 0$

17. Use penalty method to solve the following LPP

Minimize $Z = 5x + 3y$

Subject to $2x + 4y \leq 12$

$2x + 2y = 10$

$5x + 2y \geq 10$

$x, y \geq 0$

18. Solve the transportation problem when the unit transportation costs, demands and supplies are as given below.

		Destination				
		D_1	D_2	D_3	D_4	Supply
Origin	O_1	6	1	9	3	70
	O_2	11	5	2	8	55
	O_3	10	12	4	7	70
	Demand	85	35	50	45	

19. Find the sequence that minimizes the total elapsed time (in hours) required to complete the following tasks on two machines.

Task	A	B	C	D	E	F	G	H	I
Machine I	2	5	4	9	6	8	7	5	4
Machine II	6	8	7	4	3	9	3	8	11

20. Determine the optimum strategies and the value of the game from the following payoff matrix concerning a two person 4×2 game:

$$\begin{array}{cc} & Y \\ X & \begin{pmatrix} -6 & -2 \\ -3 & -4 \\ 2 & -9 \\ -7 & -1 \end{pmatrix} \end{array}$$

D–1209

Sub. Code
11353

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION,
DECEMBER 2021.

Fifth Semester

NUMERICAL ANALYSIS

(CBCS 2018 – 19 Academic Year Onwards)

Time : 3 hours Maximum : 75 marks

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

Answer ALL questions.

1. Write Newton-Raphson formula.

2. Define interpolation.

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

4. What is stirlings formula?

5. Prove that $E = e^{hD}$.

6. Find the first derivative of $\sqrt{x}$ at $x = 15$ from the table

x	15	17	19	21	23	25
$\sqrt{x}$	3.873	4.123	4.359	4.583	4.796	5.000

7. Write the Weddle's formula.

8. Write any four methods to find numerical solution of ordinary differential equations.

9. What are the auxiliary equations for Runge–Kutta method?

10. Write the correction formula of Milne's method.

SECTION B — $(5 \times 5 = 25$ marks)

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

11. (a) Write notes on Bisection method.

Or

(b) Solve by Gauss Jordan method.

$$3x + 4y + 5z = 18$$
$$2x - y + 8z = 13$$
$$5x - 2y + 7z = 20$$

12. (a) Form the forward difference table for

x	0	1	2	3	4
y	8	11	9	15	6

Or

(b) Show that $\mu^2 = 1 + \frac{1}{4}\delta^2$.

13. (a) Find cubic polynomial for

x	0	1	2	3
$f(x)$	1	2	1	10

Or

(b) Construct Newton's forward interpolation polynomial.

x	4	6	8	10
y	1	3	8	16

14. (a) Evaluate $\int_{0}^{\pi/2} \sin x \, dx$ by Simpson's $\frac{1}{3}$ rule.

Or

(b) Use Lagrange's formula to find y at $x = 6$

x	3	7	9	10
y	168	120	72	63

15. (a) Compute y (0.1), y (0.2) by Runge–Kutta method for $\frac{dy}{dx} = xy + y^2$. y(0)=1.

Or

(b) Find y (0.1) given $\frac{dy}{dx} = \frac{1}{x + y}$, y(0)=1

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

Answer any THREE questions.

16. Find a real root of the equation $x^3 - x - 11 = 0$ by bisection method.

17. Solve by Gauss Jordan method

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

18. Find the divided difference table for

x	-1	0	2	4	5
y	0	1	9	65	126

and find *f(x)*

19. Evaluate $\int_0^1 \frac{dx}{1+x}$ using trapezoidal rule and Simpon's $\frac{1}{3}$ rule.

20. Find the value of $y(0.1)$ for $\frac{dy}{dx} = \frac{y-x}{y+x}, y(0) = 1$.

D–1210

Sub. Code
11354

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION, DECEMBER 2021.

Fifth Semester

Mathematics

TRANSFORM TECHNIQUES

(CBCS 2018 – 19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. State the sufficient condition for the existence of Laplace transformation.

2. Define inverse Laplace transformation.

3. Give an example for odd function.

4. Find an for cosine series.

5. Write the complex form of Fourier integral.

6. Find $F_C\left(e^{-ax}\right)$.

7. Prove that $F_C(x\ f(x)) = \dfrac{dF_S}{d_S}$.

8. Define region of convergence.

9. Find $Z(n)$.

10. Define unit impulse function.

PART B — (5 × 5 = 25 marks)

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

11. (a) State and prove initial value theorem.

Or

(b) Find $L(t^{1/2})$.

12. (a) State the properties of odd and Even function.

Or

(b) Find sine series for $f(x) = C$ in the range 0 to π.

13. (a) Prove that $F[e^{iax} f(x)] = F(s+a)$ where $F(s) = F(f(x))$.

Or

(b) Write a note on Parseval Identity.

14. (a) Find $Z\left(\frac{1}{(n-1)}\right)$.

Or

(b) Find $Z(e^{at})$.

15. (a) State and prove Second shifting theorem.

Or

(b) Find $Z^{-1}\left(\frac{z}{(z-1)(z-2)}\right)$.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. If $f(t)=\begin{cases} e^{-t} & 0<t<4, \quad Find\ L(f(t)) \\ 0 & t>4 \end{cases}$.

17. Solve the simultaneous equations $3\dfrac{dx}{dt}+\dfrac{dy}{dt}+2x+1=0$ $\dfrac{dx}{dt}+4\dfrac{dy}{dt}+3y=0$ given $x=0=y$ at $t=0$.

18. Express $f(x)=c-x$ where $0<x<c$ as a half range cosine series with period x.

19. Find $Z\left(\dfrac{1}{(n+1)(n+2)}\right), n>0$.

20. Form the difference equation for $y_n = A2^n + B^n$.

D–1211

Sub. Code
11361

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION, DECEMBER 2021.

Sixth Semester

Mathematics

DISCRETE MATHEMATICS

(CBCS 2018 – 19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Draw truth table for $p \rightarrow q$.

2. Give an example for biconditional statement.

3. What do you mean by principal disjunctive normal form?

4. Define modular lattice and give an example.

5. Define Boolean Algebra.

6. Define Parity Check code.

7. State chromatic number.

8. What are connected vertices?

9. Define Eulerian graph.

10. How will you define center of a tree?

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

(b) Prove that $\neg Q \wedge (P \to Q) \Rightarrow \neg P$.

12. (a) Write a note on Hasse diagram.

Or

(b) Prove that any chain is modular.

13. (a) State the properties of the distance function δ.

Or

(b) Prove that for any graph G, $\sum_{v \in V} d(v) = 2\,\xi$.

14. (a) If G is a tree then prove that any two distinct vertices of G are joined by a unique path.

Or

(b) Define

(i) incidence matrix

(ii) adjacency matrix with example.

15. (a) Prove that every connected graph has a spanning tree.

Or

(b) Prove that every non-trivial connected graph has atleast two points which are not cut points.

PART C — $(3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Find the conjunctive normal form of $\neg(P \vee Q) \leftrightarrow P \wedge Q$.

17. Let G be an undirected graph then prove that G is bipartite is and only if it contains no odd cycle.

18. Prove that a closed walk of odd length contains a cycle.

19. Explain briefly about Eulerian and Hamiltonian graphs.

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

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D–1212

Sub. Code
11362

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION, DECEMBER 2021.

Sixth Semester

Mathematics

FUZZY ALGEBRA

(CBCS 2018 – 19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Differentiate between a crisp set and a fuzzy set.
2. Define a level set of a fuzzy set.
3. Define the union of two fuzzy sets. Give an example.
4. Give an example of a continuous fuzzy complement which is not involutive.
5. Determine the value of
   (a) $[-1,1].[-2,-0.5]$ and
   (b) $[0,1]-[-6,5]$
6. Write down the algorithm for transitive closure $R_T(X, X)$.
7. Define a fuzzy partial ordering.
8. Write a short note on plausibility measure.
9. State the Shannon entropy.
10. What is meant by Semantic and Pragmatic?

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Let $f : X \to Y$ be an arbitrary crisp function and let $A_i \in \exists(x)$ and any $B_i \in \exists(Y)$, $i \in I$. Prove that

(i) $f\left(\bigcup_{i\in I} Ai\right) = \bigcup_{i\in I} f(Ai)$

(ii) $f\left(\bigcap_{i\in I} Ai\right) \subseteq \bigcap_{i\in I} f(Ai)$

Or

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

12. (a) What is meant by fuzzy numbers? Explain with suitable example.

Or

(b) Let $Mp = \begin{bmatrix} 0.3 & 0.5 & 0.8 \\ 0 & 0.7 & 1 \\ 0.4 & 0.6 & 0.5 \end{bmatrix}$ and $M_Q = \begin{bmatrix} 0.9 & 0.5 & 0.7 \\ 0.3 & 0.2 & 0 \\ 1 & 0 & 0.5 \end{bmatrix}$

Draw the sagittal diagram and also find $P \odot Q$.

13. (a) Let a binary fuzzy relation R be defined by the following membership matrix:

$M_R = \begin{bmatrix} 0.7 & 0.4 & 0 \\ 0.9 & 1 & 0.4 \\ 0 & 0.7 & 1 \\ 0.7 & 0.9 & 0 \end{bmatrix}$ obtain its resolution form.

Or

(b) Let $X = \{a, b, c, d\}$. Given the basic assignment $m(\{a, b, c\}) = 0.5$, $m(\{a, b, d\}) = 0.2$, and $m(X) = 0.3$

Determine the corresponding belief and plausibility measures.

14. (a) Show that the maximum of the measure of fuzziness defined by the function

$$f(A) = -\sum_{x \in X} \left(\mu_A(x) \log_2 \mu_A(x) + [1 - \mu_A(x)] \log_2 [1 - \mu_A(x)] \right) \text{ is } |X|.$$

Or

(b) With the usual notations, prove that $H(X,Y) \leq H(X) + H(Y)$.

15. (a) (i) Define the measure of dissonance.

(ii) Let $m(\{x_1, x_2\}) = 0.4$, $m(\{x_3\}) = 0.1$, $m(\{x_1, x_3\}) = 0.3$ and $m(\{x_1, x_2, x_3\}) = 0.2$ be a basic assignment representing a body of evidence with four focal elements. Calculate $E(m)$.

Or

(b) Prove that the U – uncertainty is sub additive.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

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

(b) Let $f : X \to Y$ be an arbitrary crisp function and let for any $A_i \in \exists(x)$ and any $B_i \in \exists(Y)$, $i \in I$. prove the following:

(i) $\overline{f^{-1}(B)} = f^{-1}(\overline{B})$;

(ii) $B \supseteq f(f^{-1}(B))$.

17. State and prove second characterization theorem of fuzzy complements.

18. Let $* \in \{+, -, ., /\}$ and let A, B denote continuous fuzzy numbers. Prove that the fuzzy set $A * B$ defined by $(A * B)(z) = \sup_{z=x*y} \min[A(x), B(y)]$ is a continuous fuzzy number.

19. Prove: Given a consonant body of evidence $(\mathcal{F}, m)$, the associated consonant belief and plausibility measures posses the following properties:

(a) Bel $(A \cap B) = \min[Bel\ (A), Bel\ (B)]$ for all $A, B \in \mathcal{P}(X)$;

(b) $Pl\ (A \cup B) = \max[Pl(A), Pl(B)]$ for all $A, B \in \mathcal{P}\ (X)$

20. State and prove the Gibb's theorem.

D–1213

Sub. Code
11363

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION, DECEMBER 2021.

Sixth Semester

Mathematics

COMPLEX ANALYSIS

(CBCS 2018 – 19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. If z, and z_2 are any two non zero complex numbers, prove that $\arg z_1 z_2 = \arg z_1 + \arg z_2$.

2. Define concyclic point.

3. Prove that the function $f(z) = \bar{z}$ is now here differential.

4. Define mobias transformation.

5. Define analytic function.

6. State cauchy integral theorem.

7. State Liouville's theorem.

8. Find the Taylor's series for $f(z) = \dfrac{z-1}{z+1}$ about the point $z = 0$

9. Define singular point with an example.

10. Find the residue of $\frac{1}{(z^2 + a^2)^2}$ at $z = ai$

PART B — $(5 \times 5 = 25$ marks)

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

11. (a) Let $z = r(\cos\theta + i\sin\theta)$ be any non zero complex number and n be any integer. Prove that $z^n = r^n(\cos n\theta + i\sin n\theta)$

Or

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

12. (a) If $u(x, y)$ is a harmonic function in a region D prove that $f(z) = \frac{\partial u}{\partial x} - i\frac{\partial u}{\partial y}$ is analytic in D.

Or

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

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

Or

(b) Expand $f(z) = \sin z$ in a Taylor's series about $z = \pi/4$ and determine the region of convergence of this series.

14. (a) State and prove fundamental theorem of algebra.

Or

(b) Let $f(z)$ be a continuous complex valued function defined on a region D. Prove that $\int_c (z)dz$ depends only on the end points of C if and only if there exists an analytic function $f(z)$ such that $f^{'}(z) = f(z)$ in D.

15. (a) State and prove Cauchy's is residue theorem.

Or

(b) Show that $\int_0^{2\pi} \frac{d\theta}{5+3\cos\theta} = \frac{\pi}{2}$.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Let $f(z) = u(x, y) + iv(x, y)$ be a function defined in a region D such that u, v and their first order partial derivatives are continuous in D. If the first order partial derivatives of u, v satisfy the cauchy- Riemann equations at a point $(x, y) \in D$, Prove that f is differentiable at $z = x + iy$.

17. Show that $u = \log\sqrt{x^2 + y^2}$ is harmonic and determine its conjugate and hence find the corresponding analytic function $f(z)$.

18. Let f be an analytic function defined in a region D. Let $z_0 \in D$. If $f'(z_o) \neq 0$ Prove that f is conformal at z_0

19. State and prove Cauchy's integral formula.

20. Using the method of contour integration evaluate $\int_{-\infty}^{\infty} \frac{x^2}{(x^2+1)(x^2+4)} dx.$

D–1214

Sub. Code
11364

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION, DECEMBER 2021.

Sixth Semester

Mathematics

COMBINATORICS

(CBCS 2018 – 19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Define the stirling numbers of the first kind.

2. What is meant by patterns?

3. Define the exponential generating function for $\phi(n)$.

4. Obtain determinantal expressions for S_r in terms of the $a_r's$.

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

6. State the Cauchy theorem.

7. Write a short note on the rook polynomial of the chess board C.

8. Find the rook polynomial for the manage problem.

9. When will you say that the two functions are said to be G-equivalent.

10. Write a short notes on the Cartesian product of G and H.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Write down the recurrence formula for S_n^m Also prove that the number of surjections of the n-set into the m-set is m! S_n^m.

Or

(b) Establish the following relations.

(i) $B_{n+1} = \sum_{k=0}^{n} \binom{n}{k} B_k$

(ii) $S_{n+1}^m = \sum_{k=0}^{n} \binom{n}{k} S_k^{m-1}$

12. (a) Solve the following recurrence relation by the method of generating functions. $a_n = a_{n-1} + 2(n-1)$ with $a_0 = 1$.

Or

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

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

Or

(b) If $m(p)$ is the number of circular words of length 8 and primitive period P, prove that. $2^8 = 1m(1) + 2m(2) + 4M(4) + 8M(8)$.

14. (a) Define the cycle index of a group. Also find the cycle index of the symmetric group s_n.

Or

(b) Prove that the number of circular necklace patterns with n beads and at the most c colours is $\frac{1}{n}\sum_{d/n} \phi\left(\frac{n}{d}\right) = c^d$, where ϕ is Euler's function.

15. (a) Prove the following:

(i) $\sum_{k=0}^{n} x^k = z(S_n;1 + x)$

(ii) $(n+1)! = \sum_{g \in S_n} 2^{\lambda(g)}$

Or

(b) Prove that the ordinary generating function for $z(s_n)$ is exp $\left(s_1 t + \frac{s_2 t^2}{2} + \frac{s_3 t^3}{3} + \ldots\right)$

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Let n be a positive integer. Prove that the ordinary enumerator for the partitions of n is $f(t) = \frac{1}{(1-t)(1-t^2)(1-t^3).....}$

17. State and prove generalised inclusion and exclusion principle theorem.

18. Solve the recurrence relation $F_n = F_{n-1} + F_{n-2}$ with the initial conditions $F_o = 1 = F_1$. Also prove that $F_n = \sum_{k=0}^{n/2} \binom{n-k+1}{k}$

19. State and prove the Burnside's lemma.

20. State and prove the polya's enumeration theorem.