D–2937

Sub. Code
11313

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION,
DECEMBER 2019.

First Semester

CLASSICAL ALGEBRA

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. State Binomial Theorem.

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

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

4. If α, β, γ are the roots of $x^3 - 6x^2 + 11x - 21 = 0$. Find the value of $\Sigma\alpha^2$

5. Define unit matrix.

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

7. Define rank of a $m \times n$ matrix.

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

9. Prove that the matrix A and its transpose A^T have the same characteristic roots.

10. Find the eigen values of $\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Find coefficient of x^r in the expansion of $(1 + 2x + 3x^2 + \ldots + \infty)^2$.

Or

(b) Diminish the roots of $x^4 - x^3 - 10x^2 + 4x + 24 = 0$ by 2.

12. (a) Find the positive root of $x^3 - 5x + 3 = 0$.

Or

(b) Briefly explain about Horner's method.

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

Or

(b) Solve the equation $6x^4 - 25x^3 + 37x^2 - 25x + 6 = 0$.

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

Or

(b) Examine the consistency of the equations $x + 2y + 3z = 14$, $3x + y + 2z = 11$, $2x + 3y + z = 11$.

15. (a) Verify Cayley Hamilton theorem for $\begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$.

Or

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

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Sum to infinity the series :

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

17. Form the equation with rational coefficients whose roots are $1 - \sqrt{2}, 2$.

18. If α, β, γ are the roots of $ax^3 + bx^2 + cx + d = 0$. Find $\sum \alpha^2 \beta^2$, $\sum \frac{1}{\alpha^2 \beta^2}$.

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

20. Verify Cayley Hamilton theorem for $A = \begin{bmatrix} 1 & 1 & 2 \\ 3 & 1 & 1 \\ 2 & 3 & 1 \end{bmatrix}$ and find A^{-1}.

D–2938

Sub. Code
11314

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION, DECEMBER 2019.

First Semester

Mathematics

CALCULUS

(CBCS 2018-19 Academic year onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. If $x=a(\theta-\sin\theta)$ and $y=a(1-\cos\theta)$, prove that $\frac{dy}{dx}=\cot\left(\frac{\theta}{2}\right)$.

2. Find the n^{th} derivative of $y=\sin(ax+b)$.

3. At which point on the curve $y=x^3-12x+18$ is the tangent parallel to the x-axis?

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

5. Evaluate $\int_0^{\frac{\pi}{2}} \log\tan x\,dx$.

6. Evaluate $\int_0^1 \int_0^2 x^2\ y^2\ dx\ dy$.

7. Solve $y\ dx - x\ dy + 3x^2\ y^2\ e^{x^3}\ dx = 0$.

8. Prove that $\overline{|(n+1)} = n!$, where n is a positive integer.

9. Prove that $\underline{|}(\sin at) = \frac{a}{s^2 + a^2}$.

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

PART B — (5 × 5 = 25 marks)

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

11. (a) Find $\frac{dy}{dx}$ when x and y are connected by the relation $ax^2 + 2hxy + by^2 = c$.

Or

(b) If $U = \tan^{-1}\left(\frac{x^3 + y^3}{x - y}\right)$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \sin 2u$.

12. (a) Find the envelope of the family of circles $(x - a)^2 + y^2 = 2a$, where a is the parameter.

Or

(b) Evaluate $\int \sin^6 x\ dx$.

13. (a) Prove that $\beta(m, n) = 2\int_0^{\frac{\pi}{2}} \sin^{2m-1} x \cos^{2n-1} x \, dx$.

Or

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

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

Or

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

15. (a) Find $L(te^{-t} \sin t)$.

Or

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

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Find the asymptotes of

$x^3 + 2x^2 y - x y^2 - 2y^3 + 4y^2 + 2xy + y - 1 = 0$.

17. Prove that the radius of the curve $x y^2 = a^3 - x^3$ at that point $(a, 0)$ is $\frac{3a}{2}$.

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

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

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

D–2939

Sub. Code
11323

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION, DECEMBER 2019.

Second Semester

Mathematics

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

2. Show that AB is perpendicular to CD if A is $(2, 3, 4)$ $B\,(5, 4, -1)$, $C\,(3, 6, 2)$ and $D\,(1, 2, 0)$.

3. Find the equation of the plane passing through the points (1, –2, 3), (3, 1, 2) and (2, 3, –1).

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

5. Find the equation of plane which passes through (2, 1, 3) and which contains $\frac{x}{1} = \frac{y-1}{2} = \frac{z+1}{-2}$.

6. How do you describe a cylinder?

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

8. Define orthogonal spheres.

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

10. Write a note on line integral.

PART B — (5 × 5 = 25 marks)

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

11. (a) Show that the angle between two diagonals of a cube is $\cos^{-1}\left(\frac{1}{3}\right)$.

Or

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

12. (a) Find the equation of the plane through (2, 3, –4) and (1, –1, 3) and parallel to the *X*-axis.

Or

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

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

Or

(b) The circle on the sphere

$x^2 + y^2 + z^2 + 6y - 10z + 23 = 0$

has centre (1, 2, –2). Find its equation.

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

Or

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

15. (a) Verify Green's theorem for $f = \left(x^2 + y^2\right) i = 2xy\ j$ and C is the rectangle in the xy-plane bounded by $y = 0,\ y = b,\ x = 0$ and $x = a$.

Or

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

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Find the bisector of the acute angle between the planes

$$3x + 4y - 5z + 1 = 0$$
$$5x + 12y - 13z = 0.$$

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

18. Obtain the equation of the sphere having the circle

$$S = x^2 + y^2 + z^2 - 3x + 4y - 2z - 5 = 0;$$
$$\pi = 5x - 2y + 4z + 7 = 0$$

as a great circle.

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

20. Evaluate $\iint_S (\nabla \times f) \cdot n \, dS$ where $f = y^2 i + yj - xzk$ and S is the upper half of the sphere $x^2 + y^2 + z^2 = a^2$ and $z \geq 0$.

D–2940

Sub. Code
11324

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION, DECEMBER 2019.

Second Semester

Mathematics

SEQUENCES AND SERIES

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define bounded sequence.

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

3. Prove that any convergent sequence is a Cauchy sequence.

4. State comparison test.

5. What is Cauchy's integral test?

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

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

8. Define Cauchy product of Σa_n and Σb_n.

9. State Riemann's theorem.

10. When do you say that Σb_n is a rearrangement of a series Σa_n.

PART B — (5 × 5 = 25 marks)

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

11. (a) Prove that $(n) \to \infty$.

Or

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

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

Or

(b) Prove that $(1/n)$ is a Cauchy sequence.

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

Or

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

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

Or

(b) Show that $\sum (-1)^{n+1} \frac{n}{3n - 2}$ oscillates.

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

Or

(b) Write notes on rearrangement of series.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

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

17. State and prove Cesaro's theorem.

18. Discuss the behaviour of Harmonic series $\sum \frac{1}{n^p}$.

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

20. Given $\sum \frac{1}{n^2} = S$. Prove that $1 + \frac{1}{3^2} + \frac{1}{5^2} + \cdots = \frac{3}{4} S$.

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D–2941

Sub. Code
11333

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION, DECEMBER 2019.

Third Semester

Mathematics

DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS

(CBCS 2018-19 Academic year onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Verify whether $e^y\,dx + \left(x\,e^y + 2y\right)dy = 0$ is exact.

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

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

4. Evaluate the particular integral of the differential equation $\left(D^2 + 9\right)y = 4\sin 3x$.

5. Solve: $\frac{dx}{x} = \frac{dy}{y} = \frac{dz}{z}$.

6. Verify the condition of integrability of $(2xz - yz)\,dx + (2yz - zx)dy - \left(x^2 - xy + y^2\right)dz = 0$.

7. Form the differential equation by eliminating the arbitrary constants a & b from $z = axy + b$.

8. Solve: $2p + 3q = 1$.

9. Solve $p + q + pq = 0$.

10. Define Brachistochrone problem.

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

(b) Solve: $4p^2 - 8p + 3 = 0$.

12. (a) Solve: $\left(D^2 + 3D + 2\right)y = e^x + x^2$.

Or

(b) Solve: $x^2 y'' - 3x y' - 5y = \sin(\log x)$.

13. (a) Solve:
$yz^2\left(x^2 - yz\right)dx + zx^2\left(y^2 - xz\right)dy + xy^2\left(z^2 - xy\right)dz = 0$

Or

(b) Solve: $x^2 y'' + 3x y' + y = \dfrac{1}{(1+x)^2}$.

14. (a) Eliminate the arbitrary function from $z = f\left(\dfrac{y}{x}\right)$ and form the partial differential equation.

Or

(b) Solve $p e^y = q e^x$.

15. (a) Find the orthogonal trajectories of the family of inches $x^2 + y^2 = a^2$.

Or

(b) Solve: $z = px + qy - 2\sqrt{pq}$.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Solve: $(2x+1)^2 y'' - 2(2x+1)y' - 12y = 6x$.

17. Solve by method of variation of parameters $y'' + 3y' + 2y = x^2$.

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

19. Find the general solution of $x\left(y^2 - z^2\right)p + y\left(z^2 - x^2\right)z = z\left(x^2 - y^2\right)$.

20. Solve by Charpits method

$q = px + p^2$.

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D–2942

Sub. Code
11334

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION,
DECEMBER 2019.

Third Semester

MECHANICS

(CBCS – 2018-19 Academic Year onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. State the triangle law of forces.

2. State Lami's theorem.

3. Define like and unlike parallel forces.

4. Define a couple.

5. What is the coefficient of friction?

6. Define the directrix of the catenary.

7. What is the velocity of projection?

8. State the principle of conservation of momentum.

9. Define the periodic time of a simple harmonic motion.

10. What are the two-folded problems in central orbits?

SECTION B — (5 × 5 = 25 marks)

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

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

Or

(b) A and B are two fixed points on a horizontal line at a distance C apart. Two fine light strings AC and BC of lengths b and a respectively support a mass at C. Show that the tensions of the strings are in the ratio $b(a^2 + c^2 - b^2) : a(b^2 + c^2 - a^2)$

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

Or

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

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

Or

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

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

Or

(b) Explain the oblique impact of two smooth sphere.

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

Or

(b) Derive the pedal equation of central orbit.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE of the following questions.

16. 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 $P = (X^2 + QR)^{1/2} = \dfrac{QR(Q+R)}{Q^2 + R^2 - Y^2}$.

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

18. If D is any point on the base BC of triangle ABC such that $\dfrac{BD}{DC} = \dfrac{m}{n}$ and $\angle ADC = \theta$, $\angle BAD = \alpha$ and $\angle DAC = \beta$, then prove that $(m+n)\cot\theta = m\cot\alpha - n\cot\beta$ and $(m+n)\cot\theta = n\cot B - m\cot C$.

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

20. Derive the general solution of the simple harmonic motion (S.H.M) equation.

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D–1788	Sub. Code
	11 A/13711/0111

DISTANCE EDUCATION

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

First Semester

Part I — TAMIL – PAPER – I

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

Time : Three hours Maximum : 75 marks

பகுதி அ — (10 × 2 = 20 மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் விடையளிக்க.

1. குருவாயூர் கண்ணனின் நிறம் யாது?

2. ஆயர்பாடி மாளிகையில் கண்ணன் செய்வது யாது?

3. கண்ணதாசனின் இயற்பெயரைக் குறிப்பிடுக.

4. பட்டுக்கோட்டை கல்யாண சுந்தரம் பிறந்த ஊர் யாது?

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

6. பாரத மாதாவிற்குத் 'திருப்பள்ளி எழுச்சி' பாடியவர் யார்?

7. சர்ப்ப யாகம் - நூல் குறிப்பு வரைக.

8. கண்ணகியின் சிலம்பில் எப்பரல்கள் இருந்தன?

9. உமறுப்புலவரை ஆதரித்த வள்ளல் பெயரை எழுதுக.

10. தேம்பாவணி - பொருள் தருக.

பகுதி ஆ — (5 × 5 = 25 மதிப்பெண்கள்)

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

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

(அல்லது)

(ஆ) கவிஞர் பட்டுக்கோட்டை கல்யாண சுந்தரம் பற்றி குறிப்பு வரைக.

12. (அ) கண்ணனின் குறும்புகளைப் பாரதியார் எங்ஙனம் பாடுகிறார்?

(அல்லது)

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

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

(அல்லது)

(ஆ) கண்ணகியின் வருகையை வாயில் காவலன் மன்னனுக்கு எங்ஙனம் அறிவிக்கிறான்?

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

(அல்லது)

(ஆ) இறைவனை வணங்க கன்னித்தாயும் சூசையும் ஆயர்களை அழைக்குமாற்றை எழுதுக.

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

(அல்லது)

(ஆ) கு.ப. இராஜகோபாலனின் படைப்புகளை விளக்குக.

பகுதி இ — (3 × 10 = 30 மதிப்பெண்கள்)

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. கண்ணதாசன் கண்ணனைப் புகழ்ந்துரைக்குமாற்றை விளக்கி வரைக.

17. பாரதிதாசன் உலகப்பன் பாடல் வழிக் கூறும் கருத்துக்களைத் தொகுத்துரைக்க.

18. இராமனின் சிறப்புகளைக் கம்பர் எடுத்துரைக்குமாற்றை விவரிக்க.

19. இளங்கோவடிகளின் கவித்திறத்தை நும் பாடப் பகுதியால் பாராட்டியுரைக்க.

20. தேம்பாவணி காப்பியச் சிறப்புகளை எடுத்துரைக்க.

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D–1789

Sub. Code
11B/0311B

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.B.A./B.B.A. (Banking)/B.C.A./ M.B.A. (5 Year Integrated) DEGREE EXAMINATION, DECEMBER 2023.

First Semester

Part I — COMMUNICATION SKILLS – I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

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

2. Write the meaning of 'Communication'.

3. What is 'Oral Communication'?

4. Write any one importance of Oral Communication.

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

6. What is called as Body Language?

7. What are gestures?

8. Mention any one purpose of 'Meeting'.

9. What is logical presentation in Group Discussion?

10. Define 'Professional report'.

SECTION B — ($5 \times 5 = 25$ marks)

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

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

Or

(b) Write a note on Intonation.

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

Or

(b) Discuss the forms of Oral Communication.

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

Or

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

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

Or

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

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

Or

(b) Discuss the purpose of conducting group discussion.

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

Answer any THREE questions.

16. Examine the principles of effective communication.

17. Discuss the purpose of meetings.

18. Elucidate the features of written communication.

19. Analyse the steps involved in Essay Writing.

20. Explain the ways of organizing a group discussion.

D–1790

Sub. Code

12/13712/0112/ 0312

DISTANCE EDUCATION

COMMON FOR B.A/B.Sc./B.B.A./B.B.A. (BANKING)/B.C.A./M.B.A. (5 YEAR INTEGRATED) DEGREE EXAMINATION, DECEMBER 2023.

First Semester

Part II – ENGLISH PAPER – I

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

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

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

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

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

8. Fill in the blanks with Prepositions:

(a) He is running _____ the temple.

(b) He left _____ London yesterday.

9. Fill in the blanks with suitable Articles.

(a) Which road is _____ right one?

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

10. Write the purpose of Précis Writing.

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

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

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

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

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

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

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

Or

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

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

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

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

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

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

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

20. Report the following conversation in Indirect Speech.

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

(b) Which post office do you mean?

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

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

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

D–1881

Sub. Code
11313

DISTANCE EDUCATION

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

First Semester

CLASSICAL ALGEBRA

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

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

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

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

4. State the Descarte's rule of sign.

5. Define strum's function.

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

7. Define adjoint of a matrix.

8. Define rank of a matrix.

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

10. State Cayley – Hamilton theorem.

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

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

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

Or

(b) Solve the equation

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

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

Or

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

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

Or

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

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

Or

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

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

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

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

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

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

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

D–1882

Sub. Code
11314

DISTANCE EDUCATION

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

First Semester

CALCULUS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

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

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

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

4. Define Evolute.

5. Define Curvature.

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

7. Define Gamma function.

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

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

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

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

(b) Find the asymptotes of

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Verify Euler's theorem for

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

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

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

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

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

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D–1791

Sub. Code
21A

DISTANCE EDUCATION

Common for B.A./B.Sc./B.B.A./B.B.A. (Banking)/B.C.A./M.B.A. (5 year integrated) DEGREE EXAMINATION, DECEMBER 2023.

Second Semester

Part – I – TAMIL PAPER – II

(CBCS 2018 – 19 Academic year onwards)

Time : Three hours Maximum : 75 marks

பகுதி அ — (10 × 2 = 20 மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் விடையளிக்க.

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

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

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

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

(அல்லது)

(ஆ) பண்ணாற்றும் மருந்தால் பாவம் தீர்க்க வந்த காலத்தினை விவரி.

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

(அல்லது)

(ஆ) "கூழை தாங்கிய எருமை" என்பதனை விளக்குக.

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

(அல்லது)

(ஆ) மொழி முதல் எழுத்துக்கள் குறித்து விளக்குக.

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

(அல்லது)

(ஆ) மரபுக் கவிதையில் பாரதிதாசனின் முக்கியத்துவம் யாது?

15. (அ) தொலைக்காட்சி தமிழுக்கு ஆற்றிவரும் பங்களிப்பு யாது?

(அல்லது)

(ஆ) தமிழ் வளர்ச்சியில் இணையத்தின் முக்கியத்துவம் பற்றி விளக்குக.

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

பின்வரும் வினாக்களுக்கு மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. நும் பாடப்பகுதியில் அமைந்துள்ள தேம்பாவணி பாடல் கருத்துக்களை தொகுத்துரைக்க.

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

18. சார்பெழுத்து என்றால் என்ன? அதன் வகைகளை எடுத்துக்காட்டுகளுடன் விளக்குக.

19. தமிழ்மொழிக்கு சைவ சமயப் பெரியவர்கள் ஆற்றிய தொண்டினை விவரிக்க.

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

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D–1792	Sub. Code
	21B

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.B.A./B.B.A. (Banking)/B.C.A./ M.B.A. (5 Year Integrated) DEGREE EXAMINATION, DECEMBER 2023.

Second Semester

Part I — COMMUNICATION SKILLS – II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL questions.

1. What is meant by code of communication skills?

2. What do you mean by communication skills?

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

4. Mention any four tips to improve speaking skills.

5. What are the types of listening?

6. What are the five stages of interview?

7. Write any two important elements for paragraph writing.

8. What does an editor do in publishing?

9. What is corporate communication?

10. Write any two tips for writing press release.

SECTION B — ($5 \times 5 = 25$ marks)

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

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

Answer any THREE questions.

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

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

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

19. Prepare a resume for a new job.

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

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D–1793

Sub. Code
22/13722

DISTANCE EDUCATION

Common for B.A./B.Sc./B.B.A./B.B.A. (Banking)/B.C.A./ M.B.A. (5 Years. integrated) DEGREE EXAMINATION, DECEMBER 2023.

Second Semester

Part II — ENGLISH PAPER – II

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

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. To Whom the Sonnets of Shakespeare addressed?

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

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

4. Define Soliloquy.

5. What does “Yellow Wood” stand for?

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

7. What does the word “Gitanjali” mean?

8. Why did Shylock hate Antonio?

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

10. What is note making?

PART B — (5 × 5 = 25 marks)

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

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

Or

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

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

Or

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

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

Or

(b) Is Shylock a Villian or victim?

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

Or

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

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

Or

(b) What are steps to organize an essay?

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

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

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

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

19. Make notes of the following passage :

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

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

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

(a) Have living standards in India risen rapidly?

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

(c) What have we succeeded in doing?

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

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

D–1883

Sub. Code
11323

DISTANCE EDUCATION

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

Second Semester

ANALYTICAL GEOMETRY AND VECTOR CALCULUS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

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

2. Define Direction cosines.

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

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

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

6. Write down the equation of Right circular cone.

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

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

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

10. State Green's theorem.

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

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

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

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

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

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

D–1884	Sub. Code
	11324

DISTANCE EDUCATION

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

Second Semester

SEQUENCES AND SERIES

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Define monotonic sequence. Give an example.

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

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

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

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

6. State the root test.

7. Define absolutely convergent series.

8. State Raabe's test.

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

10. Define alternating series. Give an example.

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Show that :

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

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

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

17. State and prove Cesaro's theorem.

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

19. State and prove Cauchy's condensation test.

20. State and prove Leibnitz's test.

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D–1794

Sub. Code
31A/13731

DISTANCE EDUCATION

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

Third Semester

Part I : TAMIL Paper – III

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

Time : Three hours Maximum : 75 marks

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

அனைத்து வினாக்களுக்கும் விடையளிக்கவும்.

1. முல்லைப்பாட்டின் ஆசிரியர் யார்?

2. நாழிகைக் கணக்கரின் பணி யாது?

3. ஐங்குறு நூற்றில் கபிலர் சுட்டும் மரங்களின் பெயர்களை எழுதுக.

4. நற்றிணைப் பாடல்களைத் தொகுப்பித்த அரசன் யார்?

5. சோம்பலோடு இருப்பவர்க்கு எவை கிட்டாதெனக் கருவூர்க் கோசிகனார் கூறுகிறார்?

6. ஆனந்தப் பையுள் துறையை விளக்குக.

7. பாடாண் திணை - குறிப்பு வரைக.

8. திருக்குறளுக்கு வழங்கப்பெறும் வேறு பெயர்கள் யாவை?

9. விமலாதித்தன் யார்?

10. புதினம் - விளக்கம் தருக.

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

பின்வரும் வினாக்களுக்கு ஒருபக்க அளவில் விடை தருக.

11. (அ) தலைவனின் பாசறை அமைப்பினை விளக்குக.

(அல்லது)

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

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

(அல்லது)

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

13. (அ) மலையமான் திருமுடிக்காரியின் வள்ளல் தன்மையைச் சுட்டுக.

(அல்லது)

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

14. (அ) அறிவுடைமை குறித்துத் திருவள்ளுவர் கூறுவன யாவை?

(அல்லது)

(ஆ) நான்மணிக்கடிகை சுட்டும் வாழ்க்கை நெறிகளை எழுதுக.

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

(அல்லது)

(ஆ) சுவடுகள் நாவலில் பார்வதியின் பாத்திரப் படைப்பை ஆராய்க.

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

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. முல்லைபாட்டு வெளிப்படுத்தும் தலைவியின் கற்புநிலை மேன்மையைக் கட்டுரையாக்கம் செய்க.

17. நற்றிணை வெளிப்படுத்தும் இயற்கை வருணனைகளைத் தொகுத்துரைக்க.

18. திருக்குறள் வெளிப்படுத்தும் அறக்கோட்பாடுகளை நும் பாடப்பகுதி கொண்டு விளக்கி வரைக.

19. இராசராசசோழன் நாடகத்தின் கதைக் கோப்புச் சிறப்பைக் கட்டுரை வடிவில் எழுதுக.

20. சுவடுகள் நாவலில் பாத்திரப்படைப்பு உருவாக்கத்தினை ஆராய்ந்து கட்டுரை எழுதுக.

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D–1795

Sub. Code
31B

DISTANCE EDUCATION

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

Third Semester

Part-I — HUMAN SKILLS DEVELOPMENT – I

(CBCS 2018-19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Define Interpersonal Relationship.

2. Define Attitude.

3. What is meant by 'Counselling'?

4. What is Dais Etiquette?

5. Write briefly on self esteem.

6. Give the meaning of 'Leadership'.

7. What is called as positive attitude?

8. Write briefly on goal setting.

9. Give the meaning of 'Anger'.

10. What is 'Stress'?

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

(b) Write on the significance of thinking ahead.

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

Or

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

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

Or

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

14. (a) Discuss the advantages of Negotiations.

Or

(b) Discuss the importance of Goal Setting.

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

Or

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

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Discuss in details the merits of good habits.

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

18. Discuss the significance of Self-esteem.

19. Explain the factors that influence personality.

20. Write elaborately on the Management of conflicts.

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D–1796

Sub. Code
32/13732

DISTANCE EDUCATION

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

Third Semester

PART II — ENGLISH — PAPER III

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

Time : Three hours Maximum : 75 marks

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

Answer ALL questions.

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

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

3. How did Verger lose his job?

4. Why is Mathilde envious of Madame Forestier?

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

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

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

8. Why could Swami not keep a light burning?

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

(a) We all love ———— (honest)

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

10. What is an Adjective?

SECTION B — ($5 \times 5 = 25$ marks)

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

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

(i) I know a funny little man.

(ii) He is a man of few words.

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

(iv) How many marks did you got?

(v) An empty vessel makes much noise.

Or

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

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

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

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

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

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

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

Answer any THREE questions.

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

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

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

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

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

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

(a) The child has been ———— treated.

(b) The choir sang ————.

(c) The burglar crept ————.

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

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

(f) She ———— comes here now,

(g) I hope you will ———— be well.

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

(i) He did ———— in the examination.

(j) The bull charged ————.

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D–1885

Sub. Code
11333

DISTANCE EDUCATION

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

Third Semester

DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Define order of a differential equation.

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

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

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

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

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

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

8. Solve : $pq = k$.

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

10. Solve : $q = xp$.

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Solve :

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

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

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

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

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

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

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D–1886

Sub. Code
11334

DISTANCE EDUCATION

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

Third Semester

MECHANICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

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

2. State Lami's theorem.

3. Define like and unlike parallel forces.

4. Write down the condition of equilibrium.

5. Define a couple with an example.

6. Define angle of friction.

7. Define a common catenary.

8. Define Projectile and its trajectory.

9. Give an example for Impulsive force.

10. What is meant by central force?

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. State and prove the parallelogram law of forces.

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

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

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

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

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D–1797

Sub. Code
41A/13741

DISTANCE EDUCATION

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

Fourth Semester

Part I –TAMIL PAPER – IV

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

Time : Three hours Maximum : 75 marks

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

அனைத்து வினாக்களுக்கும் விடையளிக்கவும்.

1. வெண்பாவில் பயின்று வரும் தளைகள் யாவை?

2. கண்ணி வகைப் பாடல்கள் எவ்வாறு அமைந்திருக்கும்?

3. அறத்தொடு நிற்றல் என்றால் என்ன?

4. அன்பின் ஐந்திணைகளைக் குறிப்பிடுக.

5. அணி இலக்கணம் பேசும் நூலினைக் குறிப்பிடுக.

6. சிலேடை அணி எத்தனை வகைப்படும்? அவை யாவை?

7. தொல்காப்பியத்திற்குப் பாயிரம் எழுதியவர் யார்?

8. பத்துப்பாட்டு நூல்களைக் குறிப்பிடுக.

9. பாண்டியன் பரிசு நூலின் கதைத் தலைவி யார்?

10. இயேசு காவியம் எத்தனை பாகங்களைக் கொண்டது?

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

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

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

(அல்லது)

(ஆ) சிந்துப் பாடலின் இலக்கணம் கூறி அதன் வகைகளை விளக்குக.

12. (அ) ஐந்திணைகளின் கருப்பொருள் குறித்து எழுதுக.

(அல்லது)

(ஆ) அறத்தொடு நிற்றல் நிலையில் தோழியின் பங்கு பற்றி எழுதுக.

13. (அ) உருவக அணியினைச் சான்றுடன் விளக்குக.

(அல்லது)

(ஆ) நிறுத்தற் குறியினைப் பயன்படுத்தும் முறைகள் பற்றி எழுதுக.

14. (அ) வீரயுகப் பாடல்கள் குறித்து எழுதுக.

(அல்லது)

(ஆ) குறுந்தொகைப் பாடல்களின் காதற்சிறப்பினை விளக்குக.

15. (அ) பாஞ்சாலி சபதத்தின் தனித்தன்மையை விளக்குக.

(அல்லது)

(ஆ) பாண்டியன் பரிசு காவியத்தில் வரும் சமூகச் சிந்தனைகளை நிரல்படுத்துக.

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

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. கலிப்பாவின் பொது இலக்கணம் கூறி வகைகளை விரிவாக எழுதுக.

17. புதுக்கவிதையின் வளர்ச்சிக்குக் குறியீடு எவ்வாறு துணை நிற்கிறது?

18. புறப்பொருள் துறைகளில் கையறுநிலை பெறும் இடத்தினை ஆராய்க.

19. இரட்டைக் காப்பியங்களில் காணலாகும் அறச்சிந்தனைகளை நிரல்படுத்துக.

20. இயேசு காவியத்தின் வழி இறைவனின் அருட்செயலை விளக்குக.

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D–1798	Sub. Code
	41B

DISTANCE EDUCATION

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

Fourth Semester

Part I — HUMAN SKILLS DEVELOPMENT – II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL questions.

1. What is called communication?

2. What is the goal of a presentation?

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

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

5. What are Hard Skills?

6. Write any two forms of Technical Communication.

7. Write any one features of group discussion.

8. Define Motivation.

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

10. Suggest anyone way to arrest stress.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Describe effective communication.

Or

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

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

Or

(b) Discuss the need for leadership skill.

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

Or

(b) Discuss the need for Managerial Skills.

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

Or

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

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

Or

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

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

Answer any THREE questions.

16. Explain the techniques of counselling.

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

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

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

20. Explain the importance of Organisation Skills.

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D–1799

Sub. Code
42/13742

DISTANCE EDUCATION

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

Fourth Semester

PART II — ENGLISH – PAPER IV

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

Time : Three hours Maximum : 75 marks

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

Answer ALL questions.

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

2. Who was Lalajee?

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

4. What have Pickering and Higgins written respectively?

5. Why did Swamy run away from home?

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

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

8. Why is Romeo exiled?

9. Add Tag Questions :

(a) None of us knew the answer, ————

(b) Use your eyes, ————.

10. Correct the following sentences :

(a) There is atleast fifty persons waiting outside.

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

SECTION B — ($5 \times 5 = 25$ marks)

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

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

Answer any THREE questions.

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

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

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

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

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

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D–1887	Sub. Code
	11343

DISTANCE EDUCATION

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

Fourth Semester

ANALYSIS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

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

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

3. Prove that Q is countable.

4. Define second category. Give an example.

5. Define a connected set. Give an example.

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

7. State Daurboux theorem.

8. Define disconnected metric space.

9. Define a sequentially compact metric space.

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

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. State and prove Holder's inequality.

17. State and prove Baire's Category theorem.

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

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

20. State and prove Heine – Borel theorem.

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D–1888

Sub. Code
11344

DISTANCE EDUCATION

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

Fourth Semester

STATISTICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

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

2. Define Harmonic mean.

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

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

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

6. Define line of regression.

7. Write down the Newton forward different formula.

8. What are the components of time series?

9. What is mean by class frequency?

10. Write the Fishers index number formula.

PART B — ($5 \times 5 = 25$ marks)

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

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

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

Or

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

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

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

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

Or

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

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

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

Or

(b) Estimate the missing term of the following :

x :	0	1	2	3	4
y :	1	3	9	–	81

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

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

Or

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

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

(ii) Also determine the short term fluctuations.

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

Or

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

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

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

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

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

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

17. Calculate the mode from the following series :

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

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

18. Fit a second degree parabola by taking x_i as the independent variable :

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

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

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

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

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

(a) Family budget method

(b) Aggregate expenditure method.

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

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D–1889	Sub. Code
	11351

DISTANCE EDUCATION

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

Fifth Semester

MODERN ALGEBRA

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Define Empty set. Give an example.

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

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

4. Define a cyclic group. Give an example.

5. State Fermat's theorem.

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

7. Define a commutative ring.

8. Define a prime ideal.

9. Define a vector space over a field F.

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

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

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

17. State and prove Lagrange's theorem.

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

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

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

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D–1890

Sub. Code
11352

DISTANCE EDUCATION

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

Fifth Semester

OPERATIONS RESEARCH

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

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

2. What is the role of slack variable?

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

4. Define integer programming problem.

5. What is meant by unbalanced transportation problem?

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

7. What is sequencing problem?

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

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

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

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

(b) Express the following LPP in the canonical form

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

Subject to the constraints

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

x_2 is unrestricted.

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

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

Subject to the constraints

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

Or

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

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

Or

(b) Solve the following transportation problem :

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

14. (a) Explain Hungarian method algorithm.

Or

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

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

15. (a) Explain the following terms :

(i) Pay off matrix

(ii) Dominance property.

Or

(b) Distinguish between PERT and CPM.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Use Big-M method to solve

Minimize $Z = 4x_1 + 3x_2$

Subject to

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

and $x_1, x_2 \geq 0$.

17. Use duality to solve the following LPP :

Maximize $Z = 2x_1 + 2x_2$

Subject to

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

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

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

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

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

Machines

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

Solve the assignment problem.

20. Solve the following 2×4 game graphically :

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

D–1891

Sub. Code
11353

DISTANCE EDUCATION

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

Fifth Semester

NUMERICAL ANALYSIS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. State the Newton-Raphson formula for iteration.

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

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

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

5. Write the Hermite's formula.

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

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

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

9. State Taylor's theorem.

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

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

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

12. (a) Solve :

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

By Jocobi's method.

Or

(b) Prove that :

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

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

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

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

Or

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

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

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

Or

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

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

Or

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

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

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

17. By using Gauss-Seidal iteration method solve :

$8x - y + z = 18$

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

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

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

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

(a) Trapezoidal rule,

(b) Simpson's rule.

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

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

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D–1892	Sub. Code
	11354

DISTANCE EDUCATION

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

Fifth Semester

TRANSFORM TECHNIQUES

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Show that $L[1] = 1/s$.

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

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

4. Define odd and even function.

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

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

7. Define Fourier sine transform.

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

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

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

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

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

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

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

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

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

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D–1893

Sub. Code
11361

DISTANCE EDUCATION

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

Sixth Semester

DISCRETE MATHEMATICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

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

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

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

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

5. Define lattice. Give an example.

6. Define Boolean algebra.

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

8. Define Euler graph.

9. Define Chromatic number of a graph.

10. Define spanning tree of a graph.

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

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

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

Or

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

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

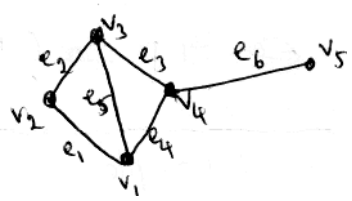
Or

(b) Prove that every chain is a lattice.

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

Or

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



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

Or

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

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

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

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

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

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

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

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

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

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D–1894	Sub. Code
	11362

DISTANCE EDUCATION

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

Sixth Semester

FUZZY ALGEBRA

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

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

2. Define normal and subnormal fuzzy set.

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

4. Define fuzzy union.

5. State laws of absorption.

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

7. What is meant by fuzzy upper bound?

8. Define a fuzzy number. Give an example.

9. State Cauchy's functional equation.

10. Explain Semantic.

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

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

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

Or

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

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

Or

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

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

Or

(b) Explain the different types of uncertainty.

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

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

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

Or

(b) Explain the principles of uncertainty and information.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

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

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

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

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

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

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

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

20. Maximize the function

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

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

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

D–1895	Sub. Code
	11363

DISTANCE EDUCATION

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

Sixth Semester

COMPLEX ANALYSIS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Define Sterigraphic projection.

2. Define harmonic function.

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

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

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

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

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

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

9. Define isolated singularity.

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

PART B — (5 × 5 = 25 marks)

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

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

Or

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

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

Or

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

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

Or

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

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

Or

(b) State the prove Liouville's theorem.

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

Or

(b) State and prove Rouche's theorem.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

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

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

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

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

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

D–1896

Sub. Code
11364

DISTANCE EDUCATION

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

Sixth Semester

COMBINATORICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Define Fibonacci number.

2. Define recurrence relation.

3. Define generating function.

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

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

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

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

8. State the inclusion and exclusion principle.

9. Define permutation group.

10. State Polya's theorem.

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

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

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

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

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

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

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

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

D-6658

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.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

First Semester

Part I – TAMIL – Paper I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

பகுதி அ — (10 × 2 = 20 மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் விடையளிக்க.

1. பாரத போர் முடிக்க கண்ணன் எடுத்தது யாது?
2. ஆயர்பாடியில் தாய்மடியில் மாயக்கண்ணன் தூங்கியது எவ்வாறு?
3. இருக்கிறதெல்லாம் பொதுவாய்ப் போனால் என்ன நடக்காது ?
4. 'பாதரமாதா திருப்பள்ளி எழுச்சி' பாடியவர் ?
5. நாமக்கல் கவிஞரின் இயற்பெயரைக் குறிப்பிடுக.
6. 'எதற்காக' என்ற கவிதையின் ஆசிரியர் யார் ?
7. சிலப்பதிகாரம் எத்தனைக் காதைகளால் அமைந்துள்ளது ?

8. தயரதன் மந்திர ஆலோசனை நடத்த காரணம் யாது ?

9. உமறுப்புலவர் – சிறு குறிப்பு வரைக.

10. தேம்பாவணி நூல் குறிப்புத் தருக.

பகுதி ஆ — (5 × 5 = 25 மதிப்பெண்கள்)

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) கண்ணன் புகழ் பாடும் இயற்கைப் பொருட்களைக் கண்ணதாசன் எங்ஙனம் விளங்குகிறார்?

(அல்லது)

(ஆ) 'நெஞ்சில் குடியிருக்கும்' என்ற பாடலில் காதலர்கள் உரையாடுமாற்றை விவரிக்க.

12. (அ) பாரதியார் கூறும் 'உலக வழக்கம்' குறித்த செய்திகளை எடுத்துரைக்க.

(அல்லது)

(ஆ) பிறைநிலவுப் பற்றி கவிஞர் பெ.தூரன் கவிப்பாடுமாற்றை எழுதுக.

13. (அ) பாரதத்தின் பெருமையும் நோயின் வலிமையும் என நாமக்கல் கவிஞர் எவற்றைக் கூறுகிறார்?

(அல்லது)

(ஆ) மீராவின் பவிதைகள் தரும் கருத்துக்களை எழுதுக.

14. (அ) வாயில் காவலர்க்குத் தன்வரவினைக் கண்ணகி எங்ஙனம் உரைத்தாள்?

(அல்லது)

(ஆ) தசரதன் இராமனுக்கு உரைத்த அறிவுரைகளை எடுத்தெழுதுக.

15. (அ) ஆயர்கள் கன்னித்தாயை வணங்கி வரவேற்ற நிகழ்வை விளக்கி எழுதுக.

(அல்லது)

(ஆ) நபிகள் ஈத்தங்குலை வரவழைத்தமைக்கான காரணத்தை எழுதுக.

பகுதி இ — (3 × 10 = 30 மதிப்பெண்கள்)

பின்வரும் வினாக்களுக்கு மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. பாரத மாதாவின் திருப்பள்ளி எழுச்சிச் சிறப்பை விவரிக்க.

17. பாரதிதாசன் உலகிற்குக் காட்டும் வழியை நும் பாடப்பகுதியால் எடுத்துரைக்க.

18. சிற்பி, 'சர்ப்ப யாகம்' கவிதை வழி உரைக்கும் செய்திகளை விரிந்துரைக்க.

19. கண்ணகி வழக்குரைத்த பாங்கை இளங்கோவடிகள் பாடுமாற்றை எழுதுக.

20. தேம்பாவணி காட்சிப் படலச் செய்திகளைத் தொகுத்துரைக்க

D-6659

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 Years Integrated) DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

First Semester

PART – I

COMMUNICATION SKILLS – I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. State the importance of Communication.
2. What are Principles of Effective Communication?
3. Define Oral Communication.
4. Write the Functions of intonation
5. What are the advantages and uses of Words and Phrases?
6. Bring out the types of Non-Verbal Communications.
7. Explain the Report Writing.

8. Briefly explain Layout.

9. Define Logical Presentation.

10. Mention any two steps that involved in Written Communication.

PART B — (5 × 5 = 25 marks)

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

11. (a) Write a short note on Effective communication.

Or

(b) What are types of communication?

12. (a) Explain the forms of Oral Communication and its Importance.

Or

(b) Write about the Preparation of speech.

13. (a) State the characteristics of an effective sentence.

Or

(b) Define Final Draft.

14. (a) Write about body language and postures in Non-Verbal Communication.

Or

(b) What are the types of Report Writing?

15. (a) Define Logical Presentation.

Or

(b) Write the steps involved in the application for Employment and curriculum vitae.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Write an essay on Communication and its importance.

17. Define Intonation and how its function important in Oral Communication.

18. What is mean by Written Communication and write the advantage of words and phrases

19. Distinguish between the paragraph writing and Essay Writing.

20. Explain Group discussion in Official Communication.

D–6660	Sub. Code
	12

DISTANCE EDUCATION

COMMON For B.A/B.Sc/ BBA/ BBA (Banking)/B.C.A/M.B.A (5 Years Integrated) DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

First Semester

Part II- ENGLISH PAPER –I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Why water is called as the Elixir of life?

2. What is the irony in Mrs. Packletide's Tiger?

3. How did Carl Sagan change the world?

4. What are the effects of sensual drugs?

5. Define Gerund.

6. What is the difference between models & Semi modals?

7. What are the two basic rules for Direct and Indirect speech?

8. Define tenses and its types.

9. What is descriptive paragraph?

10. Define Dialogue Writing.

PART B — (5 × 5 = 25 marks)

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

11. (a) What makes water one of the most powerful and wonderful thing on the earth?

Or

(b) In what way did the villagers help Mrs. Packletide shoot the tiger?

12. (a) What is the authors view is essential to Indian civilization?

Or

(b) What are the impacts of Drug Abuse.

13. (a) Define Articles and its types with examples.

Or

(b) Write a short notes on modals.

14. (a) Briefly explain Preposition with suitable examples.

Or

(b) What are rules for Direct and Indirect speech?

15. (a) Bring out the format of Formal Letter Writing.

Or

(b) List out the features of Paragraph writing.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Illustrate the concept of "The Cat" by Catharine M. Willson.

17. "The Hazards of Drug Abuse" in Dangers of Drug Abuse.

18. Analyse the idea of "Our Civilization" by C.E. Foad.

19. Define transformation of sentences Write its types with example

20. Develop the following hints into a readable passage and give a suitable title.

A rich farmer - lot of land - cattle and servants - two sons - happy life - After some years younger son unhappy - asked for his share of the property - wouldn't listen to father's advice - got his share - sold them all - went away to another country-fell into bad ways - soon all money gone - poor - no one to help him - understood his mistake.

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D–6691

Sub. Code
11313

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

First Semester

Mathematics

CLASSICAL ALGEBRA

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Write the expansion of $(1+x)^{-1}$

2. State Fundamental Theorem of Algebra.

3. Write a note on Horner's method.

4. If α, β, γ are the roots of $x^3 + qx + r = 0$, find $(\beta+\gamma)(\gamma+\alpha)(\alpha+\beta)$.

5. Define a diagonal matrix.

6. Find the transpose of $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$.

7. Find the determinant of $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 0 & 2 & 2 \end{bmatrix}$,

8. State the working rule to test the consistency of given system of equations.

9. Define : Eigen value.

10. State Cayley-Hamilton theorem.

PART B — (5 × 5 = 25 marks)

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

11. (a) Find the coefficient of x^n in the expansion of $\frac{1}{1-x^2}$.

Or

(b) Diminish the roots of the equation $x^4 - 4x^3 - 7x^2 + 22x + 24 = 0$ by 1.

12. (a) Show that the equation $x^6 + 3x^2 - 5x + 1 = 0$ has two real roots and four imaginary roots.

Or

(b) Find the positive root of $x^3 - 2x - 5 = 0$.

13. (a) If $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 2 \\ 2 & -1 \end{bmatrix}$, find $A + 5B$.

Or

(b) Mention the types of Matrices.

14. (a) Find the inverse of $\begin{bmatrix} 1 & 2 & 4 \\ 2 & 1 & 2 \\ 4 & 2 & 1 \end{bmatrix}$

Or

(b) Find the Eigen vectors for $\begin{bmatrix} 1 & 3 \\ 4 & 2 \end{bmatrix}$

15. (a) Verify Cayley Hamilton theorem for $A = \begin{bmatrix} 1 & 1 & 2 \\ 3 & 1 & 1 \\ 2 & 3 & 1 \end{bmatrix}$.

Or

(b) Show that $x - y + 2z = 5$, $3x + y + z = 8$ and $2x - 2y + 3z = 7$ are consistent.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Sum to ∞ the series

$$1 - \frac{1}{4} + \frac{1}{4} \cdot \frac{3}{8} = \frac{1}{4} \cdot \frac{3}{8} \cdot \frac{5}{12} + \ldots\ldots$$

17. Solve the equation $x^4 - 6x^3 + 11x^2 - 10x + 2 = 0$ given that $2 + \sqrt{3}$ is a root.

18. Find positive root of $2x^3 - 3x - 6 = 0$.

19. Show that the equations $2x + 6y = -11, 6x + 20y - 6z = -3$ $6y - 18z = -1$ are not consistent.

20. Find all the Eigen values and Eigen vectors of $A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$.

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D–6692	Sub. Code
	11314

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

First Semester

Mathematics

CALCULUS

(CBCS 2018 – 2019 Academic year onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. If $y = ae^{mx} + Be^{-mx}$, prove that $y_2 = m^2 y$.

2. Find the centre of curvature of the curve $y = x^2$ at the origin.

3. Evaluate $\int \frac{1}{x \log x} dx$.

4. Evaluate $\int_0^{\pi/2} x \sin x \, dx$.

5. Find the integrating factor of the differential equation $\frac{dy}{dx} = y \cot x = 2x \sin x$.

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

7. Evaluate $\int_0^{\pi/2} \sin^5 x \cos^3 x \, dx$.

8. Prove that $L(\cos ax) = \frac{s}{s^2 + a^2}$.

9. Form the partial differential equation by eliminating the arbitrary constants from $z = (x + a)(y + b)$.

10. Solve $p + q = 1$.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) If $y = \sin^{-1} x$, Prove that $(1 - x^2) y_2 - x y_1 = 0$.

Or

(b) Find the equation of the normal to the curve $x = a(\theta - \sin\theta)$, $y = a(1 - \cos\theta)$ at $\theta = \pi/2$.

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

Or

(b) Prove that $\int_0^{\pi/2} \log \tan x \; dx = 0$.

13. (a) Show that $\int_0^{\pi/2} \frac{.\cos}{1 + \sin\theta} d\theta = \log 2$.

Or

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

14. (a) Solve $\left(D^2-3D+2\right)y=\sin 4x$.

Or

(b) Form the differential equation of family of circles with radius r and with centres on the y axis (r is arbitrary).

15. (a) Find $L\left(\frac{1-\cos x}{x}\right)$.

Or

(b) Eliminate the arbitrary function from $z=f\left(y/x\right)$ and form a partial differential equation.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Find the maximum and minimum of $f(x, y)=2\left(x^2-y^2\right)-x^4+y^4$.

17. Evaluate $\int e^{ax}\sin bx\,dx$.

18. Solve $\left(D^2-1\right)y=xe^{3x}$.

19. Using laplace transformation solve the following differential equation $y''+4y'+13y=2e^{-x}$ given $y(0)=0$ and $y'(0)=-1$.

20. Find the complete integral of $px+qy=pq$ using charpits method.

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D–6661	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 Years Integrated) DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Second Semester

Part I – TAMIL PAPER – II

(CBCS 2018 – 19 Academic year onwards)

Time : Three hours Maximum : 75 marks

பகுதி அ — (10 × 2 = 20 மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் விடையளிக்க.

1. வீரமாமுனிவரின் பிற நூல்கள் யாவை?

2. வீரமாமுனிவர் சூசையப்பரை எவ்வாறு அழைக்கிறார்?

3. உழிஞைப் போர் என்றால் என்ன?

4. தாய் கதையின் மையக்கரு எது?

5. முதலெழுத்துக்கள் யாவை?

6. வினைச்சொல் என்றால் என்ன?

7. தமிழுக்குத் தொண்டு செய்த கிறித்துவ தமிழறிஞர்கள் சிலரைக் குறிப்பிடுக.

8. புதினம் என்றால் என்ன?

9. ந. பிச்சமூர்த்தி குறிப்பு வரைக.

10. பெரிய புராணம் எதனை விளக்குகிறது?

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

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) இறைவன் பொறை, மீடி, தாழ்வு கொண்டதன் காரணங்கள் யாவை?

(அல்லது)

(ஆ) நற்பலன் தருபவன் இறைவன் எனும் கூற்றினை வீரமாமுனிவர் வழி நின்று விவரி.

12. (அ) வானவீதியின் – சிறுகதையில் காணலாம் சமுதாயச் செய்திகளைத் தருக.

(அல்லது)

(ஆ) இகல் மதில் குடிமி கொண்ட மண்ணு மங்கலம் பற்றி நீவிர் அறிவது யாது?

13. (அ) அல்வழிப்புணர்ச்சியை சான்றுடன் விளக்குக.

(அல்லது)

(ஆ) மொழி இறுதியெழுத்து பற்றி நீவிர் அறிவது யாது?

14. (அ) இதழ்கள் தமிழுக்கு ஆற்றிவரும் செய்திகள் எவை? விளக்குக.

(அல்லது)

(ஆ) பெரிய புராணத்தில் தரப்படும் செய்திகள் எவை? விளக்குக.

15. (அ) இருபதாம் நூற்றாண்டில் உரைநடை வளர்ச்சிக்குப் பங்களிப்பு செய்த எவரேனும் இருவர் குறித்த செய்திகளைத் தருக.

(அல்லது)

(ஆ) சமண சமயத்தவர்கள் தமிழுக்கு ஆற்றிய தொண்டுதனை சுருக்கித் தருக.

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

பின்வரும் வினாக்களில் **மூன்றனுக்குக்** கட்டுரை வடிவில் விடை தருக.

16. நும் பாடப் பகுதியில் அமைந்துள்ள தேம்பாவணி காட்சிப்படலத்தில் வீரமாமுனிவர் காட்டும் இறை பக்தியை விளக்குக.

17. கம்பன் புறத்திணையில் காணப்படும் தும்பைப் போர் குறித்து கட்டுரை வரைக.

18. ஆகுபெயரின் இலக்கணம் கூறி அதன் வகைகளைச் சான்றுகளுடன் விளக்குக.

19. வைணவர்கள் தமிழுக்கு ஆற்றிய தொண்டு குறித்து கட்டுரை வரைக.

20. இக்கால இலக்கியங்களில் புதுக்கவிதையின் தோற்றம் வளர்ச்சி குறித்து கட்டுரை வரைக.

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D–6662

Sub. Code
21B

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.B.A./B.B.A. (Banking)/B.C.A./M.B.A. (5 YRS INTEGRATED) DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Second Semester

Part I — COMMUNICATION SKILLS – II

(CBCS 2018-19 Academic Year onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. What are the codes of communication?

2. Explain the process of responding a communication.

3. Bring out the ways to improve one's fluency in spoken English.

4. Define labio-dental sounds with examples.

5. Explain the back vowels.

6. What is the significance of listening?

7. What is meant by emotional mode on conversation?

8. What is a reference in a resume?

9. Give details of goodwill letters.

10. Bring out the importance of technical writing.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Discuss the process of encoding and decoding a language in communication.

Or

(b) Write a note on the various responses of communication.

12. (a) Write a note on the articulation of the consonants of English.

Or

(b) Define and explain triphthongs.

13. (a) Give a brief account of presentation skills.

Or

(b) What is the significance of telephonic interview?

14. (a) What are the guidelines to be followed while attending an interview?

Or

(b) Write a paragraph on the topic "Health is Wealth".

15. (a) Discuss the guidelines to publish an article in a newspaper.

Or

(b) Enumerate the role played by an editor in a journal.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE of the following questions.

16. 'Communication skills allow you to understand and be understood by the others' – Discuss.

17. Discuss the salient features of speaking English effectively.

18. Write an essay on the types of purposes of writing.

19. You are annoyed by the milk supply of the State Dairy Corporation. Write to the Chairman.

20. Take a book you know well and write an alternate ending that is the exact opposite of the real ending.

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D– 6663	Sub. Code
	22

DISTANCE EDUCATION

COMMON FOR BA/B.SC/BBA/BBA(BANKING)/BCA/MBA
FIVE YEAR INTEGRATED DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Second Semester

PART II – ENGLISH PAPER – II

(CBCS – 2018-19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Why did Wordsworth compose the poem "Lines" composed upon Westminister Bridge?

2. Describe the urn in the poem "Grecian Urn".

3. What are the symbolic elements in "The Road Not Taken"?

4. Describe the war elements in "Strange Meeting".

5. Why is "Gitanjali" considered as a song offering?

6. What is the relation between Antonio and shylock in "The Merchant of Venice"?

7. Explain two types of essays.

8. What is the purpose of writing a report?

9. When do you write a Newsletter?

10. Write two significant Characteristics of interview skills.

PART B — (5 × 5 = 25 marks)

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

11. (a) Consider Shakespeare as a sonneteer.

Or

(b) Discuss the character of Lucrezia in "Andrea Del Sarto".

12. (a) Consider Wilfred Owen as a war poet in "Strange Meeting".

Or

(b) Discuss the theme of "Gitanjali".

13. (a) Critically analyse Sarojini Naidu's "The Coromandel Fishers".

Or

(b) Enumerate the background of the poem "The Express".

14. (a) Discuss the "Pound of Flesh" scene in "The Merchant of Venice".

Or

(b) Discuss the character of Bassanio in "The Merchant of Venice".

15. (a) Write a report on the recently celebrated college day function.

Or

(b) Write a letter to the principal complaining about the lack of library facilities.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Critically appreciate "Grecian Urn" by John Keats.

17. Consider "The Road Not Taken" as an allegory.

18. Justify the title "The Coromandel Fishers" by Sarojini Naidu.

19. Consider "The Merchant of Venice" as a Romantic comedy.

20. Attempt a creative writing on the topic: "If you could be any famous person for a day, who would you want to be? Why?

D–6693	Sub. Code
	11323

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Second Semester

ANALYTICAL GEOMETRY AND VECTOR CALCULUS

(CBCS 2018–19 Academic Year onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Define radical axis.

2. Find the equation of the circle whose centre is origin and radius 5.

3. Find the direction cosines of the straight line joining the points (1,2,-4) and (2,1,-3).

4. Write the condition for two straight lines to be parallel.

5. Write the general equation of a right circular cone.

6. Write the equation of a right circular cylinder whose axis is $\frac{x}{l} = \frac{y}{m} = \frac{z}{n}$.

7. Define skew lines.

8. Find the centre and radius of the sphere.

$x^2 + y^2 + z^2 - 12x + 2y - 4z + 16 = 0.$

9. Define irrotational vector.

10. Find gradient of $\phi = x^3 + yz^2 + zx$.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Find the angle between the two lines $2x - 3y = 10$ and $x + y = 5$.

Or

(b) Find the limiting points of the system of circles coaxal with $x^2 + y^2 - 6x - 6y + 4 = 0$; $x^2 + y^2 - 2x - 4y + 3 = 0.$

12. (a) 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).

Or

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

13. (a) Find the equation of the cone whose vertex is $\alpha, \beta, \gamma)$ and the base is $ax^2 + by^2 = 1; z = 0.$

Or

(b) Find the equation of the right circular cylinder, whose axis is $\frac{x}{2} = \frac{y}{3} = \frac{z}{6}$ and radius 4.

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

Or

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

15. (a) Prove that $\nabla f(r) = \frac{f'(r)}{r}\vec{r}$.

Or

(b) Find curl curl f at the point (1, 1, 1) if $f = x^2yi + xzj + 2yzk$.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions

16. Find the equation of the circles which pass through the points of intersection of $x^2 + y^2 - 2x + 1 = 0$, $x^2 + y^2 - 5x - 6y + 4 = 0$ and which touch the line $2x - y + 3 = 0$.

17. Find the image of the point (1, 3, 4) under the reflection in the plane $2x - y + z + 3 = 0$.

18. Find the equation of the cylinder whose generator are parallel to the line $\frac{x}{1} = \frac{y}{-2} = \frac{z}{3}$ and whose guiding curve is the ellipse $x^2 + 2y^2 = 1;\ z = 0$.

19. Find the shortest distance and the equation of the line of shortest distance in symmetrical form of the lines

$$\frac{x-8}{3}=\frac{y+9}{-16}=\frac{z-10}{7} \text{ and } \frac{x-15}{3}=\frac{y-29}{8}=\frac{z-5}{-5}$$

20. Evaluate $\iint_s f.n\,ds$ where $f=(x+y^2)i-2xj+2yzk$ and s is the surface of the plane $2x+y+2z=6$ in the first octant.

D–6694

Sub. Code
11324

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Second Semester

Mathematics

SEQUENCES AND SERIES

(CBCS 2018–19 Academic Year onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Write first five terms of the sequence $a_n = \frac{2-3n}{2+3n}$.

2. Prove that any convergent sequence is a bounded sequence.

3. Prove that if $(a_n) \to a$ and $k \in R$ then $Ka_n \to Ka$.

4. Show that $\lim_{n\to\infty}\left(\frac{1^2+2^2+...+n^2}{n^3}\right) = \frac{1}{3}$.

5. Show that $\lim_{n\to\infty}(1+1/2+...+1/n) = 0$.

6. Show that the series $1+2+3+....$ diverges to ∞.

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

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

9. Define absolutely convergence of the infinite series with example.

10. State Riemann's theorem.

SECTION B — (5 × 5 = 25 marks)

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

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

Or

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

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

Or

(b) Show that $\lim_{n\to\infty}(1 + \frac{1}{n})^n = \lim_{n\to\infty}(1 + \frac{1}{1!} + \frac{1}{2!} + \ldots + \frac{1}{n!})$.

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

Or

(b) Test the convergence of the series $\sum \frac{n^2+1}{5^n}$.

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

Or

(b) Prove Leibnitz's test (ie) Let $\Sigma(-1)^{n+1} a_n$ be an alternating series whose terms a_n satisfy the following

(i) (a_n) is a monotonic decreasing sequence

(ii) $\lim_{n\to\infty} a_n = 0$ Then the given alternating series converges.

15. (a) Test the converges of the series,

$$\left(\frac{1}{2}+\frac{1}{3}\right)+\left(\frac{1}{2^2}+\frac{1}{3^2}\right)+\left[\frac{1}{2^3}+\frac{1}{3^3}\right]+....$$

Or

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

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions

16. Prove the Cauchy's first limit theorem i.e $If(a_n) \to l$ then $\left(\frac{a_1 + a_2 + ... + a_n}{n}\right) \to l$.

17. Prove Kummer's test. ie Let Σa_n be a given series of positive terms and $\Sigma 1/d_n$ be a series of positive terms diverging to ∞. Then

(a) Σa_n converges if $\lim_{n\to\infty}(d_n \frac{a_n}{a_{n+1}} - d_{n+1}) > 0$ and

(b) Σa_n diverges if $\lim_{n\to\infty}(d_n \frac{a_n}{a_{n+1}} - d_{n+1}) < 0$.

18. Prove Dirichlet's test. (ie) Σa_n be a series whose sequence of partial sums (S_n) is bounded. Let (b_n) be a monotonic decreasing sequence converging to zero then. the series $\Sigma a_n b_n$ converges.

19. Test the convergence of the series

$$1 + \frac{3}{7}x + \frac{3.6}{7.10}x^2 + \frac{3.6.9}{7.10.13}x^3 + \ldots.$$

20. Prove Abel's theorem. (ie) If Σa_n and Σb_n converges to a and b respectively and if the Cauchy product ΣC_n converges to C then $C = ab$.

D–6664

Sub. Code
31A

DISTANCE EDUCATION

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

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Third Semester

Tamil

Part I – TAMIL – PAPER III

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

பகுதி அ — (10 × 2 = 20 மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் விடையளிக்க.

1. முல்லைப்பாட்டின் ஆசிரியர் பெயரைத் தருக.

2. 'நெடுந்தொகை' என அழைக்கப்படும் எட்டுத் தொகை நூல் எது?

3. குறிஞ்சித்திணைக்கான உரிப்பொருளைக் குறிப்பிடுக.

4. பரணர் பாடியப் பாடல்களின் எண்ணிக்கையைத் தருக.

5. நற்றிணை – பெயர்க்காரணம் கூறுக.

6. பாசறை – சிறுகுறிப்பு வரைக.

7. பாடாண்திணையை வரையறு.

8. திருக்குறள் எப்பா வகையால் இயற்றப்பட்டுள்ளது?

9. நான்மணிக்கடிகையின் ஆசிரியர் யார்?

10. இராசராசனின் தமக்கையார் பெயரை எழுதுக.

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

பின்வரும் வினாக்களுக்கு ஒருபக்க அளவில் விடை தருக.

11. (அ) ஐங்குறுநூற்றைப் பற்றி விரிவாக எழுதுக.

(அல்லது)

(ஆ) குறிஞ்சித் திணையின் சிறப்புகளைத் தொகுத்துரைக்க.

12. (அ) பரணரின் புலமைத் திறத்தைப் பாராட்டியுரைக்க.

(அல்லது)

(ஆ) அகநானூற்று நூலின் அமைப்பும் பகுப்பும் குறித்து எழுதுக.

13. (அ) நற்றிணையில் சிலப்பதிகாரச் சாயல் அமைந்த பாடலை எடுத்துரைக்க.

(அல்லது)

(ஆ) கையறுநிலையைத் துறைகளுடன் விளக்குக.

14. (அ) அறிவுடையார் குறித்து வள்ளுவர் உரைக்குமாற்றை எழுதுக.

(அல்லது)

(ஆ) யார் யார் உயிர் வாழ மாட்டார்கள் என நான்மணிக்கடிகை கூறுகின்றது?

15. (அ) இராசஇராசசோழன் நாடகத்தின் கதைச்சுருக்கத்தை எழுதுக.

(அல்லது)

(ஆ) சுவடுகள் நாவலின் 'இராசாத்தி' பாத்திரப் படைப்பை மதிப்பிடுக.

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

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. முல்லைநில இயல்புகளை முல்லைப்பாட்டின் வழி விரித்துரைக்க.

17. குறிஞ்சிக்குக் கபிலர் என்பார் கருத்தை நும் பாடப் பகுதியால் விளக்குக.

18. நப்பசலை பாடல்களின் கருத்துக்களைத் தொகுத்துரைக்க.

19. தலைமகன் பாசறையிலிருந்து பேசுமாற்றைச் சேந்தம்பூதனார் வழி விளக்குக.

20. 'சுவடுகள்' என்னும் நாவலின் கதைக்கருவை விளக்கி வரைக.

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D–6665

Sub. Code
31B

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A./M.B.A (5 yrs Integrated)
DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Third Semester

Part I — HUMAN SKILLS DEVELOPMENT — I

(CBCS 2018-19 Academic Year onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Define Interpersonal Behaviour.

2. Write about developing Skills.

3. What is mean by Etiquette?

4. What are significance of thinking ahead?

5. What is Self-acceptance?

6. What are the types of Goat Setting?

7. Write the importance of change Resistance.

8. Define Competitive Negotiation.

9. What are the canons of good human relations?

10. What is mean by stress?

PART B — (5 × 5 = 25 marks)

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

11. (a) What are the merits of good habits?

Or

(b) Write the features of Interpersonal Behaviour?

12. (a) Write the Difference between Self-Concept and Self-Esteem.

Or

(b) What are the Etiquettes in using mobile and telephones?

13. (a) Write the characteristic and style of leadership.

Or

(b) Explain the importance of Goal setting.

14. (a) Write the structure and style of Negotiating skills?

Or

(b) How to develop the positive attitudes?

15. (a) Write about the conflict Management.

Or

(b) Explain the consequences of Anger Management.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Write about Human skills and its Habits.

17. Explain about self-concept and its Meanings.

18. What is mean by Decision Making Skills and what are the steps involved in Decision Making?

19. Define Attitudes and How to develop the Positive attitude?

20. Elaborate Human Relation Skill and the Need of good human relations.

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D–6666

Sub. Code
32

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A./MBA (5 Yrs. Integrated) DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Third Semester

English

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 the questions.

1. What method does Swami used to get out of his father's challenge?

2. Who is Ratan?

3. What is the Verger's Opinion about reading?

4. How does Mr. James change his attitude?

5. Who was Eddie and how was he killed?

6. What sort of proposal is Anton Chekhov play the proposal about?

7. Write a short analysis of ‘Progress’ by St. John Ervine.

8. Who are Jean and Pierre in 'The Pie and the Tart'?

9. What are the travail in "The Refugee"?

10. Define Noun with examples.

PART B — (5 × 5 = 25 marks)

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

11. (a) Explain the Sense of Belonging and separation in 'Post Master'.

Or

(b) What happened between the vicar and the Verger?

12. (a) How does Philip prove himself a mature and responsible man?

Or

(b) How differently professor Henry Corrie and Mrs. Meldon think about war?

13. (a) Discuss the clash of tradition and modernity as presented in the boy comes here.

Or

(b) Explain the James R.Waugh 'The Silver Idol'.

14. (a) Write the Jean's trick in 'The pie and the Tart'.

Or

(b) Give a note on four friends experience in Reunion.

15. (a) Explain Parts of Speech.

Or

(b) How do you write an agenda for a meeting?

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. What is the central idea of the story The Diamond Necklace?

17. Why marriage proposal important to all the characters in "The Proposal" by Aton Chekhov.

18. Sketch the character of Gaultier from 'The Pie and the Tart'.

19. Explain the political, Economical issues in Asif Currimbhoy's 'The Refugee'.

20. Differentiate verb and adverb with suitable examples.

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D–6695	Sub. Code
	11333

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Third Semester

DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS

(CBCS 2018-19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Verify whether $(x^2 - y)\,dx + (y^2 - x)\,dy = 0$ is exact.

2. Solve $p^2 - 9p + 18 = 0$.

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

4. Solve $\frac{dx}{yz} = \frac{dy}{zx} = \frac{dz}{xy}$.

5. Verify the condition of integrability of $3x^2dx + 3y^2dy - (x^3 + y^3 + e^{2z})\,dz = 0$.

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

7. Solve $x^2p + y^2q = z^2$.

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

9. Define Brachistrochrone problem.

10. Define orthogonal trajectories.

PART B — (5 × 5 = 25 marks)

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

11. (a) Solve $ydx - xdy + 3x^2y^2e^{x^3}dx = 0$.

Or

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

12. (a) Solve $(D^2 - 4D + 3)y = \sin 3x \cos 2x$.

Or

(b) Given that $y = x$ is a particular solution of the differential equation

$x^2y'' - 2x(1 + x)y' + 2(1 + x)y = x^3$. Find its general solution.

13. (a) Solve

$yz^2(x^2 - yz)dx + zx^2(y^2 - xz) + xy^2(z^2 - xy)dz = 0$.

Or

(b) Solve $x^2y'' + 4xy' + 2y = e^{x}$.

14. (a) Form a partial differential equation by eliminating the arbitrary function ϕ from

$\phi(x + y + z, x^2 + y^2 - z^2) = 0$.

Or

(b) Solve $(y^2 + z^2)\, p - xyq + xz = 0$.

15. (a) Solve $p + q + pq = 0$.

Or

(b) Solve $4(1 + 2^3) = 9z^4 pq$.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

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

17. Solve : $(2x + 1)^2\, y'' - 2(2x + 1)\, y' - 12y = 6x$.

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

19. Solve by charpits method

$pxy + pq + qy - yz = 0$.

20. Find the orthogonal trajectories of the family of coaxal circles $x^2 + y^2 + 2gx + k = 0$, where g is the parameter and k is the constant.

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D–6696

Sub. Code
11334

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Third Semester

MECHANICS

(CBCS 2018 – 2019 Academic year onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL questions.

1. State the parallelogram law of forces.
2. State the resolved parts theorem.
3. Define moment of a force.
4. Define a couple.
5. Define friction.
6. Define a common catenary.
7. Give the formula for finding the horizontal range of the projectile.
8. The velocity of either body in a direction perpendicular to the common normal is unaffected by impact-Give reasons.

9. Define a simple harmonic motion.

10. What is meant by the equiangular spiral?

SECTION B — (5 × 5 = 25 marks)

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

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

Or

(b) State and prove the Lami's theorem.

12. (a) Prove : If three coplanar forces acting on a rigid body keep it in equilibrium, they must be either be concurrent or be all parallel.

Or

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

13. (a) A uniform chain of length l is suspended from two points A, B in the same horizontal line. If the tension at A is twice that at the lowest point, show that the span AB is $\frac{l}{\sqrt{3}}\log\left(2+\sqrt{3}\right)$.

Or

(b) A particle is thrown over a triangle from one end of a horizontal base and grazing the vertex falls on the other end of the base. If A, B are the base angles, and α the angle of projection, show that $\tan\alpha = \tan A + \tan B$.

14. (a) 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.

Or

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

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

Or

(b) With the usual notations, Prove that

(i) $\frac{1}{p^2} = u^2 + \left(\frac{du}{d\theta}\right)^2$

(ii) $\frac{h^2}{p^3} \cdot \frac{dp}{dr} = P$.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

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

17. A beam of weight W hinged at one end is supported at the other end by a string so that the beam and the string are in a vertical plane and make the same angle θ with the horizon. Show that the reaction at the hinge is $\frac{w}{4}\sqrt{8 + \operatorname{cosec}^2\theta}$.

18. Show that the path of a projectile is a parabola.

19. A smooth circular table is surrounded by a smooth rim whose interior surface is vertical. Show that a ball projected along the table from a point A on the rim in a direction making an angle α with the radius through A will return to the point of projection after two impacts if $\tan\alpha = \frac{e^{(3/2)}}{\sqrt{1+e+e^2}}$. Also prove that, when the ball returns to the point of projection, its velocity is to its original velocity as $e^{(3/2)}:1$.

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

D–7172

Sub. Code
41A

DISTANCE EDUCATION

Common for B.A/B.Sc/B.C.A DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Fourth Semester

PART I TAMIL PAPER IV

(CBCS 2018-19 Academic year onwards)

Time : Three hours Maximum : 75 marks

பகுதி அ — (10 × 2 = 20 மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் விடையளிக்க.

1. அந்தாதித் தொடை - குறிப்பு வரைக.

2. அகவற்பா எனப்படும் பா யாது?

3. கீர்த்தனை எத்தனைப் பகதிகளைக் கொண்டது?

4. பெருத்திணை என்றால் என்ன?

5. கையறுநிலை - கொருள் விளக்கம் தருக.

6. பிறிது மொழிதல் அணியை விளக்குக.

7. 'புலவலாற்றப்படை' எனக் குறிப்பிடப்படும் ஆற்றுப்படை நூல் யாது?

8. இரட்டைக் காப்பியங்கள் எவை?

9. இயேசு காவியம் - ஆசிரியர் குறிப்பு வரைக.

10. 'பாஞ்சாலி சபதம்' காப்பியத்தின் முதன்மைப் பாத்திரம் யார்?

பகுதி ஆ — (5× 5= 25 மதிப்பெண்கள்)

பின்வரம் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

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

(அல்லது)

(ஆ) வெண்பாவின் இலக்கணத்தைச் சான்று காட்டி விளக்குக.

12. (அ) அன்பின் ஐந்திணைகளுக்கான விளக்கங்களை எழுதுக.

(அல்லது)

(ஆ) ' செவியறிவுறூஉ' என்பதை விளக்கிச் சான்று காட்டுக.

13. (அ) உவமை அணி இலக்கணத்தை வகைகளுடன் விளக்குக.

(அல்லது)

(ஆ) மொழி நடையில் நிறுத்தல் குறிகளை எவ்வெவ்விடங்களில் பயன்படுத்த வேண்டும்?

14. (அ) அகநானூறு குறித்த செய்திகளைத் தொகுத்துரைக்க.

(அல்லது)

(ஆ) திருக்குறள் பெருமைகளை நும் பாடப் பகுதியால் எடுத்துரைக்க.

15. (அ) சிலப்பதிகாரத்தின் 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. காஞ்சித்திணையின் துறைகளைச் சான்றுகள் காட்டி விளக்குக.

18. செய்யுள் படைப்பில் அணி இலக்கணம் பெறுமிடத்தை எடுத்துரைக்க.

19. சங்க இலக்கியங்களின் வெவ்வியல் தன்மைகளை விரித்துரைக்க.

20. பாஞ்சாலி பாத்திரப் படைப்பில் பாரதியார் காட்டும் முக்கியத்துவத்தைக் கட்டுரைக்க.

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D–7173

Sub. Code
41B

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION

MAY 2021 EXAMINATION

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MAY 2020 ARREAR EXAMINATION

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. What are the roles of counsellor?

2. What is mean by communication?

3. Explain Organization skills.

4. What are the causes of Multi tasking skills?

5. Define leader.

6. What are the technical skills?

7. Explain the human system understanding skills.

8. Write about the organization and their major interaction.

9. How do you plan your Presentation?

10. What are the importances of problem solving skills?

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Define counselling and state the techniques of counselling.

Or

(b) Give description about attention.

12. (a) Explain the conceptual skills.

Or

(b) Write about the organization skills and its importance.

13. (a) What are the qualities of a good leader?

Or

(b) Write the preparing and planning for presentation skills.

14. (a) Define society and their major interaction.

Or

(b) What are the major interactions in human system with organisation?

15. (a) Define problem solving skills.

Or

(b) What is mean by cooperative learning skills?

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Write the importance and techniques of counselling.

17. Define technical skills. What are the tools and procedure of technical skills?

18. Explain the causes and responsibilities of multi-tasking skills.

19. Elaborate the understanding skills in human system.

20. What are the causes of making social responsibilities?

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D–7174

Sub. Code
42

DISTANCE EDUCATION

Common for B.A./B.Sc./B.C.A. DEGREE EXAMINATION

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Fourth Semester

PART II ENGLISH PAPER - IV

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Who is Schatz in ‘A Day's wait’?

2. Write about Efim and Elisha in “Two old Men"

3. What happens during the Ambassador’s garden party in 'Pygmalion'?

4. Discuss Swami’s character as youthful.

5. How Romeo is affected by Balthazar’s news?

6. Who is Polixenes?

7. Who is Leontes in Shakespeare’s The Winter’s tale?

8. Define phrase with examples.

9. What are the Concord rules?

10. What is question tag?

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Why does the boy tell his father to leave the sickroom in “A Day's wait"?

Or

(b) Explain the central theme of ‘Two old men'.

12. (a) In ‘Pygmalion’, how does Higgins display his passion and respect for the English language?

Or

(b) Why does Higgins agree to educate the flower girl in Shaw’s ‘Pygmalion'?

13. (a) Write about the “Predators” Hallucination in ‘Swami and friends’.

Or

(b) Compare and contrast the Venice and Belmont in “The Merchant of Venice".

14. (a) Write the opening scene of the play “The Winter's Tale".

Or

(b) Why is Nehru’s speech called as Captivator of hearts?

15. (a) What is the significance of the first meeting held by Nehru?

Or

(b) Expand the following proverb: The child is father of the man.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Write a critical appreciation of Jim Corbelt's 'Lalajee'.

17. How are Victorian social classes represented in Pygmalion?

18. Write about Bassano's reaction to Antonio's willingness to sign the bond.

19. Write an essay on Phrase and Clause with suitable examples.

20. What are the skills required for group discussion?

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D-7216

Sub. Code
11343

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION.
MAY 2021 EXAMINATION
&
MAY 2020 ARREAR EXAMINATION

Fourth Semester

ANALYSIS

(CBCS 2018 – 19 Academic year onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL the questions.

1. Define an uncountable set.

2. Let (M,d) be a metric space. Let $x \in M$. Show that $\{x\}^c$ is open.

3. If A and B are closed subset of R. Prove that $A \times B$ is a closed subset in $R \times R$.

4. Define complete metric space.

5. Prove that composition of two continuous function is continuous.

6. State mean value theorem.

7. Define connected metric space.

8. Prove that $(0,1)$ with usual metric is not compact.

9. Let $T : M \to M$ be a contraction mapping. Prove that T is continuous on M.

10. Define uniform convergence.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Let d_1 and d_2 be two metrices on M. Define $d(x,y) = d_1(x,y) + d_2(x,y)$. Prove that d is a metric on M.

Or

(b) Prove that $(0,1]$ is uncountable.

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

Or

(b) Let M be a metric space and $A \subseteq M$. Then prove that $\overline{A} = A \cup D(A)$.

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

Or

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

14. (a) Prove that every continuous function is Riemann integrable.

Or

(b) For any partition p of $[a,b]$, prove that $m[f : p](b-a) \le L[f : p] \le U[f : p] \le M[f : p](b-a)$.

15. (a) If A and B are connected subsets of a metric space M and $A \cap B \neq \phi$. Prove that $A \cup B$ is connected.

Or

(b) State and prove intermediate value theorem.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. State and prove Holder's inequality.

17. State and prove Cantor's intersection theorem.

18. State and prove

(a) Fundamental theorem of calculus.

(b) Any compact subset A of a metric space M is bounded.

19. Prove that a subspace of R is connected iff it is an interval.

20. State and prove contraction mapping theorem.

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D–7217

Sub. Code
11344

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Fourth Semester

STATISTICS

(CBCS 2018-19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Show that arithmetic mean of first n natural numbers is $\frac{1}{2}(n+1)$.

2. Calculate G.M. and H.M. for 2, 4, 6, 27.

3. What do you mean by curve fitting?

4. Prove that $-1 \le \gamma \le 1$.

5. Write Spearman's formula for rank correlation.

6. Prove that regression coefficients are independent of change of origin but dependent on change of scale.

7. Find whether the following data are consistent.

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

8. Define index number.

9. What do you mean by price relatives?

10. Define time series and give an example.

PART B — (5 × 5 = 25 marks)

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

11. (a) Find mean median and mode for the data 6, 8, 2, 5, 9, 5, 6, 5, 2, 3.

Or

(b) Calculate first four central moments for

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

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

x:	0	1	2	3	4
f:	1	1.8	3.3	4.5	6.3

Or

(b) Find correlation coefficient for the following data:

Length	3	4	6	7	10
Weight	9	11	14	15	16

13. (a) Prove that the arithmetic mean of the regression coefficient is greater than or equal to the correlation coefficient.

Or

(b) If $x = 4y + 5$ and $y = kx + 4$ are the regression lines of x on y and y on x respectively. Show that $0 \leq k \geq \frac{1}{4}$.

14. (a) Find U_5 given that $U_1 = 4$, $U_2 = 7, U_4 = 13$ and $U_7 = 30$ by Lagrange's formula.

Or

(b) Find the frequencies of the remaining positive classes for the following data:

$N = 1800 \quad (A) = 850 \quad (B) = 780 \quad (C) = 326$
$(AB\gamma) = 200 \; (A\beta C) = 94 \; (\alpha BC) = 72 \; (ABC) = 50$.

15. (a) Check whether the attributes A and B are independent for $(A) = 30 \quad (B) = 60 \quad (AB) = 12$, $N = 150$.

Or

(b) Explain the types of index numbers.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Find coefficient of skewness for the following data :

Size:	6	7	8	9	10	11	12
Frequency:	3	6	9	13	8	5	4

17. Give the equations of the two regression lines $4x - 5y + 33 = 0$ and $20x - 9y = 107$. Decide which is the equation of the regression of y on x.

18. By using Gregory-Newton's formula find U_x and estimate $U_{1.5}$ and U_9.

U_0	U_1	U_2	U_3	U_4
1	11	21	28	29

19. Explain :

(a) Time reversal test

(b) Factor reversal test

(c) Commodity reversal test.

20. Calculate index numbers by using Laspeyre's method, Paache's method, Bowley's method.

Commodities	Base year		Current Year	
	Price	Quantity	Price	Quantity
A	2	8	4	6
B	5	10	6	5
C	4	14	5	10
D	2	19	2	13

D–7218

Sub. Code
11351

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Fifth Semester

Mathematics

MODERN ALGEBRA

(CBCS 2018-19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define equivalance relation and give an example.

2. Prove that in an abelian group $(ab)^2 = a^2b^2$.

3. Let H and K are two subgroups of a finite group G such that $|H| > \sqrt{|G|}$ and $|K| > \sqrt{|G|}$ then prove that $H \cap K \neq \{e\}$.

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

5. Prove that any unit in R cannot be a zero divisor.

6. Let R be a ring with Identity 1. If I is an ideal of R and $1 \in I$ then $I = R$.

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

8. Prove that the union of two subspaces of a vector space need not be a subspace.

9. Define inner product space.

10. Let V be an innerproduct space and let S_1 and S_2 be subsets of V. If $S_1 \subseteq S_2$ then prove that $S_2^{\perp} \subseteq S_1^{\perp}$.

PART B — (5 × 5 = 25 marks)

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

11. (a) Show that $f = R \to R$ defined by $f(x) = 2x - 3$ is a bijection and find its inverse. Compute $f \circ f^{-1}$ and $f^{-1} \circ f$.

Or

(b) Let G denote the set of all matrices of the form $\begin{pmatrix} x & x \\ x & x \end{pmatrix}$ where $x \in R^*$. Prove that G is a group under matrix multiplication.

12. (a) Let G be a group, and a be an element of order n in G. Prove that $a^m = e$ iff n divides m.

Or

(b) Let $f : G \to G'$ be a Homomorphism. Prove that f is $1-1$ iff kerf = $\{ e \}$.

13. (a) Prove that Z_n is a field iff n is prime.

Or

(b) Define integral domain and prove that the characteristic of an integral domain D is either 0 or a prime number.

14. (a) Find the g.c.d. of $16 + 7i$ and $10 - 5i$ in the ring R of Gaussian integers.

Or

(b) Let V be a vector space over a field F. Let $S, T \subseteq V$. then prove the following.

(i) $S \subseteq T \Rightarrow L(S) \subseteq L(T)$

(ii) $L(S \cup T) = L(S) + L(T)$

(iii) $L(S) = S$ iff S is a subspace of V.

15. (a) Let V and W be vector spaces over a field F. Let $T : V \to W$ be an isomorphism. Prove that T maps a basis of V on to a basis of W.

Or

(b) State and prove Schwartz's inequality.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. State and prove Cayles theorem.

17. Let A and B are two subgroups of a group G. Prove that AB is a subgroup of G iff $AB = BA$.

18. Let R be a commutative ring with identity. Let P be an ideal of R. Prove that P is a prime ideal iff R/P is an integral domain.

19. State and prove division algorithm.

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

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D–7219

Sub. Code
11352

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Fifth Semester

OPERATIONS RESEARCH

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define optimum solution for L.P.P.

2. What do you mean by slack variables?

3. State complementary slackness theorem.

4. Define integer programming problem.

5. Give an example for a balanced transportation problem.

6. State any two difference between transportation and assignment problem.

7. When will you say that the assignment problem is unbalanced?

8. Find the saddle point of

$$\begin{array}{c} \quad A \\ B \begin{pmatrix} 15 & 2 & 3 \\ 6 & 5 & 7 \end{pmatrix} \\ \quad -7 \quad 4 \quad 0 \end{array}$$

9. Define Total Float of an activity.

10. What is the difference between Total Float and Free Float?

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Explain briefly about Graphical method.

Or

(b) Write the dual of the following LPP

Maximize $Z = x_1 + 2x_2 + x_3$

Subject to $2x_1 + 2x_2 - x_3 \leq 2$

$-2x_1 + x_2 - 5x_3 \leq -6$

$4x_1 + x_2 + x_3 \leq 6$

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

12. (a) Explain cutting plane method for Integer programming problem.

Or

(b) Find starting solution of the following transportation problem by least cost method.

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

13. (a) Explain MODI method.

Or

(b) Write the mathematical formulation of an Assignment problem.

14. (a) For the set of data given below, determine the sequence that minimises the total elapsed time.

		Jobs				
		A	B	C	D	E
Machines	1	5	4	8	7	6
	2	3	9	2	4	10

Or

(b) For what value of λ the game with the following matrix is strictly determinable.

		Player B		
		B1	B2	B3
Player A	A1	λ	6	2
	A2	–1	λ	–7
	A3	–2	4	λ

15. (a) Solve graphically $\begin{bmatrix} 2 & 7 \\ 3 & 5 \\ 11 & 2 \end{bmatrix}$.

Or

(b) Determine the critical path.

Activity:	1-2	1-3	2-4	2-5	3-4	3-5
Duration:	8	4	10	2	5	3

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

Answer any THREE questions.

16. Solve the following L.P.P. graphically

Maximize $Z = 100x_1 + 40x_2$

Subject to $5x_1 + 22x_2 \leq 1000$;

$3x_1 + 2x_2 \leq 900$;

$x_1 + 2x_2 \leq 500$

and $x_1, x_2 \geq 0$.

17. Solve the following L.P.P.

Maximize $Z = 3x_1 + 2x_2$

Subject to $2x_1 + x_2 \leq 2$;

$3x_1 + 4x_2 \geq 12$

and $x_1, x_2 \geq 0$.

18. Solve the transportation problem.

	1	2	3	4	Supply
I	21	16	25	13	11
II	17	18	14	23	13
III	32	27	18	41	19
Demand	6	10	12	15	

19. Describe briefly about Hungarian Method.

20. Solve the following game

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

D–7220

Sub. Code
11353

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Fifth Semester

Mathematics

NUMERICAL ANALYSIS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Write the algebraic equation of degree n.

2. What do you mean by finite differences?

3. Write Cramer's rule.

4. What is Gauss Forward Formula?

5. Define the operator μ.

6. Write the first derivation of Newton's forward interpolation formula.

7. Define trapezoidal rule for numerical integration.

8. Solve $\frac{dy}{dx} = x + y^2 + 1$ given $y(0) = 0$ by Picard's method.

9. For $\frac{dy}{dx} = x + y, y(0) = 0$ find A_0, B_0 by Runge-Kutta method.

10. Define prediction error.

PART B — (5 × 5 = 25 marks)

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

11. (a) Find the positive root of $x^3 - x - 1 = 0$ by the method of false position.

Or

(b) Solve by Gauss elimination method $\begin{matrix} 4x - 3y = 11 \\ 3x + 2y = 4 \end{matrix}$.

12. (a) State and prove fundamental theorem for finite differences.

Or

(b) Prove that $E = e^{nD}$.

13. (a) If $y(75) = 246, y(80) = 202, y(85) = 118, y(90) = 40$ find $y(79)$.

Or

(b) Find θ at $x = 84$

x :	40	50	60	70	80	90
θ :	184	204	226	250	276	304

14. (a) Find $y'(x)$

x :	0	1	2	3	4
$y(x)$:	1	1	15	40	85

Hence find $f'(x)$ at $x = 0.5$.

Or

(b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using trapezoidal rule with $n = 0.2$.

15. (a) Solve $\frac{dy}{dx} = 1 - y, y(0) = 0$ using Euler's method. Find y at $x = 0.1$ and 0.2.

Or

(b) Derive Adam's predictor corrector method.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Find a real root of the equation $x^3 - 3x + 1 = 0$ lying between 1 and 2 by using bisection method.

17. Solve by Newton Raphson method $x^3 + x - 1 = 0$.

18. Apply stirlings formula to find $y(25)$ for

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

19. Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 51$

x :	50	60	70	80	90
y :	19.96	36.65	58.81	77.21	94.61

20. Using Taylor's theorem, find $y(0.1), y(0.2), y(0.3)$ for $\frac{dy}{dx} = 1 + xy$ with $y_0 = 2$.

D–7221	Sub. Code
	11354

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Fifth Semester

TRANSFORM TECHNIQUES

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Find $L(\cos at)$.

2. Evaluate $\int_0^\infty e^{-2t} \sin 3t \, at$.

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

4. What do you mean by odd function and even function?

5. Define z–transform.

6. Find $(1-x)^{-1}$.

7. Find $z\left[e^{at}\right]$.

8. If $f(x)$ is an even function, expand it in Fourier series.

9. State initial value theorem on z–transformation.

10. Write the conditions for Fourier expansion of $f(x)$.

PART B — (5 × 5 = 25 marks)

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

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

Or

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

12. (a) Show that $x^2 = \frac{\pi^2}{3} + 4\sum_{n=1}^{\infty}(-1)^n \frac{\cos nx}{n^2}$ in $(-\pi < x < \pi)$.

Or

(b) Express $f(x) = \frac{1}{2}(\pi - x)$ as Fourier series in $(0, 2\pi)$.

13. (a) Find sine series for $f(x) = c$ in the range 0 to π.

Or

(b) Express $f(x) = c - x$ where $0 < x < c$ as a half range cosine series with period $2c$.

14. (a) Find $z(n)$.

Or

(b) Determine $z[a^n]$.

15. (a) Prove the linearity of z–transformation.

Or

(b) Find $z(n-2)$.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Find $L(t^n)$. Deduce for $n = 0$, $n = 1$, $n = 2$, $n = \frac{1}{2}$ and $n = -1/2$.

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

18. Find Fourier series with period 3 to represent $f(x) = 2x - x^3$ in the range $(0, 3)$.

19. Find $z[n^3]$.

20. Evaluate $z[2^n \sin h\ 3n]$.

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D–7222

Sub. Code
11361

DISTANCE EDUCATION

B.Sc., DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Sixth Semester

Mathematics

DISCRETE MATHEMATICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL Questions.

1. Define tautology.

2. State rule P of inference.

3. What do you mean by quantifiers?

4. Define relation and give an example.

5. Define (a) Isolated vertex (b) Pendant vertex.

6. Define adjacency matrix of a graph.

7. What do you mean by chromatic polynomial?

8. Define centre of a tree.

9. Give an example of a spanning tree.

10. Define Euler graph.

SECTION B — (5 × 5 = 25 Marks)

Answer ALL Questions choosing either (a) or (b)

11. (a) Show that $(P \to Q) \wedge (R \to Q)$ and $(P \vee R) \to Q$ are equivalent formulae.

Or

(b) Show that $\neg Q, \; P \to Q \Rightarrow \neg P$.

12. (a) Prove that every distributive lattice is modular.

Or

(b) Show that $(m, m+1)$ parity check code can detect one error.

13. (a) Let G be a graph. Then $\Sigma d(v) = 2\varepsilon$ where, $\varepsilon = |E(G)|$.

Or

(b) Write a note on complete graph and draw K_4 and K_5.

14. (a) Prove that every non trivial tree has atleast two vertices of degree one.

Or

(b) Draw all possible trees with four vertices.

15. (a) Prove that in a tree T a vertex V is a cut vertex iff $\deg(v) \neq 1$.

Or

(b) State the properties of Cutset.

SECTION C — (3 × 10 = 30 marks)

Answer any Three Questions.

16. Verify whether (a) $(P \vee Q) \rightarrow P$ is a tautology.(b) $(Q \vee R) \rightarrow (P \wedge \neg R)$ is a tautology.

17. Show that a lattice L is distributive iff for all $a,b,c \in L$, $(a \vee b) \wedge c \leq a \vee (b \wedge c)$.

18. Let G be a simple graph with n vertices. Show that if $f(G) \geq \left\lfloor \frac{x}{2} \right\rfloor$ then G is connected.

19. Let G be a graph and $e \in E(G)$. Then show that $\tau(G) = \tau(G - e) + \tau(G, e)$.

20. Prove that every cycle has an even number of edges in common with any cut set.

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D–7223	Sub. Code
	11362

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Sixth Semester

FUZZY ALGEBRA

(CBCS 2018–19 Academic Year onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL the questions.

1. Define a strong α-cut with an example.

2. Find the value of

   (a) $[2,5] - [1,3]$

   (b) $[4,10]/[1,2]$

3. Define Fuzzy compatibility relation.

4. Define Fuzzy Homomorphism.

5. How will you define standard composition of binary fuzzy relations?

6. Define necessity measure.

7. State any four arithmetic operations on closed intervals.

8. Define possibility measure.

9. What are conditional uncertainties?

10. Define syntactic and semantic concept of information.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Write a note on Extension principle.

Or

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

12. (a) Let A,B be two fuzzy numbers whose membership functions are given by

$$A(x) = \begin{cases} (x+2)/2 & for \quad -2 < x \le 0 \\ (2-x)/2 & for \quad 0 < x < 2 \\ 0 & otherwise. \end{cases}$$

$$B(x) = \begin{cases} (x-2)/2 & for \quad 2 < x \le 4 \\ (6-x)/2 & for \quad 0 < x \le 6 \\ 0 & otherwise. \end{cases}$$

Calculate fuzzy numbers $A + B$ and A / B.

Or

(b) Describe the role of strong α-cuts in fuzzy set theory.

13. (a) Let a given finite body of evidence $(\mathcal{F}, m)$ be nested. Then prove that the associated belief and plausibility measures have the following properties : for all $A, B \in \mathcal{P}(X)$,

(i) $Bel\ (A \cap B) = \min[Bel(A), Bel(B)]$

(ii) $Pl(A \cup B + \max[Bel(A), Bel(B)]$.

Or

(b) Describe in detail the properties of Fuzzy morphism.

14. (a) Briefly explain about possibility distribution function.

Or

(b) Write a note on possibility distribution function.

15. (a) Explain the measure of confusion.

Or

(b) Explain the entropy like measures.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions

16. (a) Let $f : X \to Y$ be crisp function, then show that $A \in f(x)$, for all $\alpha \in [0, 1]$, ${}^{\alpha+}[f(A)] = f({}^{\alpha+}A)$.

(b) State and prove the second characteristics theorem of fuzzy complement.

17. Prove that every possibility measure on a finite power set is uniquely determined by a possibility distribution function $r : X \to [0,1]$.

18. Narrate the following types of fuzzy relations with suitable example for each :

(a) Reflexive

(b) Symmetric

(c) Transitive

(d) Antireflexive

(e) Irreflexive.

19. Explain the measures of nonspecificity.

20. Prove that the inequality

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

D–7224

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11363

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION.

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Sixth Semester

COMPLEX ANALYSIS

(CBCS – 2018-19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define Harmonic function.
2. What do you mean by power series?
3. Prove that the transformation $w = \bar{z}$ is not a bilinar transformation.
4. Find fixed points for the transformation $w = \dfrac{1+z}{1-z}$.
5. Find $\displaystyle\int_C \frac{dz}{z-3}$ where C is the circle $|z-2| = 5$.
6. State Morera's theorem.
7. What do you mean by zero of order r for $f(z)$?
8. Find singular point for $f(z) = \dfrac{1}{z}$.
9. What is essential singularity?
10. Define residue of $f(z)$.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Verify C.R. equations for $f(z) = |z|^2$.

Or

(b) Let $f = u + iv$ be an analytic function in D. Then V is a harmonic conjugate of u if and only if u is a harmonic conjugate of $-v$.

12. (a) Given $v(x, y = x^4 - 6x^2y^2 + y^4$. Find $f(z) = u(x, y) + iv(x, y)$ such that $f(z)$ is analytic.

Or

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

13. (a) Find the bilinear transformation which maps the points $z_1 = 2,\ z_2 = i,\ z_3 = -2$ onto $w_1 = 1,\ w_3 = -1$ respectively.

Or

(b) Find the general bilinear transformation which maps the unit circle $|z| = 1$ onto $|w| = 1$ and the points $z = 1$ to $w = 1$ and $z = -1$ to $w = -1$.

14. (a) Evaluate $\int_C \frac{\sin z}{\left(z - \frac{\pi}{2}\right)^2} dz$ where C is the circle $|z| = 2$.

Or

(b) Find $\int_C \frac{e^z}{z^n} dz$ where C is the circle $|z| = 1$.

15. (a) Find the Taylor's series for $f(z) = \frac{1}{z}$ about $z = 1$.

Or

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

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. By giving counter example. Prove that C.R. equations are not sufficient for differentiability.

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

18. State and prove Cauchy's integral formula.

19. If $f(z)$ and $g(z)$ are analytic inside and on a simple closed curve C *and if* $|g(z)| < |f(z)|$ on C, then prove that $f(z) + g(z)$ and $f(z)$ have the same number of zeros inside C.

20. Evaluate $\int_C \tan z dz$ where C is $|z| = 2$.

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D–7225

Sub. Code
11364

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION

MAY 2021 EXAMINATION

&

MAY 2020 ARREAR EXAMINATION

Sixth Semester

COMBINATORICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define stirling numbers of the first kind.

2. In how many ways can 5 men and 5 women seated in a round table it no two women may be seated side by side?

3. Define ordinary generating function.

4. Define Lexicographic ordering.

5. Define multinomial number.

6. Define Euler function $\phi(a)$.

7. Define Subgroup.

8. Define cycle index of a group G.

9. Define Polya – Substitution.

10. Define primitive period.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Prove that the number of subjections of the n-set into the m-set A is $m!\,s_n^m$.

Or

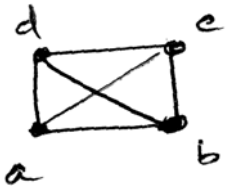
(b) Calculate the co-efficient of t^{12} in $\left(\frac{1-t^6}{1-t}\right)^4$.

12. (a) Prove that every element $\sigma \in S_n$ can be written as a product of disjoint cycles.

Or

(b) Prove that $\phi(n) = n\prod_{i=1}^{k}\left(1-\frac{1}{P!}\right)$, where $P_1, P_2 \ldots P_k$ are distinct prime factors of n, not equal to 1.

13. (a) Find the chromatic polynomial of the graph.



Or

(b) What is menage number? Explain with suitable example.

14. (a) Discuss the problem of Fibonacci.

Or

(b) Prove that the number of circular necklace patterns with n-beads and atmost c colours is $\frac{1}{n}\sum_{d/n}\phi\left(\frac{n}{d}(d)\right)$ where ϕ is Eulers function.

15. (a) What is $(z(E_m))[z(s_n)]$, where E_m is the identity permutation on m symbols.

Or

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

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. State and prove the Generalised inclusion and exclusion principle.

17. State and prove Burnsides Lemma.

18. State and prove Polya's enumeration theorem.

19. (a) Prove that $\xi(t) = \sum_{j=0}^{N} w(j)(t-1)^j$. (5)

(b) What is permutation group? Explain. (5)

20. Define G-equivalent. Prove that G-equivalent is an equivalence relation on the set R^D of all functions from D to R.

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D–1119

Sub. Code
11A/13711

DISTANCE EDUCATION

Common for B.A./B.Sc./B.B.A./B.B.A.(Banking)/B.C.A./M.B.A.
(5 Year Integrated) DEGREE EXAMINATION, MAY 2023.

First Semester

PART I : TAMIL PAPER – I

(பகுதி I : தமிழ் – I)

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

Time : Three hours Maximum : 75 marks

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

அனைத்து வினாக்களுக்கும் விடையளிக்க.

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

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

அனைத்து வினாக்களுக்கும் ஒரு பக்க அளவில் விடையளிக்க.

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

(அல்லது)

(ஆ) பட்டுக்கோட்டை கலியாண சுந்தரத்தின் பகுத்தறிவுச் சிந்தனைகளை விளக்குக.

12. (அ) கண்ணனின் குறும்புகளைப் பாரதி வழி விளக்குக.

(அல்லது)

(ஆ) பாரதிதாசனின் கவித்திறத்தை ஆராய்க.

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

(அல்லது)

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

14. (அ) கோப்பெருந்தேவியின் தீக்கனா - குறித்து எழுதுக.

(அல்லது)

(ஆ) இராமன் வீதியிற் சென்றபோது நிகழ்ந்தவற்றை விளக்குக.

15. (அ) மந்திரக் கிழவர் மாண்புகள் குறித்தெழுதுக.

(அல்லது)

(ஆ) நபிகள் நாயகம் ஈத்தங்குலை வரவழைத்த திறம் குறித்தெழுதுக.

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

எவையேனும் மூன்றனுக்கு கட்டுரை வடிவில் விடையளிக்க.

16. ஸ்ரீ கிருஷ்ணகானம் கூறும் கண்ணனின் பெருமைகளைத் தொகுத்து எழுதுக.

17. பாரத மாதாவின் திருப்பள்ளி எழுச்சிச் சிறப்பினை விளக்கி எழுதுக.

18. கண்ணகி வழக்குரைத்த திறம் குறித்துக் கட்டுரைக்க.

19. மந்திரப்படலம் கூறும் செய்திகளைத் தொகுத்து எழுதுக.

20. காட்சிப்படலக் கருத்துக்களை விளக்கி வரைக.

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D–1120

Sub. Code
11B

DISTANCE EDUCATION

Common for B.A./B.Sc./B.B.A./B.B.A. (Banking)/B.C.A./M.B.A. (5 Year Integrated) DEGREE EXAMINATION, MAY 2023.

First Semester

Part I – COMMUNICATION SKILLS – I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

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

2. Define 'Communication'.

3. What is 'Dyadic Communication'?

4. Define 'Conversation'.

5. What does non-verbal communication refer to?

6. What is a layout in paragraph writing?

7. Write briefly on Group Discussion.

8. What is Body Language?

9. What is Report Writing?

10. What are typographical errors?

PART B — ($5 \times 5 = 25$ marks)

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

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

Or

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

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

Or

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

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

Or

(b) Relate Behavioural Skills and Group Discussion.

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

Or

(b) Write a note on Sentence Formation.

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

Or

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

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Discuss the barriers to effective communication.

17. Discuss the purpose of meetings.

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

19. Explain the steps involved in preparing Curriculum Vitae.

20. Explain the different types of Report Writing.

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D–1121

Sub. Code
12/13712

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.B.A./
B.B.A. (Banking)/B.C.A./M.B.A. (5 Year Integrated) DEGREE
EXAMINATION, MAY 2023

First Semester

Part II : ENGLISH PAPER - I

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

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. How water is the elixir of life?

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

3. Where did Jim Corbett sit after killing tiger?

4. How machines are good servants but bad masters?

5. List out the drug-related health disorders.

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

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

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

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

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

PART B — (5 × 5 = 25 marks)

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

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

Or

(b) Discuss the character of the cat.

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

Or

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

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

Or

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

14. (a) Change the following as directed :

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

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

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

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

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

Or

(b) Fill in with proper prepositions.

(i) The cat jumped ———— the counter.

(ii) The book belongs ———— Anthony.

(iii) She was hiding ———— the table.

(iv) They were sitting ———— the tree.

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

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

Or

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

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

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

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

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

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

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

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D-1208

Sub. Code
11313

DISTANCE EDUCATION

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

First Semester

CLASSICAL ALGEBRA

(CBCS 2018-19 Academic Year onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

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

2. Prove that any convergent sequence is bounded.

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

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

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

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

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

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

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

10. Write any two properties of Cayley Hamilton theorem.

PART B — (5 × 5 = 25 marks)

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

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

Or

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

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

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

17. Sum to infinity the series :

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

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

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

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

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D–1209

Sub. Code
11314

DISTANCE EDUCATION

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

First Semester

CALCULUS

(CBCS – 2018-19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL the questions.

1. What are polar coordinates?

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

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

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

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

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

7. State reduction formula.

8. Prove that $\lfloor (n+1) = n!$ where n is a positive integer.

9. Find the complete integral of $z = px + qy + (q/p) - p$.

10. Find $\int x^3 \cos 2x \, dx$.

SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) If $x^y = e^{x-y}$, prove that $\frac{dy}{dx} = \frac{\log x}{(1+\log x)^2}$.

Or

(b) Find y_n for $y = \sin(ax+b)$.

12. (a) Find the $p-r$ equation of $r = a\sin\theta$.

Or

(b) Find the $p-r$ equation of the cardioid $r = a(1-\cos\theta)$.

13. (a) Evaluate $\int \frac{x^3}{(x-1)(x-2)} dx$.

Or

(b) Find the equation of tangent to $y = 2x^2 - 4x + 5$ at $(3,11)$.

14. (a) Solve : $\frac{dy}{dx} = \frac{y^3 + 3x^2 y}{x^3 + 3xy^2}$.

Or

(b) Evaluate $\int \cos^7 x \, dx$.

15. (a) Evaluate $\iint xy\ dx\ dy$ taken over the positive quadrant of the circle $x^2 + y^2 = a^2$.

Or

(b) Solve : $y^2z = p + x^2z = xy^2$, where $p = \frac{\partial z}{\partial x}$, $q = \frac{\partial z}{\partial y}$.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Find the maximum and minimum values of $u = x^3y^2(1 - x - y)$.

17. Find the radius of convergence at the point θ on the curve $x = a(\theta + \sin\theta)$, $y = a(1 - \cos\theta)$.

18. Evaluate $\int_0^\infty \int_x^\infty \frac{x^{-y}}{y} dy\, dx$.

19. Evaluate $\int_0^a \int_0^b \int_0^c xyz\ dz\ dy\ dx$.

20. Using Laplace transforms, solve $y' + 3y = e^{-2x}$ given $y(0) = 4$.

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D–1122	Sub. Code 21A

DISTANCE EDUCATION

Common for B.A./B.Sc./B.B.A./B.B.A. (Banking)/B.C.A./M.B.A. (5 Year Integrated) DEGREE EXAMINATION, MAY 2023.

Second Semester

Part I : TAMIL PAPER — II

(CBCS 2018 – 2019 Academic year onwards)

Time : Three hours Maximum : 75 marks

பகுதி அ — ($10 \times 2 = 20$ மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் விடையளிக்க.

1. தேம்பாவணியின் காப்பியத் தலைவன் பெயரைக் குறிப்பிடுக.

2. நீலபத்மநாபன் எந்தப் படைப்பிற்காகச் சாகித்ய அகதெமி விருது பெற்றார்?

3. 'நூலிலாட்டு' என்றால் என்ன?

4. முதலெழுத்துக்களைச் சுட்டிக் கூறுக.

5. அன்மொழித்தொகை-விளக்கம் தருக.

6. 'ஆறில் ஒரு பங்கு' என்னும் சிறுகதையின் ஆசிரியர் யார்?

7. ஓரங்க நாடகம்-குறிப்பு வரைக.

8. இந்தியாவின் முதல் வானொலி நிலையம் எங்கு அமைக்கப்பட்டது?

9. பெரியபுராணத்தின் காப்பிய நாயகன் யார்?

10. பெண்களின் பாதுகாப்பிற்காகத் தமிழகக் காவல்துறை உருவாக்கியுள்ள 'செயலி' யாது?

பகுதி ஆ — ($5 \times 5 = 25$ மதிப்பெண்கள்)

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) புண் ஆற்றும் மருந்தாய் பாவம் தீர்க்க வந்த காலத்தினை வீரமாமுனிவர் எங்ஙனம் விவரிக்கின்றார்?

(அல்லது)

(ஆ) சாந்தி உள்ளம் உருகிப் போற்றி நின்றதனை விளக்கி வரைக.

12. (அ) நீலபத்மநாபனின் 'விமோசனம்' சிறுகதைச் சுருக்கத்தை எழுதுக.

(அல்லது)

(ஆ) தடாகையின் ஆற்றலைக் கம்பன் எங்ஙனம் விரிந்துரைக்கிறார்?

13. (அ) மொழி முதல் எழுத்துக்களை எடுத்துக்காட்டுகளுடன் விவரிக்க.

(அல்லது)

(ஆ) ஆகுபெயர் இலக்கணத்தைச் சான்று காட்டி விளக்குக.

14. (அ) மகாகவி பாரதியாரின் தேசப்பற்றைப் பாராட்டியுரைக்க.

(அல்லது)

(ஆ) தமிழ் நாவல் இலக்கிய வளர்ச்சி வரலாற்றை எடுத்துரைக்க.

15. (அ) கம்பன் கவித்திறத்தை நும் பாடப்பகுதியால் விவரிக்க.

(அல்லது)

(ஆ) கல்வி வளர்ச்சியில் தொலைக்காட்சியின் பங்கு குறித்து விளக்கிடுக.

பகுதி இ — ($3 \times 10 = 30$ மதிப்பெண்கள்)

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. சாந்தி உள்ளம் மகிழ்ந்து குழந்தை ஏசுவைப் போற்றுமாற்றை விவரிக்க.

17. நீலபத்மநாபனின் சிறுகதைகள் பேசும் சமூகக் கருத்துக்களைக் கட்டுரைக்க.

18. பிறமொழிச் சொற்களைத் தமிழில் ஆளும் முறைகள் குறித்து விவரிக்க.

19. போர்க்களத்தில் செய்தி தொடர்பு பெறுமிடத்தைக் கம்பராமாயணத்தின் வழி விளக்குக.

20. இணையப் பயன்பாட்டில் தமிழ்மொழி பெறும் முக்கியத்துவத்தைச் சான்றுகளுடன் எழுதுக.

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D–1123

Sub. Code
21B

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.B.A./B.B.A. (Banking)/B.C.A./M.B.A. (5 Year Integrated) DEGREE EXAMINATION, MAY 2023.

Second Semester

Part I – COMMUNICATION SKILLS – II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What is Communication Skills?

2. What are comprised in Communication skills?

3. Define Intonation.

4. Why Phonetics is important in communication skills?

5. What is meant by soft skills?

6. What are the modes involved in conversation skills?

7. Define planning in presentation skills.

8. Explain the term Creative writing.

9. Define Resume.

10. What is meant by Corporal Communication Skills?

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Write the code and content of communication skills.

Or

(b) Explain the stimulus and Response of Communications Skills.

12. (a) Write the Guidelines for Effective Speaking in Communication Skills.

Or

(b) What are the Etiquettes of Communication Skills?

13. (a) How self-assessment is important in Communicating in Soft Skills.

Or

(b) Explain the modes of Conversation Skills.

14. (a) Define Listening Skill and its types.

Or

(b) Explain about editing and publishing.

15. (a) Write the Structure of Effective sentences in Writing Skills.

Or

(b) Write a short note on various kinds of letters.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Write an essay on the process of communication and factors.

17. Explain how phonetics is priority in Speaking Skill.

18. Write about Language Skills and its ability in Learner centre activities.

19. How writing skills is important in corporate Communication.

20. Explain the Structure of Effective Sentence and Paragraph.

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D–1124

Sub. Code
22/13722

DISTANCE EDUCATION

Common for B.A./B.Sc./B.B.A./B.B.A. (Banking)/B.C.A./M.B.A. (5 Year Integrated) DEGREE EXAMINATION, MAY 2023.

Second Semester

Part II – ENGLISH PAPER - II

(CBCS 2018 – 2019 Academic Year Onwards/ 2021 Calendar Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions

1. What type poem is 'The Road Not Taken'?

2. What did Andrea do with the money he had stolen as given in 'Andrea del Sarto'?

3. How is the speaker preoccupied with the depiction of pictures in 'Ode on a Grecian Urn'?

4. What do the first three lines of the poem 'Lines, Composed upon Westminster Bridge, September 3, 1802' emphasise?

5. What does the First Part of *Gitanjali* sing about?

6. What is the moral of *Gitanjali*?

7. How does Portia react to the Prince of Morocco's failure as a suitor?

8. What act does Jessica believe will solve the misery of life with Shylock?

9. Write the problems of Comprehension tests.

10. Read the given passage and answer the questions:

Looking back, I had come a long way. The little boy, born to cricket, who once fashioned a crude pitch with a mattock out of the side of a hill in the tiny hamlet of Lisarow, had gone on to play forty four times for Australia. From Lisarow to Lord's. Yes it had been a long, long way.

(a) Whom do you think the writer could be?

(i) A cricketer

(ii) A traveller

(iii) A peasant

(iv) A voyager

(b) He belongs to ————————

(c) How many times has he played for his country?

SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL the questions choosing either (a) or (b).

11. (a) Write the theme of the poem, 'Strange Meeting'.

Or

(b) How and why does Andrea compare his skill in painting with Michael Angelo and Raphael?

12. (a) How does the speaker react on seeing the figures on the Urn in 'Ode on a Grecian Urn'?

Or

(b) "The main theme of 'The Road Not Taken' is making choices" – Elucidate.

13. (a) Write the main concept of *Gitanjali*.

Or

(b) How does the speaker contemplate early-morning London from the Westminster Bridge?

14. (a) Discuss Shylock's dramatic function in *The Merchant of Venice*.

Or

(b) In the end how comic is *The Merchant of Venice*?

15. (a) Write a report on the damage done by five to the office building and the ways and means of carrying on with the business during the renovation of the building.

Or

(b) Read the following passage and answer the following questions:

Our days were spent in the servants' quarters in the south-east corner of the outer apartments. One of our servants was Shyam, a dark Chubby boy with curly locks, hailing from the District of Khulna. He would put me into a selected spot and, tracing a chalk line all around, warn me with solemn face and uplifted finger, of the perils of transgressing this ring.

Whether the threatened danger was material or spiritual I never fully understood, but a great fear used to possess me and I had read in the Ramayana of the tribulations of Sita for having left the ring drawn by Lakshman. So it was not possible for me to be sceptical of its potency.

(i) Where did the writer spend his day time?

(ii) Was Shyam the only servant?

(iii) Where did the servant come from?

(iv) Why was the author afraid of transgressing the circle drawn by the servant?

(v) What made Sita undergo the suffering?

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Critically appreciate the poem, 'The Coromandel Fishers'.

17. How does Rabindranath Tagore draw the picture of death through his songs in *Gitanjali*?

18. Draw the character sketch of Shylock in *The Merchant of Venice*.

19. Read the following passage and make notes:

The plants which man grows to provide food for himself and his animals must have water or they will die. This is because plant nutrients in the soil cannot enter the root unless they have first been dissolved in water. Plants also need to absorb large quantities of water from the soil to build up their tissues. They lose a great deal of water to the atmosphere each day as water vapour. The process by which plants lose water is called transpiration. In hot climates more water is lost, and this loss must also be replaced from the soil.

Rain supplies most of the water that plants need but unfortunately it does not always fall at the right time of the year or in sufficient quantities. Plants may stay alive if rain is scarce, but they will not yield such a good harvest of food.

For centuries, man had devised methods of supplementing natural supplies of water to his crops by means of irrigation. These methods vary according to the climate, the crops and the available water resources. In tropical and Mediterranean countries water is usually brought to the crops by a network of surface ditcher. This is known as surface irrigation. In Europe and in the U.S.A., water is normally pumped from a stream through pipes and spread on the field from the above. This is called overhead irrigation.

20. Write an essay on the following topic:

Information Technology Revolution.

D–1210	Sub. Code
	11323

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

Second Semester

ANALYTICAL GEOMETRY AND VECTOR CALCULUS

(CBCS 2018-2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Find the direction cosines of the line which is equally inclined to the axes.

2. Prove by direction cosines that the points (3, –1, 1), (5, –4, 2) and (11, –3, 5) are collinear.

3. Write the two point form of equation of the straight line.

4. Find the equation of the line through the points (–1, 3, 2) and (1, 6, 1)

5. How do you describe a cylinder?

6. What do you mean by skew lines?

7. If $\vec{r} = \vec{a}\cos\omega t + \vec{b}\sin\omega t$ where a, b are constant vectors then prove that $\frac{d^2r}{dt^2} + \omega^2 r = 0$.

8. Find the equation to the sphere whose center is (2, –3, 4) and radius is 5 units.

9. State Green's theorem.

10. If $f = x^2yi + y^2zj + z^2xk$ find curl f.

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

11. (a) A line makes 30° and 120° with the positive directions of x-axis and y-axis respectively. What angle does it make with the positive direction of the z-axis?

Or

(b) Show that the angle between two diagonals of a cube is $\cos^{-1}(1/3)$.

12. (a) Prove that the lines $x + y - z = 5$, $9x - 5y + z = 4$ and $6x - 8y + 4z = 3$, $x + 8y - 6z + 7 = 0$ are parallel.

Or

(b) Find the equation of the plane containing the point (–1, 7, 2) and the line $\frac{x+3}{2} = \frac{y+2}{3} = \frac{z-2}{-2}$.

13. (a) Find the equation of the cone whose vertex is the point (1, 1, 0) and whose base is the curve $y = 0$, $x^2 + z^2 = 4$.

Or

(b) Find the equation of the right circular cone whose vertex is at origin, whose axis is the line $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$ and the semi vertical angle of 30°.

14. (a) Find curl curl f at (1, 1, 1) if $f = x^2yi + xzj + 2yzk$.

Or

(b) Prove that a plane section of a sphere is a circle.

15. (a) Verify Gauss divergence theorem for $f = (x^2 - yz)i - 2x^2yj + 2k$ over the cube bounded by $x = 0,\ y = 0,\ z = 0,\ x = a,\ y = a$ and $z = a$.

Or

(b) Prove that $\nabla f(r) = \left(\frac{f'(r)}{r}\right) \cdot \vec{r}$.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Show that the straight line whose direction cosines are given by $2l - m + 2n = 0$ and $lm + mn + nl = 0$ are at right angles.

17. Find the equation of right circular cylinder of radius 2 whose axis passes through (1, 2, 3) and has direction cosines proportional to (2, –3, 6).

18. Find the equation of the sphere through the circle $x^2 + y^2 + z^2 + 2x + 3y + 5z = 0$; $2x + 6y + 5z - 6 = 0$ and passing through the center of the sphere $x^2 + y^2 + z^2 - 2x - 4y + 6z + 1 = 0$.

19. If S is solenoidal prove that curl curl curl curl $f = \nabla^4 f$.

20. Find the work done by the force $F = 3xy\, i - 5zj + 10xk$ along the curve $x = t^2 + 1,\ y = 2t^2,\ z = t^3$ from $t = 1,$ to $t = 2$.

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D–1211

Sub. Code
11324

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

Second Semester

SEQUENCES AND SERIES

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. State Cauchy's first theorem on limits.

2. Define bounded sequence.

3. Show that $\lim_{n\to\infty} n^{1/n} = 1$.

4. Prove that any convergent sequence is a cauchy sequence.

5. Show that $\sum \frac{1}{4n^2 - 1} = \frac{1}{2}$.

6. What is Cauchy's integral test?

7. Show that the series $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \ldots$ converges.

8. Discuss the convergence of $\sum_{n=2}^{\infty}\left(\frac{\sin n}{\log n}\right)$.

9. When do you say that Σb_n is a rearrangement of a series Σa_n.

10. Show that the convergence of $0+\Sigma a_n$ implies the convergence of $\sum \frac{a_n}{n}$.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

11. (a) Show that $\lim_{n\to\infty}\frac{\sin n}{n}=0$.

Or

(b) Prove that a sequence cannot converge to two different limits.

12. (a) Prove that $(1/n)$ is a cauchy sequence.

Or

(b) Prove that $\lim_{n\to\infty}\frac{x^n}{n!}=0$.

13. (a) Test the convergence of $\sum \frac{1}{(\log n)^n}$.

Or

(b) Discuss the convergence of $\sum \frac{1}{\sqrt{n^3+1}}$.

14. (a) Let (a_n) be a bounded sequence and (b_n) be a monotonic decreasing bounded sequence. Then prove that $\Sigma a_n (b_n - b_{n+1})$ is absolutely convergent.

Or

(b) Test the convergence of $\sum\left(1+\frac{1}{n}\right)^{-n^2}$.

15. (a) Prove that the sum of an absolutely convergent series is unaltered by any rearrangement of its terms.

Or

(b) Prove that if Σa_n is an absolutely convergent and (b_n) is a bounded sequence then $\sum a_n b_n$ is absolutely convergent.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Show that $\lim_{n\to\infty}\left(a^{1/n}\right)=1$ where $a>0$ is any real number.

17. Discuss the behaviour of geometric sequence (r^n).

18. State and prove Kummer's test.

19. Test the convergence of $\sum\frac{n^3+a}{2^n+a}$.

20. Prove that the series $\left(1-\frac{1}{2}\right)+\left(1-\frac{3}{4}\right)+\left(1-\frac{7}{8}\right)+\ldots$ converges. But, when the brackets are removed it oscillates.

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D–1125

Sub. Code
31A/ 13731

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION, MAY 2023.

Third Semester

PART I – TAMIL — PAPER — III

(CBCS 2018 – 2019 Academic year onwards
2021 Calendar Year Onwards)

Time : Three hours Maximum : 75 marks

பகுதி அ — ($10 \times 2 = 20$ மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் விடையளிக்க.

1. பத்துப்பாட்டு பெயர்க் காரணம் தருக.

2. மஞ்ஞைப்பத்து-குறிப்பு வரைக.

3. நற்றிணையின் பாடலடி வரையறையைச் சுட்டுக.

4. உலோச்சனார் சுட்டும் இரும்பு போன்ற மரம் எது?

5. திருக்குறளில் பயின்று வரும் பாவகையைக் கூறுக.

6. மங்கலம் என்பது யாது? திருக்குறள் வழி விளக்குக.

7. நான்மணிக் கடிகையின் ஆசிரியர் யார்?

8. பறை ஒலியால் இறக்கும் பறவை எது?

9. இராசராச சோழனின் மகள் பெயரைச் சுட்டுக.

10. சுவடுகள் நாவலில் இடம்பெறும் தலைமை மாந்தர் பெயர்களை எழுதுக.

பகுதி ஆ — ($5 \times 5 = 25$ மதிப்பெண்கள்)

பின்வரும் வினாக்களுக்கு ஒருபக்க அளவில் விடை தருக.

11. (அ) முல்லைப் பாட்டு கூறும் விரிச்சி கேட்டல் குறித்து எழுதுக.

(அல்லது)

(ஆ) மஞ்ஞைப்பத்து வெளிப்படுத்தும் வர்ணனைகளை விளக்குக.

12. (அ) மேகம் பெரும் மழை பொழிந்ததனால் ஏற்பட்ட பயன்களாகப் பெருங்குன்றூர்க் கிழார் குறிப்பிடுவன யாவை?

(அல்லது)

(ஆ) வரைவிடை மெலிவு ஆற்றுவிக்கும் தோழி தலைவனை நோக்கிக் கூறியது யாது?

13. (அ) குறித்த பருவத்தில் தலைவன் வாராமையால் ஏற்பட்ட தலைவியின் நிலையாகக் கருவூர்க் கோசிகனார் கூறுவனவற்றை எழுதுக.

(அல்லது)

(ஆ) வரைவிடை வைத்துப் பிரிந்தபோது தலைவி வருந்திய நிலையை உலோச்சனார் எங்ஙனம் புனைகின்றார்?

14. (அ) வாழ்க்கைத் துணை நலம் கூறும் செய்திகளைத் திருக்குறள் வழி ஆராய்க.

(அல்லது)

(ஆ) நான்மணிக் கடிகை சுட்டும் நல்லாள் பிறக்கும் குடியை அறிபவர் யார்?

15. (அ) இராசராச சோழன் நாடகத்தின் தொடக்கச் சிறப்பினை விளக்குக.

(அல்லது)

(ஆ) சுவடுகள் நாவலில் இரகுபதி பாத்திரப் படைப்பினை ஆராய்க.

பகுதி இ — ($3 \times 10 = 30$ மதிப்பெண்கள்)

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. முல்லைப் பாட்டு சுட்டும் கார்கால வருணனையைக் கட்டுரையாக்கம் செய்க.

17. கபிலர் குறிஞ்சித் திணை பாடுவதில் வல்லவர் என்பதை நும்பாடப் பகுதி கொண்டு விளக்கி வரைக.

18. பதிணென்கீழ்க் கணக்கு நூல்கள் சுட்டும் வாழ்வியல் அறங்களைத் தொகுத்துரைக்க.

19. இராசராச சோழன் நாடகத்தின் பாத்திரப்படைப்பு உருவாக்கம் குறித்து விவரிக்க.

20. சுவடுகள் நாவலின் கதைப் போக்கு அமைப்பினைக் கட்டுரை வடிவில் எழுதுக.

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D–1126

Sub. Code
31B

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc. B.C.A. DEGREE EXAMINATION, MAY 2023.

Third Semester

Part I – HUMAN SKILLS DEVELOPMENT-I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. What is Interpersonal Relationship?

2. What do you mean by developing human skills? Briefly answer.

3. Write briefly on Personality'.

4. Give the meaning of 'Positive Personality'.

5. Define 'Decision—Making' skills.

6. Give any two steps involved in decision making.

7. Write the meaning of goal setting.

8. Mention any one cause for Anger.

9. Write briefly on styles of Leadership.

10. What is Negotiation Skill?

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Write a note on levels of functions of mind.

Or

(b) Discuss the merits of good habits.

12. (a) How do you build a 'Positive Personality'?

Or

(b) Discuss the importance of self-acceptance.

13. (a) Discuss the skills involved in 'decision making'.

Or

(b) What are creative Negotiation and competitive Negotiation?

14. (a) What is resistance to change?

Or

(b) Write a note on 'pealing with change'.

15. (a) Discuss the necessity for developing positive attitudes.

Or

(b) Write the Canons of good human relations.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Explain the features of Interpersonal Behaviour.

17. Expound the etiquettes in using mobile phones and telephones.

18. Explain the various characteristics of Leadership.

19. Discuss in detail the causes and consequences of anger.

20. Explain the different methods of managing the stress.

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D–1127

Sub. Code
32/13732

DISTANCE EDUCATION

Common for B.A./B.Sc./B.C.A DEGREE EXAMINATION, MAY 2023.

Third Semester

PART II – ENGLISH PAPER III

(CBCS 2018 – 2019 Academic Year Onwards/2021 Calendar Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Write briefly about the Postmaster.

2. Who is the author of the prescribed one-act play — 'Progress'?

3. What was the discovering that astonished the Vicar?

4. What does the necklace in reality represent in 'The Diamond Necklace'?

5. Write the theme of the play 'The Proposal' briefly.

6. Why does Mrs. Higgins refuse to serve breakfast to Philip?

7. What according to Pierre, is a sure sign of starvation?

8. Why could Swami hardly breathe?[in 'A Hero]

9. Give any four examples for Common Noun.

10. Fill in the blanks with the Abstract Nouns formed from the words given in brackets:

(a) Solomon was famous for his _____ (wise).

(b) Always speak the _____(true).

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) "Guy de Maupassant talks about the deceptiveness of appearances in 'The Diamond Necklace". Justify.

Or

(b) Attempt a character sketch of the Verger.

12. (a) How do Lomov and Natalya fight over the quality of dogs?

Or

(b) Bringout the comic elements in 'The Boy Comes Home'.

13. (a) How does the playwright bring out Pierre's nervousness when he presents himself as the messenger to carry the eel pie?

Or

(b) Why did Swami keep expecting the devil to come and carry him away?

14. (a) What happened to the Postmaster and Ratan at the end of the story, 'The Postmaster'?

Or

(b) Write a summary of 'The Refugee'.

15. (a) Pick out the Adjectives in the following sentences and state their kind:

(i) Some dreams are like reality.

(ii) Such men are dangerous.

(iii) He lives on Yonder Mountain.

(iv) I saw several sheep in the valley.

(v) He is ninety years of age.

Or

(b) Choose the right verbs from brackets to complete each sentence:

(i) The wind (blew, galloped, flew) hard that day.

(ii) A cork (floats, sails, flows) on water.

(iii) A river (floats, flows, swims) by our village.

(iv) The bird has (flown, fled, run) out of the cage.

(v) The servant (lay, laid, put) the table for breakfast.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. How does 'The Diamond Necklace' explore the perceived power of objects?

17. Whom do you think was wiser, Swami or his father? Justify your preference. [in 'A Hero']

18. Comment on the tendency of wealthy families seeking ties with other wealthy families as presented in 'The Proposal'.

19. Describe the events that took place in your College Day celebration.

20. Fill in the blanks with correct kind of Pronouns:

(a) The prisoner hanged _____ (reflective)

(b) They _____ went there. (Emphasizing)

(c) _____ is my house. (demonstrative)

(d) Do good to _____ (indefinite)

(e) _____ of the girls was given a rose. (Distributive)

(f) _____ do you want to see ? (interrogative)

(g) This is the horse _____ won the race. (relative)

(h) This is the boy _____ the teacher praised. (relative)

(i) I _____ was there. (Emphasizing)

(j) The horse has hurt _____ (Reflexive)

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D–1212	Sub. Code
	11333

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

Third Semester

DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Solve : $y = 2px + y^2p^3$.

2. Solve : $\left(D^2 + D + 1\right)y = 0$.

3. Solve : $\frac{dx}{yz} = \frac{dy}{xz} = \frac{dz}{xy}$.

4. Eliminate the arbitrary function $z = f\left(x^2 + y^2\right)$.

5. Verify the conduction of integrability for $(y+z)dx + (z+x)dy + (x+y)dz = 0$.

6. Define homogeneous linear differential equation.

7. Solve the equation $y'' + 4y' + 4y = 0$.

8. Solve $qe^x = pe^y$.

9. Find the orthogonal trajectories of the family of curves given by $r = a\sin\theta$.

10. Define Orthogonal trajectory.

SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Define exact differential equation. Solve $e^y dx + \left(xe^y + 2y\right)dy = 0$.

Or

(b) Solve : $y = 2px + y^2 p^3$.

12. (a) Solve : $xdy - ydx = \sqrt{x^2 + y^2}\,dx$.

Or

(b) Solve : $\left(D^2 - 5D + 6\right)y = 7e^{3x} + 5$.

13. (a) Solve : $x^2 \frac{d^2y}{dx^2} + 3x\frac{dy}{dx} + y = \frac{1}{(1-x)^2}$.

Or

(b) Solve the equations $\frac{dx}{+\left(y^2 - z^2\right)} = \frac{dy}{xy} = \frac{dz}{xz}$.

14. (a) Solve $\left(\frac{d^2y}{dx^2}\right) - \left(\frac{dy}{dx}\right)2\tan x + 5y = 0$.

Or

(b) Solve $\frac{d^2y}{dx^2} + \frac{dy}{dx}\cot x + 4y\operatorname{cosec}^2 x = 0$ by changing the independent variable x to z.

15. (a) Solve $px + qy + \left(\frac{q}{p} - p\right) = 0$.

Or

(b) Show that the family of parabolas $y^2 = 4c(x + c)$ is self orthogonal in the sense that when a curve in the family intersects another curve of the family then it is orthogonal to it.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Solve $\frac{dx}{dt} + 4x + 3y = t$; $\frac{dy}{dt} + 2x + 5y = e^t$.

17. Solve the equation $\frac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$, by method of variation of parameters.

18. Solve $z(z - y)dx + (z + x)z\,dy + x(x + y)dz = 0$ by forming the auxillary.

19. Find the complete integral value of $q = (z + px)^2$ by using Charpits method.

20. Explain Brachistochrone problem.

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D–1213

Sub. Code
11334

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION, MAY 2023.

Third Semester

MECHANICS

(CBCS 2018-19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. State triangle law of forces.

2. State parallelogram of forces.

3. Write the condition of equilibrium.

4. Define the centre of two parallel forces.

5. Define a couple.

6. What is the angle of projection?

7. Define the force of restitution.

8. Define the principle of conservation of momentum.

9. What is the velocity of central orbit?

10. Write the equation of polar co-ordinates.

SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Two forces act on a particle. If the sum and difference of the forces are at right angles to each other, then show that the forces are of equal magnitude.

Or

(b) State and prove the converse of the triangle law of forces.

12. (a) Obtain the resultant of any number of coplanar forces.

Or

(b) Prove that if two couples, whose moments are equal and opposite, act in the same plane upon a rigid body, they balance one another.

13. (a) Derive the intrinsic equation of the catenary.

Or

(b) Show that the greatest height which is a particle with initial velocity v can reach on a vertical wall at a distance 'a' from the point of projection is $\frac{v^2}{2g} - \frac{ga^2}{2v^2}$. Prove also that the greatest height above the point of projection attained by the particle in its flight is $\frac{v^6}{2g(v^4 + g^2a^2)}$.

14. (a) Prove that the path of a projectile is a parabola.

Or

(b) A smooth sphere or particle whose mass is m and whose coefficient of restitution is e, impinges obliquely on a smooth fixed plane. Find its velocity and direction of motion after impact.

15. (a) Derive the pedal equation of central orbit.

Or

(b) Find the law of force towards the pole under which the curve $r^n = a^n \cos n\theta$.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. A weight is supported on a smooth plane of inclination α by a string inclined to the horizon at an angle γ. If the slope of the plane be increased to β and the slope of the string unaltered, the tension of the string is doubled. Prove that $\cos\alpha - 2\cos\beta = \tan\lambda$.

17. *ABCDEF* is a regular hexagon and at *A*, act forces represented by $\overline{AB}$, $2\overline{AC}$, $3\overline{AD}$, $4\overline{AE}$ and $5\overline{AF}$. Show that the magnitude of the resultant is $AB\sqrt{351}$ and that it makes an angle $\tan^{-1}\left(\frac{7}{\sqrt{3}}\right)$ with *AB*.

18. Prove that the effect of a couple upon a rigid body is not altered if it is transferred to a parallel plane provided its moment remains unchanged in magnitude and direction.

19. A particle is projected at an angle α with a velocity u and it strikes up an inclined plane of inclination β at right angles to the plane. Prove that

(a) $\cot\beta = 2\tan(\alpha - \beta)$

(b) $\cot\beta = \tan\alpha - 2\tan\beta$.

20. Obtain the loss of kinetic energy due to direct impact of two smooth spheres.

D–1128

Sub. Code
41A/13741

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION,
MAY 2023.

Fourth Semester

Part - I — TAMIL – Paper IV

(CBCS – 2018-19 Academic Year Onwards/
2021 Calendar Year onwards)

Time : Three hours Maximum : 75 marks

பகுதி அ — (10 × 2 = 20 மதிப்பெண்கள்)

அனைத்து வினாக்களுக்கும் விடையளிக்க.

1. இயலசையின் வகைகளைக் குறிப்பிடுக.

2. தளை எத்தனை வகைப்படும்?

3. கலிப்பாவிற்கான ஓசையைக் கூறுக.

4. குறிஞ்சித்திணைக்கான சிறுபொழுதுகளை எழுதுக.

5. செவியறிவுறூஉ என்றால் என்ன?

6. சிலேடை – குறிப்பு வரைக.

7. குறிஞ்சிப்பாட்டு என்னும் நூலைப் பாடியவர் யார்?

8. திருக்குறளில் மொத்தம் எத்தனை அதிகாரங்கள் உள்ளன?

9. சீவகசிந்தாமணி காப்பியத்தை இயற்றிய ஆசிரியர்?

10. 'பாஞ்சாலி சபதம்' காப்பியக் கதை மாந்தர்கள் இருவரைக் குறிப்பிடுக.

பகுதி ஆ — ($5 \times 5 = 25$ மதிப்பெண்கள்)

பின்வரும் வினாக்களுக்கு ஒரு பக்க அளவில் விடை தருக.

11. (அ) அடியின் வகைகளைச் சான்றுகளுடன் விளக்குக.

(அல்லது)

(ஆ) சிந்து என்னும் யாப்பு வகையை விளக்கி வரைக.

12. (அ) அறத்தொடு நிற்றல் என்றால் என்ன? அதன் முக்கியத்துவத்தைச் சுட்டுக.

(அல்லது)

(ஆ) சங்க காலத்தில் நடுகல் வழிபாடு மேற்கொண்ட வரலாற்றை எழுதுக.

13. (அ) 'மையோ மாமலையோ மறிகடலோ' – இதில் பயின்று வரும் அணியை விளக்குக.

(அல்லது)

(ஆ) மொழி நடையில் காற்புள்ளி எவ்வெவ்விடங்களில் பயன்படுத்த வேண்டும்?

14. (அ) பத்துப்பாட்டில் இடம்பெற்றுள்ள ஆற்றுப்படை நூல்களைப் பற்றி எழுதுக.

(அல்லது)

(ஆ) திருக்குறள் எங்ஙனம் பகுக்கப்பட்டுள்ளது? விளக்கி வரைக.

15. (அ) கம்பராமாயணத்தின் தனிச்சிறப்புகளைப் புலப்படுத்துக.

(அல்லது)

(ஆ) சிற்பியின் 'மௌன மயக்கங்கள்' கவிதைகள் குறித்து விரித்துரைக்க.

பகுதி இ — ($3 \times 10 = 30$ மதிப்பெண்கள்)

பின்வரும் வினாக்களில் மூன்றனுக்குக் கட்டுரை வடிவில் விடை தருக.

16. தொடையின் வகைகளைச் சான்றுகளுடன் விளக்கி வரைக.

17. புறத்திணையின் வகைகளைச் சான்றுகளுடன் விளக்குக.

18. செய்யுள் படைப்பில் அணி இலக்கணம் பெறுமிடத்தை எடுத்துரைக்க.

19. கம்பரின் கவித்திறத்தைச் சான்றுகளுடன் கட்டுரைக்க.

20. 'பாண்டியன் பரிசு' காப்பியத்தின் கதைக் களத்தை விரித்துரைக்க.

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D-1129

Sub. Code
41B

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.C.A. DEGREE EXAMINATION, MAY 2023

Fourth Semester

PART I — HUMAN SKILLS DEVELOPMENT – II

(CBCS 2018-19 Academic Year onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Write any four techniques of counselling.

2. Why are managerial skills important?

3. What is conceptual skills? Give two examples.

4. Write about the importance of organisational skills.

5. What are the two types of multitasking?

6. Write five qualities of a good leader.

7. What are the most common types of social interaction?

8. What are problem-solving skills?

9. Define dependability in problem solving skills.

10. What is the main goal of cooperative learning skills?

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Illustrate the role of a counsellor.

Or

(b) Elaborate the human relational skills.

12. (a) How to prepare for a presentation?

Or

(b) Define the nature of organizational skills.

13. (a) What are the skills you must convey in a job interview?

Or

(b) What are the demands of multi tasking?

14. (a) What are the employability skills?

Or

(b) Define intrapersonal skills with examples.

15. (a) Why is problem solving an important skill?

Or

(b) What is the importance of social responsibility?

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Describe managerial skills and its need.

17. Elaborate importance and meaning of conceptual skills.

18. Write an essay on nature, importance and types of organisational skills.

19. Responsibilities of an individual in a society. Explain.

20. How to handle a problem?

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D–1130

Sub. Code
42/13742

DISTANCE EDUCATION

Common for B.A./B.Sc./B.C.A. DEGREE EXAMINATION, MAY 2023.

Fourth Semester

Part II – ENGLISH PAPER-IV

(CBCS 2018 – 2019 academic year onwards / 2021 calendar year onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. What surprise was in store for Lalajee before he left Mokameh Ghat?

2. In "A Day's Wait," how does the father dispel the boy's fear?

3. What is the meaning of the title, Pygmalion?

4. Where did Swami and his friends live?

5. On what condition does Shylock agree to loan money to Antonio?

6. Who was Paulina?

7. What was Gandhiji's weapon against the British rule?

8. How did Nehru endear himself to everyone?

9. What is meant by "Concord"?

10. How would you thank a stranger who lends you a pen at the post office?

PART B — ($5 \times 5 = 25$ marks)

Answer ALL the questions choosing either (a) or (b)

11. (a) What is the moral of the story, "Little Girls are Wiser than Men"?

Or

(b) Write a brief description of Klass Van Bommel.

12. (a) What happens during the Ambassador's garden party in *Pygmalion*?

Or

(b) Justify the title of the story, *Swami and His Friends*.

13. (a) What reasoning did Arragon use in choosing the casket?

Or

(b) What is the function of the Nurse in Romeo and Juliet?

14. (a) What was the legitimate aspiration of the blacks?

Or

(b) Describe Toynbee's second meeting with Nehru.

15. (a) Choose the correct form of the verb that agrees with the subject:

(i) The cost of cars ——————(is, are) high.

(ii) Neither the workers nor the manager —————— (was, were) to blame.

(iii) Every spring the alumni —————— (gather, gathers) in the Quadrangle for reception.

(iv) The crowd at the match —————— (have, has) been standing the entire time.

Or

(b) Write a paragraph on the proverb, "Well begun is half done."

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. How were the trips by the two old men fulfilled in their own ways?

17. How does *Pygmalion* deal with the issue of social class?

18. Consider Romeo and Juliet a tragic love story.

19. Write an essay on the personality of Nehru from Toynbee's account.

20. Draft a discussion between a teacher and the student on the possible abuses of the Internet.

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D–1214	Sub. Code
	11343

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

Fourth Semester

ANALYSIS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Define countable set.

2. Prove that any subset A of $\mathbb{R}$ which contains (0, 1] is uncountable.

3. What is usual metric on $\mathbb{R}^n$.

4. Prove that any open interval (a,b) is an open set in $\mathbb{R}$ with usual metric.

5. What is complete metric space?

6. State inverse function theorem.

7. Define contraction mapping.

8. What do you mean by Riemann integration?

9. What is an open cover for a metric space M?

10. Define uniform continuity.

SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL the questions, choosing either (a) or (b).

11. (a) Prove that any infinite set contains a countably infinite subset.

Or

(b) In $\mathbb{R}$ with usual metric prove that [a, b) is neither closed nor open.

12. (a) Prove that A is closed iff $A = \overline{A}$.

Or

(b) Prove that for a convergent sequence (x_n) the limit is unique.

13. (a) State and prove Baire's category theorem.

Or

(b) Prove that the metric spaces [0, 1] and [0, 2] with usual metric are homeomorphic.

14. (a) Prove that $f : [0,1] \to \mathbb{R}$ defined by $f(x) = x^2$ is uniformly continuous on [0, 1].

Or

(b) State and prove intermediate value theorem.

15. (a) Prove that $(0, \infty)$ with usual metric is not compact.

Or

(b) Prove that a closed subspace of a compact metric space is compact.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Prove that [0,1] is uncountable.

17. Prove that in any metric space every closed ball is a closed set.

18. State and prove cantor's intersection theorem.

19. Prove that any closed interval [a, b] is a compact subset of $\mathbb{R}$.

20. Prove that continuous image of a compact metric space is compact.

———————

D–1215	Sub. Code
	11344

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

Fourth Semester

STATISTICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Show that the A.M of the first n natural number is $\frac{1}{2}(n+1)$.

2. Find the Median and Quartiles of the heights in c.m of eleven students given by 66, 65, 64, 70, 61, 60, 56, 63, 60, 67, 62.

3. Find the G.M. of the four numbers 2, 4, 6, 27.

4. Define Correlation.

5. Prove that $\Delta(\log U_x) = \log\left(1 + \frac{\Delta Ux}{Ux}\right)$.

6. Find whether the following data are consistent
$N = 600 \ \ (A) = 300 \ (B) = 400 \ (AB) = 50$.

7. Define Laspeyre's and Fishers Index Number.

8. State the normal equations for fitting a straight line.

9. State Newtons forward Interpolation formula for equal Intervals.

10. Explain seasonal variation in time series.

SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL the questions, choosing either (a) or (b).

11. (a) The frequencies of the values 0, 1, 2, ...n of a variable are given respectively by 1, nc_1, nc_2 ....nc_n. Show that the mean is $\frac{1}{2}n$.

Or

(b) Obtain the Median for the following frequency distribution

x:	1	2	3	4	5	6	7	8	9
f:	8	10	11	16	20	25	15	9	6

12. (a) Fit a straight line to the following data :

x:	0	1	2	3	4
y:	2.1	3.5	5.4	7.3	8.2

Or

(b) Prove that $\gamma_{xy} = \frac{\sigma_x^{\,2} + \sigma_y^{\,2} - \sigma_{(x-y)}^{\,2}}{2\sigma_x \sigma_y}$.

13. (a) Prove that the regression co-efficients are independent of the change of origin but dependent on change of scale.

Or

(b) Evaluate

(i) $\frac{\Delta^2 x^3}{Ex^2}$ taking $h = 1$

(ii) $\Delta^3 (1 - ax)(1 - bx)(1 - (x))$.

14. (a) Find U_x for the following data, using Gregory – Newtons formula and hence estimate U_9.

U_0	U_1	U_2	U_3	U_4
1	11	21	28	29

Or

(b) Find U_5 given that $U_1 = 4, U_2 = 7, U_4 = 13, U_7 = 30$.

15. (a) Given $(A) = 30$; $(B) = 25; \alpha = 30$; $(\alpha\beta) = 20$

Find

(i) N (ii) (β)

(iii) (AB) (iv) $(A\beta)$

(v) $(\alpha\beta)$

Or

(b) Prove that Fishers index number is an Ideal Index Number.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. The scores of two cricketers A and B in 10 innings are given below. Find who is a better run gether and who is most consistent player.

A scores (*xi*)	40	25	19	80	38	8	67	121	66	76
B scores (*yi*)	28	70	31	0	14	111	66	31	25	4

17. Fit a second degree parabola by taking *xi* as a independent variable.

x :	0	1	2	3	4
y :	1	5	10	22	38

18. Calculate the correlation coefficient for the following data :

x :	10	12	18	24	23	27
y :	13	18	12	25	30	10

19. Population was recorded in a village as follows

Year :	1941	1951	1961	1971	1981	1991
Population :	2000	2300	2800	3400	4150	5120

Estimate the population for the year 1945 and 1985.

20. Calculate

(a) Laspeyre

(b) Paaches

(c) Fishers

(d) Bowles Index Number

Commodities :	Base Year		Current Year	
	Price	Quality	Price	Quality
A	2	8	4	6
B	5	10	6	5
C	4	14	5	10
D	2	19	2	13

D–1216	Sub. Code
	11351

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

Fifth Semester

MODERN ALGEBRA

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Define difference of sets.

2. State D' Morgan's laws.

3. Prove that any cyclic group is abelian.

4. Define order of an element.

5. Define normal sub group.

6. Define ring with an example.

7. Define prime ideal.

8. Define natural homomorphism.

9. Show that $\mathbb{R}$ is not a vector space over C.

10. Define rank and nullity of a matrix.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) For any three sets A, B, C prove that

$$A \Delta B = (A - B) \cup (B - A)$$

Or

(b) Let G be a group. Let $a, b, \in G$. Then prove that $(ab)^{-1} = b^{-1} a^{-1}$ and $\left(a^{-1}\right)^{-1} = a$.

12. (a) Prove that a subgroup of a cyclic group in cyclic.

Or

(b) Show that the intersection of two normal sub groups of a groups G is a normal subgroup of G_1.

13. (a) Prove that in a ring with identity the identity element is unique.

Or

(b) Prove that any finite integral domain is a field.

14. (a) Prove that the only isomorphism $f : Q \to Q$ is the identify map.

Or

(b) Prove that any Euclidean domain R is a U.F.D.

15. (a) Prove that the intersection of two subspaces of a vector space is a subspace.

Or

(b) Let V be a finite dimensional inner product space. Let W be a subspace of V. Then prove that $\left(W^{\perp}\right)^{\perp} = W$.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Let A and B be two subgroups of a group G. Then prove that AB is a subgroup of G if and only if $AB = BA$.

17. State and prove Lagrange's theorem on groups.

18. State and prove the fundamental theorem of homomorphism.

19. Let V be a vector space over = field f. Let A and B be subspaces of V. Prove that $\frac{A+B}{A} \cong \frac{B}{A \cap B}$.

20. Let V be a finite dimensional vector space over a field F. Let W be a subspace of V. Prove that

(a) $\dim \frac{W}{V} = \dim V$

(b) $\dim \frac{V}{W} = \dim V - \dim W$

———————

D–1217

Sub. Code
11352

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

Fifth Semester

OPERATIONS RESEARCH

(CBCS 2018-19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. What is O.R.?

2. Define a basic solution.

3. Write the dual of the L.P.P

   Minimize $z = 4x_1 + 6x_2 + 18x_3$

   Subject to: $x_1 + 3x_2 \geq 3$

   $x_2 + 2x_3 \geq 5$ and

   $x_j \geq 0,\ j = 1, 2, 3$

4. What is meant by an unbounded solution in LPP?

5. What is the objective of an assignment problem?

6. Write down the mathematical formulation of transportation problem.

7. Define network.

8. Define maximin and minimax principle.

9. Write down the expansion of PERT and CPM.

10. Find the value of the game

$$\begin{array}{c} \\ A \end{array} \begin{array}{c} B \\ \begin{pmatrix} 10 & 6 \\ 8 & 3 \end{pmatrix} \end{array}$$

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b)

11. (a) Solve graphically:

Minimize $Z = 3x_1 + 2x_2$

Subject to the constraints

$$-2x_1 + x_2 = 1$$
$$x_1 \leq 2$$
$$x_1 + x_2 \leq 3$$
$$x_1, x_2 \geq 0$$

Or

(b) Reduce the following LPP to its standard form:

Maximize $Z^* = 3x_1 + 4x_2 + 6x_3$

Subject to the constraints:

$$2x_1 + x_2 + 2x_3 \geq 6$$
$$3x_1 + 2x_2 = 8$$
$$7x_1 - 3x_2 + 5x_3 \geq 9$$

12. (a) Using Big-M method solve the following LPP

Minimize $z = 4x_1 + 3x_2$

Subject to: $2x_1 + x_2 \geq 10$

$-3x_1 + 2x_2 \leq 6$

$x_1 + x_2 \geq 6$

$x_1, x_2 \geq 0$

Or

(b) Write down the dual of the principal LPP:

Maximize $Z = 3x_1 + x_2 + x_3 + 4x_4$

Subject to: $x_1 + x_2 - 2x_3 + x_4 = 5$

$x_1 - 2x_2 + 4x_3 + 2x_4 = 10$

$x_1, x_2, x_3, x_4 \geq 0$

13. (a) Using Vogel's approximation method, find a basic feasible solution to the following Transportation problem.

	1	2	3	4	a_i
I	21	16	25	13	11
II	17	18	14	23	13
III	32	27	18	41	19
b_j	6	10	12	15	43

Or

(b) Explain the steps in the Hungarian method for solving assignment problems.

14. (a) A T.V repairman finds that the time spent on his jobs has an exponential distribution with mean 30 minutes. If he repairs the sets in approximately poisson with an average rate of 10 per 8- hour day. What is repairmen's expected idle time?

Or

(b) There are five jobs each which must go through the two machines A and B in the order A–B processing times are given below

Job	1	2	3	4	5
Machine A	10	2	18	6	20
Machine B	4	12	14	16	8

Determine the optimum sequences for the 5 jobs and the minimum total elapsed time.

15. (a) Using the principle of dominance solve the following game:

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

Or

(b) Explain the following terms:

(i) Pessimistic time

(ii) Optimistic time and

(iii) Most likely time

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Use simplex method to solve the following LPP:

Maximize $Z = 4x_1 + 10x_2$

Subject to: $2x_1 + x_2 \leq 50$

$2x_1 + 5x_2 \leq 100$

$2x_1 + 3x_2 \leq 90$

$x_1, x_2 \geq 0$

17. Use dual simplex method to solve the LPP

Maximize $Z = -3x_1 - 2x_2$

Subject to: $x_1 + x_2 \geq 1$

$x_1 + x_2 \leq 7$

$x_1 + 2x_2 \geq 10$

$x_2 \leq 3$

$x_1, x_2 \geq 0$

18. Solve the following transportation problem

		Destination			
		A	B	C	Availability
Source	I	6	8	4	14
	II	4	9	8	12
	III	1	2	6	5
	Demand	6	10	15	

19. Determine the optimal solution to the following assignment problem:

	I	II	III	IV
A	10	5	13	15
B	3	9	18	3
C	10	7	3	2
D	5	11	9	7

20. Solve the following 3×3 game

	Player B		
Player A	1	–1	3
	3	5	–3
	6	2	–2

D–1218

Sub. Code
11353

DISTANCE EDUCATION

B.Sc. DEGREE EXAMINATION, MAY 2023.

Fifth Semester

Mathematics

NUMERICAL ANALYSIS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Write down the formula for regula falsi method.

2. Show that $\Delta(\sin x) = 2\sin\frac{1}{2}.\cos\left(x+\frac{1}{2}\right)$.

3. Show that $\Delta\nabla = \Delta - \nabla$.

4. State the Newtons' divided difference interpolating formula.

5. Form the difference table for the following.

6. Write down the gauss backward interpolation formula.

7. State the Newton's forward difference formula to compute the derivatives.

8. State Simpson's $\frac{1}{3}$ rule.

9. What is the order of $y_{x+2} + y_{x+1} = 2^x$?

10. Solve $y_n - 6y_{n-1} + 9y_{n-2} = 0$.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Find the smallest positive root of $x^3 - 2x + 0.5 = 0$ by Newton – Raphson method.

Or

(b) Solve the equations using Jacobis iteration method.

$$20x + y - 2z = 17$$
$$3x + 20y - z = -18$$
$$2x - 3y + 20z = 25$$

12. (a) Prove that $\Delta \log f(x) = \log\left[1 + \frac{\Delta f(x)}{f(x)}\right]$.

Or

(b) Prove that $\Delta + \nabla = \frac{\Delta}{\nabla} - \frac{\nabla}{\Delta}$.

13. (a) Find $\frac{dy}{dx}$ at $x = 1$ form the following table.

x	0	1	3
y	1	–2	4

Or

(b) Evaluate $\int_0^1 e^{-x^2} dx$ by dividing the range of integration into 4 equal parts using trapezoidal rule.

14. (a) Using Simpson's $\frac{1}{3}$ rule, evaluate $\int_0^1 \frac{x^2}{1+x^3} dx$ with $h = 0.25$.

Or

(b) Evaluate $\Delta[x(x+1)(x+2)(x+3)]$.

15. (a) Using R–K method of second order find $y(0.1)$, When $y' = -y$, $y(0) = 1$.

Or

(b) Using Taylor's series method, solve $\frac{dy}{dx} = x^2 + y^2 - 2$, $y(0) = 1$ at $x = 0.1$.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Find the real root of the equation $x^3 + x^2 - 1 = 0$ by iteration method.

17. Solve the system of equations.

$$8x - y + z = 18$$
$$2x + 5y - 2z = 3$$
$$x + y - 3z = -6$$

Using Gauss-seidel iteration method.

18. Using Trapezoidal and Simpsons rules, find $\int_0^1 x^2 dx$ by dividing $(0,1)$ into 4 equal intervals.

19. Solve $\frac{d^2y}{dx^2} - x.\left(\frac{dy}{dx}\right)^2 + y^2 = 0$ using Runge-Kutta method for $x = 0.2$; initial conditions are $x = 0,\ y = 1,\ y' = 0$.

20. Using Adam's – Bash forth predictor corrector formula find $y(0.4)$ given that $\frac{dy}{dx} = \frac{xy}{2}; y(0.1) = 1.01,$ $y(0.2) = 1.022,\ y(0.3) = 1.023$.

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D–1219

Sub. Code
11354

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

Fifth Semester

TRANSFORM TECHNIQUES

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Find $L\left(e^{at}\right)$.

2. Find $L^{-1}\left\{\dfrac{s^2-3s+4}{s^3}\right\}$.

3. If $L\{f(t)\}=F(s)$, prove that $L\{f(at)\}=\dfrac{1}{a}F(s/a)$.

4. Define even function with example.

5. When a function is defined in $(0, 2l)$, it is possible to expand it series? How?

6. Find the sine transform of $f(x)$, it

$$f(x)=\begin{cases}\sin x, & a<x<a\\ 0, & x>a\end{cases}$$

7. Define the root mean square value of a function $f(x)$ in $(0, 2\pi)$.

8. Define Parsevals identity in fourier series.

9. Find z-transform of $\left[\frac{1}{2^k}\right]$, $-4 \le k \le 4$.

10. Find $z^{-1}\left(\frac{1}{z-2}\right)$ when $|z| > 2$.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Find $L(\sin 2t \sin 3t + \cos^3 2t)$.

Or

(b) Find $L^{-1}\left(\frac{1}{(s+1)(s^2+2s+2)}\right)$.

12. (a) Apply convolution theorem to evaluate $L^{-1}\left\{\frac{s}{(s^2+a^2)^2}\right\}$.

Or

(b) Expand $f(x) = \sin x$ in $(-\pi, \pi)$ as fourier series.

13. (a) Find the fourier cosine series for $f(x) = x^2$ in $(0, \pi)$.

Or

(b) Find the fourier sine transform of $\frac{e^{-ax}}{x}$.

14. (a) Find fourier transform of $\left[\frac{\sin ax}{x}\right]$ and hence prove that $\int_{-\infty}^{\infty} \frac{\sin^2 ax}{x^2} dx = a\pi$.

Or

(b) Find $z[f(k)]$, where $f(k) = \begin{cases} 5^k, & k < 0 \\ 3^k, & k \geq 0 \end{cases}$

15. (a) Evaluate $z^{-1}\left(\frac{2z^2 - 10z + 13}{(z-3)^2(z-2)}\right)$ when $2 < |z| < 3$.

Or

(b) Find $z^{-1}\left\{\frac{z^2 + 2z}{z^2 + 2z + 4}\right\}$ by using Residue theorem.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Using Laplace transform solve $(D-2)x - (D+1)y = 6e^{3t}$ $(2D-3)x + (D-3)y = 6e^{3t}$ given $x(0) = 3$, $y(0) = 0$.

17. Find the fouries series of $f(x)$, where

$$f(x) = \begin{cases} -\pi, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$$

and hence prove that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots = \frac{\pi^2}{8}$.

18. Expand $f(x) = x \sin x$ for $(-\pi, \pi)$ and hence prove that $\frac{\pi - 2}{4} = \frac{1}{1.3} + \frac{1}{3.5} + \frac{1}{5.7} + \frac{1}{7.9} + \cdots\cdots$

19. Find the Fourier sine and cosine transform of x^{n-1}. Hence deduce that $\frac{1}{\sqrt{x}}$ is self reciprocal under both the transforms. Also find $F\left\{\frac{1}{\sqrt{|x|}}\right\}$.

20. Solve $6y_{k+2} - y_{k+1} - y_k = 0$, given $y(0) = 0$, $y(1) = 1$.

D–1220

Sub. Code
11361

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

Sixth Semester

DISCRETE MATHEMATICS

(CBCS 2018-19 Academic Year onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. What are Sentential connectives.

2. Define atomic and compound statements.

3. Define tautology.

4. State De Morgan's Laws.

5. Give an example for a lattice.

6. Define Hamming distance.

7. When a graph is said to be disconnected?

8. Define bipartite graph.

9. What do you mean by fundamental circuit?

10. Define Hamiltonian graph.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b)

11. (a) Determine the truth table for $P \to (Q \to R)$.

Or

(b) Verify $(PVQ) \to P$ is a tautology.

12. (a) Prove that every chain is a lattice.

Or

(b) State any four properties of Lattice.

13. (a) Let $X = 1011, Y = 0101$ Find $\delta(x, y)$.

Or

(b) Prove that is any graph G, the number of vertices of odd degree is even.

14. (a) Prove that every cycle has even number of edges in common with any cutset.

Or

(b) Prove that a connected graph with n vertices and $n-1$ edges is a tree.

15. (a) Show that every tree with exactly two vertices of degree 1 is a path.

Or

(b) Prove that if G is a (p,q) graph, the coefficient of λ^{p-1} in $f(G,\lambda)$ is –q.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Obtain the disjunctive normal form of $P \to ((P \to Q) \wedge \neg(\neg Q \vee \neg \mathrm{P})$.

17. Prove that $(L \times M, \wedge, V)$ is a lattice.

18. If a graph G is uniquely n-colourable prove that $\delta(G) \geq n-1$.

19. Prove that every tree has a center consisting of either one point or two adjacent points.

20. Prove that every hamiltonian graph is 2-connected.

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D–1221	Sub. Code
	11362

DISTANCE EDUCATION

B.Sc.(Mathematics) DEGREE EXAMINATION, MAY 2023.

Sixth Semester

FUZZY ALGEBRA

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Differentiate between the crisp set and a fuzzy set.

2. Define intersection of two fuzzy sets, given an example.

3. Calculate the following :

   (a) $[-3, 4], [-3, 4]$

   (b) $[-4, 6] / [1, 2]$

4. State the properties for a fuzzy set A on R to quality as a fuzzy number.

5. What is meant by a proximity relation?

6. Define fuzzy measure.

7. What are the types of Hartley information?

8. Define measure of dissonance.

9. Define measure of confusion.

10. What are the three aspects of uncertainty and information?

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Show that $A, B \in F(x)$,

(i) $^{\alpha}(A \cap B) = {}^{\alpha}A \cap {}^{\alpha}B$

(ii) $^{\alpha}(\overline{A}) = {}^{(1-\alpha)+}\overline{A}$

Or

(b) Show that the standard fuzzy intersection is the only idempotent t–norm.

12. (a) Determine the addition of two fuzzy numbers A and B whose membership functions are given by

$$A(x) = \begin{cases} 0 & for \quad x \le -1 \text{ and } x > 3 \\ (x+1)/2 & for \quad -1 < x \le 1 \\ (3-x)/2 & for \quad 1 < x \le 3 \end{cases}$$

$$B(x) = \begin{cases} 0 & for \quad x \le 1 \text{ and } x > 5 \\ (x-1)/2 & for \quad 1 < x \le 3 \\ (5-x)/2 & for \quad 3 < x \le 5 \end{cases}$$

Or

(b) Explain the arithmetic operations on fuzzy numbers with suitable example.

13. (a) Explain Fuzzy ordering relation in detail.

Or

(b) Prove that a belief measure Bel on a finite power set $P(x)$ is a probability measure iff the associated basic probability assignment function m is given by $m(\{x\}) = Bel(\{x\})$ and $m(A) = 0$ for all subsets of X that are not singletons.

14. (a) Prove that $H(X/Y) = H(X,Y) - H(Y)$.

Or

(b) Explain the measure of fuzziness.

15. (a) Explain the entropy like measures.

Or

(b) Describe the U-uncertainty in detail.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Let $A \in F(R)$. Prove that A is a fuzzy number if and only if there exists a closed interval $[a,b] \neq \varphi$ such that

$$A(x) = \begin{cases} 1 & for \quad x \in [a, b] \\ l(x) & for \quad x \in [-\infty, a] \\ r(x) & for \quad x \in [b, \infty]. \end{cases}$$

17. (a) Find the transitive max-min closure of the fuzzy relation $R = \begin{bmatrix} 1 & 0.2 & 0 & 0 \\ 0 & 0 & 0.4 & 0.3 \\ 1 & 0.2 & 0 & 0 \\ 0 & 0 & 0.4 & 0.3 \end{bmatrix}$

(b) What is meant by a Sagittal diagram? Explain with suitable illustration.

18. Explain fuzzy compatibility relations in detail.

19. Prove that the inequality

$$-\sum_{i=1}^{n} pi \log_2 pi \leq -\sum_{i=1}^{n} Pi \log_2 qi$$

20. Describe the overview of uncertainty measures in detail.

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D–1222

Sub. Code
11363

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

Sixth Semester

COMPLEX ANALYSIS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions

1. Define Complex Plane.
2. Write C.R. Equations.
3. Define Entire function.
4. Prove that $u = 2x - x^3 + 3xy^2$ is harmonic.
5. Write some elementary transformations.
6. Define Cross ratio.
7. Write cauchy's integral formula.
8. State local mapping theorem.
9. Write Maclaurin's series.
10. Define a pole of *f(z)*.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL the questions choosing either (a) or (b).

11. (a) Show that $u = \log\sqrt{x^2 + y^2}$ is harmonic and find its conjugate.

Or

(b) Find radius of Convergence for $\sum_{n=1}^{\infty} \frac{z^n}{n^2}$

12. (a) Find the points where the mapping $w = z^n$ (n positive integer) is conformal.

Or

(b) Prove that any bilinear transformation preserves cross ratio.

13. (a) Evaluate $\int_c f(z)dz$ where $f(z) = y - x - i3x^2$ and C is the line segment from $z = 0$ to $z = 1 + i$.

Or

(b) State and prove Maximum modulus theorem.

14. (a) State and prove Rouche's theorem.

Or

(b) Expand *Cos z* into a Taylor's series about $z = \frac{\pi}{2}$.

15. (a) Prove that an isolated singularity 'a' of *f(z)* is a pole if and only if $\lim_{Z \to a} f(z) = \infty$.

Or

(b) Evaluate $\int_c \frac{dz}{2z+3}$ where C is $|z| = 2$.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Derive Cauchy-Riemann equations.

17. Show that the transformation $w = \frac{5-4z}{4z-2}$ maps the unit circle $|z| = 1$ into a circle of radius unity and centre $-1/2$.

18. Prove that $\int_c \frac{zdz}{z^2-1} = 2\pi i$ where c is the positively oriented circle $|z| = 2$.

19. Expand $f(z) = \frac{1}{2}$ in Taylor's series about $z = 1$ and $z = i$.

20. Use residue theorem to evaluate $\int \frac{3z^2+z-1}{(z^2-1)(z-3)} dz$ around the circle $|z| = 2$.

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D–1223

Sub. Code
11364

DISTANCE EDUCATION

B.Sc. (Mathematics) DEGREE EXAMINATION, MAY 2023.

Sixth Semester

COMBINATORICS

(CBCS 2018-19 Academic Year onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. What is called the stirling number of the second kind.

2. In how many permutations of the word AUROBIND do the vowels appear in the alphabetical order?

3. Write the symbolic expressions of the exponential generating function for a sequence.

4. Find the ordinary generating function (OGF) for $\varphi(n)$ if $\varphi(n)$ is the number of partitions of n into odd parts.

5. Define conjugate ordering.

6. Define Euler function.

7. In all possible throws of 6 dice, how many will have atleast four of them showing the same face?

8. What is the permanent of a matrix?

9. Define cycle index of a permutation group.

10. Describe the direct sum of two permutation groups.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b)

11. (a) Explain the stirling numbers of the second kind.

Or

(b) Prove that the following

(i) $R(1^n;m) = S_n^{\ m}$

(ii) $R'(1^n;m) = S_m^{\ 1} + S_m^{\ 2} + \cdots + S_n^{\ m}$

(iii) $R(1^n;1^m) = m!\ S_n^{\ m}$

(iv) $R'(1^n;1^m)\_ = m^n$

12. (a) Prove that the element f of $R[t]$, given by $f = \sum_{k=0}^{\infty} a_k t^k$ has an inverse in $R[t]$ if $f\alpha_0$ has an inverse in R.

Or

(b) Explain recurrence relation with example.

13. (a) Explain the complete Homogeneous symmetric functions h_λ with illustrations.

Or

(b) If $\alpha_1 \ldots\ldots \alpha_p$ belong to a commutative ring A, and n is a positive integer, prove that $(\alpha_1 + \alpha_2 + \ldots + \alpha_p)^n = \sum_{\substack{n_1, n_2 \ldots np \geq 0 \\ n_1 + n_2 + \ldots n_p = n}} \binom{n}{n_1, n_2 \ldots n_p} \alpha_1^{\ n1} \alpha_2^{\ n_2} \ldots \alpha_p^{\ n_p}$.

14. (a) Discuss the Menage problem with appropriate illustrations.

Or

(b) Let $E(m) =$ sum of the weights of elements of S that posses exactly m of the properties, then prove that $E(m) = w(m) - \binom{m+1}{m} w(m+1) + \binom{m+2}{m} w(m+2) \ldots$

$(-1)^{N-M} \binom{N}{m} w(N)$

15. (a) Explain Necklace problem.

Or

(b) Obtain the counting series for the directed graphs on 4 points.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Derive the recurrence formula for S_n^m.

17. Explain the generation functions with example.

18. Explain the power sum symmetric functions S_λ.

19. Disuses the problem of Fibonacci.

20. State and prove Polya's enumeration theorem.

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