D–1228

Sub. Code
12

DISTANCE EDUCATION

COMMON FOR B.A./B.Sc./B.B.A./
B.B.A.(Banking)/B.C.A./M.B.A. (5 Year Integrated)
DEGREE EXAMINATION, MAY 2019.

First Semester

Part II — ENGLISH PAPER I

(CBCS – 2018-19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Why is Egypt called the "Gift of The Nile?"

2. Who accompanied Mrs. Packletide on her hunting expedition?

3. Why was Haria not given a reward for his bravery?

4. What does the mother cat do, when it has only one kitten?

5. Mention any two things that have killed the art of letter-writing.

6. Which organization was formed to prevent war among nations?

7. During which 'Age' were forests replaced by grassland?

8. Whose writing influenced Gandhi very much?

9. Mention any one side effect caused by drugs.

10. What can vegetarians eat and drink to get proteins?

PART B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) How does A. G. Gardiner describe the letter-writing style of Carlyle and Keats?

Or

(b) Describe the hunting of the tiger by Mrs. Packletide.

12. (a) What does Joad say about 'order and safety' of modern civilization?

Or

(b) Give an account of life on earth 65 million years ago.

13. (a) Write a note on life in Sabarmathi Ashram.

Or

(b) Write briefly on the consequences of drug abuse.

14. (a) Rewrite as directed :

(i) It is annoying to wait for ———— long time. (Use a suitable article)

(ii) It is illegal <u>to drive</u> without a licence. (Use a gerund to replace the infinitive and rewrite the sentence.)

(iii) ———— God bless you! (Use the appropriate modal)

(iv) Sheela said, "I met my friend, Raji yesterday". (Change into indirect speech)

(v) I sent a cheque. (Change into passive voice)

Or

(b) Fill in the blanks with the appropriate tense forms of the verbs given within brackets:

(i) Joseph ———— (grow) a beard now.

(ii) Valli ———— (forget) to wind the clock last night.

(iii) My sister ———— (love) cats.

(iv) I ———— (see)him twice since six'o clock.

(v) Miriam ———— (write) lyrics for film songs for the past ten years.

15. (a) Write a paragraph on the topic, "My favourite book".

Or

(b) Write a letter to the manager of a store, making complaints about the refrigerator, you bought from their shop.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Why does C.V. Raman describe water as the 'elixir of life'?

17. How does Jim Corbett describe the brave deed of Haria in saving Narwa?

18. Elaborate on Catharine M. Wilson's thoughts on 'Cats.'

19. Trace the growth and evolution of Gandhi into a political philosopher and leader.

20. How does Haldane analyse the importance of food to Man?

———————

D–1258

Sub. Code
11313

DISTANCE EDUCATION

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

First Semester

CLASSICAL ALGEBRA

(CBCS 2018-2019 Academic Year onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL questions.

1. Give the expansion of $(1-x)^n$.

2. Find the product of the roots of the equation $2x^4 - 3x^3 + 3x^2 - x + 2 = 0$.

3. State Rolle's theorem.

4. Find the number of negative roots of the equation $x^3 - 3x + 1 = 0$.

5. Define a column matrix.

6. The determinant in which the columns are identical has the value ————.

7. Define non-singular matrix.

8. If $A = \begin{pmatrix} 5 & 3 \\ 7 & -4 \end{pmatrix}$, find A^{-1}.

9. State Cayley Hamilton theorem.

10. Define Similar matrices.

SECTION B — (5 × 5 = 25 marks)

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

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

Or

(b) Find the equation whose roots are the roots of $x^5+6x^4+6x^3-7x^2+2x-1=0$ with the signs changed.

12. (a) Solve $x^4+3x^3-3x-1=0$.

Or

(b) Find the nature of the roots of $4x^3-21x^2+18x+20=0$.

13. (a) Show that $\begin{vmatrix} 1 & 1+x & 2+x \\ 8 & 2+x & 4+x \\ 27 & 3+x & 6+x \end{vmatrix} = 12x$.

Or

(b) Given $A=\begin{pmatrix} 1 & 0 & 2 \\ 3 & 1 & 4 \\ 5 & 0 & 6 \end{pmatrix}$ and $B=\begin{pmatrix} 2 & 1 & -1 \\ 3 & 0 & 2 \\ 0 & 1 & 1 \end{pmatrix}$, compute $3A-4B$.

14. (a) Find A^{-1} if $A = \begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{pmatrix}$.

Or

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

15. (a) Calculate A^4 if $A = \begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$.

Or

(b) Find the region values of the matrix $\begin{pmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{pmatrix}$.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Show that the equation $x^3 + px^2 + qx + r = 0$ are in arithmetic progression if $2p^3 - qpq + 27r = 0$. Hence solve $x^3 - 6x^2 + 13x - 10 = 0$.

17. Determine the matrices X and Y from the equations $X + Y = \begin{pmatrix} 1 & -2 \\ 3 & 4 \end{pmatrix}$; $X - Y = \begin{pmatrix} 3 & 2 \\ -1 & 0 \end{pmatrix}$.

18. Find the positive root of the equation $x^3 - 2x^2 - 3x - 4 = 0$ correct to three places of decimals.

19. Solve $3x - y + 2z = 1$; $x - y + z = -1$; $2x - 2y + 3z = 2$.

20. Find the characteristics equation of the matrix $A = \begin{pmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{pmatrix}$ and hence determines its inverse.

D–1259

Sub. Code
11314

DISTANCE EDUCATION

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

First Semester

CALCULUS

(CBCS 2018-19 Academic Year onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

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

2. If $y = x^2 \sin ax$, find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$.

3. Verify Euler's theorem for the function $f = x^3 - 2x^2y + 3xy^2 + y^3$.

4. Find the envelope of the family of lines $y = mx + a/m$.

5. Evaluate $\int \frac{\sin\sqrt{x}}{\sqrt{x}} dx$.

6. Evaluate $\int_0^1 \int_0^2 xy^2 \, dy \, dx$.

7. Prove that $\Gamma(1) = 1$.

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

9. Prove that $L(e^{ax})=\frac{1}{s-a}$ if $s-a>0$.

10. Find the complete integral of $z=px+qy+p^2+q^2$.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) If $x^y=y^x$ prove that $\frac{dy}{dx}=\frac{y(y-x\log y)}{x(x-y\log x)}$.

Or

(b) If $y=e^{a\sin^{-1}x}$, prove $(1-x^2)y_2-xy,-a^2y=0$ where $y_1=\frac{dy}{dx}$ and $y_2=\frac{d^2y}{dx^2}$.

12. (a) If $u=\log(\tan x+\tan y+\tan z)$. Show that $\sin 2x\frac{\partial u}{\partial x}+\sin 2y\frac{\partial u}{\partial y}+\sin 2z\frac{\partial u}{\partial z}=2$.

Or

(b) If $y=\log\sqrt{\frac{1+\sin x}{1-\sin x}}$, prove that $\frac{dy}{dx}=\sec x$.

13. (a) Find the pedal equation of the curve $r\sin\theta+a=0$.

Or

(b) Find the equation of the tangent to $y^2=4ax$ at $(at^2,2at)$.

14. (a) Evaluate $\int x^3 e^{2x} dx$.

Or

(b) Prove that $\int_0^{\pi/2} \sin^5 x \cos^6 x\, dx = \frac{8}{693}$ using Beta and Gamma functions.

15. (a) Solve $\frac{dy}{dx} = \frac{y^3 + 3x^2 y}{x^3 + 3xy^2}$.

Or

(b) Solve $\frac{dx}{x^2} = \frac{dy}{y^2} = \frac{dz}{z^2}$.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Prove that $u = x^3 + y^3 - 3axy$ is maximum or minimum at $x = y = a$ according as 'a' is negative or positive.

17. Find the evolute of the parabola $y^2 = 4ax$.

18. Evaluate $\iint_D e^{y/x} dx dy$ where D is the region bounded by the straight line's $y = x$, $y = 0$ and $x = 1$.

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

20. Using Laplace transform, solve $y'' + 4y' + 4y = e^{-x}$ given that $y(0) = 0 = y'(0)$.

D–1627

Sub. Code
11323

DISTANCE EDUCATION

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

First Year — Second Semester

ANALYTICAL GEOMETRY AND VECTOR CALCULUS

(CBCS 2018-2019 Academic Year onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL the questions.

1. Define radical axes.

2. Find the equation of the circle whose centre is origin and radius 2.

3. Write the condition for two straight lines to be perpendicular.

4. Find the direction cosines of the line joining two points $(3,4,5)$ and $(-1,3,-7)$.

5. Write the general equation of a right circular cone.

6. Give the condition that the cone $ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy = 0$ has three mutually perpendicular generators.

7. Define skew lines.

8. Find the centre and radius of the sphere $x^2 + y^2 + z^2 - 2x - 4y - 6z - 3 = 0$.

9. Define solenoidal vector.

10. Find $grad\,\phi$ when $\phi = xy^2 + yz^3$.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Find the angle between the two lines $2x + 3y = 5$ and $x - y = 2$.

Or

(b) Find the equation of the circle passing through the intersection of $x^2 + y^2 - 6 = 0$ and $x^2 + y^2 + 4y - 1 = 0$ and through the point $(-1,1)$.

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

Or

(b) Find the angle between the planes $2x - y + z = 6$ and $x + y + 2z = 7$.

13. (a) Find the equation of the cone with vertex at the origin and passes through the curve $ax^2 + by^2 = 2z$, $lx + my + nz = p$.

Or

(b) Find the equation of a right circular of radius 2 whose axis is the line $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-3}{2}$.

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

Or

(b) Find the shortest distance between the lines $\frac{x-8}{3}=\frac{y+9}{-16}=\frac{z-10}{7}$ and $\frac{x-15}{3}=\frac{y-29}{8}=\frac{z-5}{-5}$.

15. (a) Show that $div\left(\frac{\vec{r}}{r}\right)=\frac{2}{r}$.

Or

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

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Find the circles which cuts orthogonally each of the following circles.

$x^2+y^2+2x+4y+1=0$

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

$x^2+y^2+6y+5=0.$

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

18. Find the equation of a cone whose vertex P is the point (α, β, γ) and whose guiding curve is the conic $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$. If the section of this conic by the plane $x=0$ be a rectangular hyperbola, find the locus of P.

19. 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.

20. Evaluate $\int_C f \cdot dr$ where $f = (x^2 + y^2)i - 2xy\,j$ and the curve C is the rectangle in the xy plane bounded by $y = 0, y = b, x = 0, x = a$.

D–1628

Sub. Code
11324

DISTANCE EDUCATION

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

First Year — Second Semester

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 the first five terms of the sequence $\frac{2n^2+1}{2n^2-1}$.

2. Prove that the sequence $(-1)^n$ is not convergent.

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

4. Show that $\underset{n\to\infty}{\text{Lt}} \frac{3n^2+2n+5}{6n^2+4n+7} = \frac{1}{2}$.

5. Show that $\underset{n\to\infty}{\text{Lim}}\, n^{1/n} = 1$.

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

7. State Cauchy's general principle of convergence for an infinite series.

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

9. State Riemann's theorem.

10. Define conditionally convergence of the infinite series with example.

SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL the questions.

11. (a) Show that if (a_n) is a monotonic sequence then $\left(\frac{a_1+a_2+\cdots+a_n}{n}\right)$ is also a monotonic sequence.

Or

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

12. (a) Let $a_n=1+\frac{1}{2}+\cdots+\frac{1}{n}$. Show that (a_n) diverges to ∞.

Or

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

13. (a) A sequence (a_n) in R is convergent iff it is a cauchy sequence.

Or

(b) Test the convergence of the series $\frac{1}{3}+\frac{1\cdot 2}{3\cdot 5}+\frac{1\cdot 2\cdot 3}{3\cdot 5\cdot 7}+\cdots$.

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

Or

(b) Using the integral test discuss the convergence of the series $\sum ne^{-n^2}$.

15. (a) Prove Leibnitz's test. (ie) Let $\sum(-1)^{n+1}a_n$ be an alternating series whose terms a_n satisfy the following :

(i) (a_n) is a monotonic decreasing sequence.

(ii) $\lim\limits_{n\to\infty} a_n = 0$. Then the given alternating series converges.

Or

(b) Show that the Cauchy product of $1+1+1+1+\cdots$ with itself is the series $1+2+3+\cdots$.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Prove Cesaro's theorem. (ie) If $(a_n)\to a$ and $(b_n)\to b$ then $\left(\frac{a_1b_n + a_2b_{n-1} + \cdots + a_nb_1}{n}\right)$ converges to ab.

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

18. Prove Cauchy's root test. (ie) $\sum a_n$ be a series of positive terms. Then $\sum a_n$ is convergent if $\lim\limits_{n\to\infty} a_n^{1/n} < 1$ and divergent if $\lim\limits_{n\to\infty} a_n^{1/n} > 1$.

19. Prove Abel's test. (ie) Let $\sum a_n$ be a convergent series. Let (b_n) be a bounded monotonic sequence. Then $\sum a_n b_n$ is convergent.

20. Test the convergence of the series $\frac{1}{3}x + \frac{1\cdot 2}{3\cdot 5}x^2 + \frac{1\cdot 2\cdot 3}{3\cdot 5\cdot 7}x^3 + \cdots$.

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