C.KANDASWAMI NAIDU COLLEGE FOR MEN

DEPARTMENT OF MATHEMATICS

MODEL EXAMINATION

SUBJECT NAME: Business Statistics **SUBJECT CODE: CZ33A**

DATE: 09.11.2022 **MAXIMUM: 75 Marks**

PART A - (10×2=20 marks)

Answer any TEN questions

1. Define pie diagram.

2. What is data?

3. Find the median from the following data 17, 19, 21, 13, 16, 18, 24, 22, 20.

4. Find range and co-efficient range 3, 7, 21, 24, 37, 40 and 45.

5. State the meaning of skewness.

6. What do you mean by correlation?

7. What is weighted aggregative method of index number?

8. Define Time series.

9. What are seasonal variations?

10. Define Standard deviation.

11. What is moving average?

12. Mention any two uses of index numbers.

PART B - ($5 \times 5 = 25$ marks)

Answer any FIVE questions.

13. What are the advantages of diagrams?

14. Calculate three-yearly moving average of the following data :

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
No. of students	15	18	17	20	23	25	29	33	36	40

15. Calculate standard deviation for the numbers given below. 73, 77, 75, 70, 72, 76, 75, 72, 74, 76.

16. Calculate rank correlation co-efficient from the following data :

Judge A:	1	2	3	4	5	6	7	8	9	10
Judge B:	3	4	10	7	8	5	1	2	6	9

17. What are the uses of time series?

18. From the following data of marks obtained by 60 students, calculate arithmetic mean.

Marks	20	30	40	50	60	70
No. of students	8	12	20	10	6	4

19. Explain the problems of analysis of time series.

PART C - ($3 \times 10 = 30$ marks)

Answer any THREE questions.

20. What are the objectives of tabulation?

21. Find the missing frequency in the following distribution when N = 100, Median = 30.

Marks	0-10	10-20	20-30	30-40	40-50	50-60
No. of students	10	?	25	30	?	10.

22. Calculate the co-efficient of skewness for the following distribution.

Variable	0-5	5-10	10-15	15-20	20-25	25-30
Frequency:	5	12	18	24	16	7

23. Find range and quartile deviation from the following information.

25 24 23 32 40 27 30 25 20 10 15 45.

24. Fit a straight line by the method of least squares to the following data. Assuming that the same rate of change continues, what would be the predicted earnings for the year 2012

Year	2003	2004	2005	2006	2007	2008	2009	2010
Earnings (Rs)	38	40	65	72	69	60	87	95

C.KANDASWAMI NAIDU COLLEGE FOR MEN

DEPARTMENT OF MATHEMATICS

MODEL EXAMINATION

SUBJECT NAME: Mathematics-I **SUBJECT CODE: SM3AA**
DATE: 09.11.2022 **MAXIMUM: 75 Marks**

PART A - (10×2=20 marks)

Answer any TEN questions

1. Write the formula for Newton Raphson method.

2. Name the method of the intervals are unequal.

3. Define Eigen vector.

4. State Cayley Hamilton theorem.

5. Define symmetric function of the roots.

6. What is meant by irrational roots?

7. Prove that $\cosh^2 x - \sinh^2 x = 1$

8. Define hyperbolic function.

9. State Leibnitz's theorem.

10. If $y = e^{ax}$ find y_n .

11. Write the Cartesian formula for radius of curvature.

12. Write the expansion of sin $n\theta$.

PART B - (5×5=25 marks)

Answer any FIVE questions.

13. Evaluate the value of p when V =25 using Newton's forward interpolation formula from the following data:

V:	10	20	30	40
P:	1.0	2.0	4.4	7.9

14. Find the eigen values of the matrix $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$.

15. Solve the equation $8x^3 - 84x^2 + 262x - 231 = 0$ if the roots are in the arithmetic progression.

16. Expand $\sin 7\theta$ in powers of $\cos\theta$ and $\sin\theta$.

17. Find the radius of curvature of the curve $x^4 + y^4 = 2$ at the point (1,1).

18. Explain the types of matrices.

19. Find the equation whose roots are the reciprocals of the roots of $x^3 - 2x^2 + 5 = 0$.

PART C - (3×10=30 marks)

Answer any THREE questions.

20. Apply Lagrange's formula to find F(x) when x=10.

x:	5	6	9	11
f(x):	12	13	14	16

21. Using Cayley-Hamilton theorem. Find A^{-1} if $A = \begin{bmatrix} 1 & 1 & 2 \\ 9 & 2 & 0 \\ 5 & 0 & 3 \end{bmatrix}$.

22. Solve $6x^6 - 25x^5 + 31x^4 - 31x^2 + 25x - 6 = 0$

23. Prove that $y = \frac{1}{2}\log\left[\frac{\sin(x-\alpha)}{\sin(x+\alpha)}\right]$, if $\cos(x+iy) = r(\cos\alpha + i\sin\alpha)$.

24. If $y = \sin(m\sin^{-1}x)$ prove that $(1-x^2)y_{n+2} - (2n+1)xy_{n+1} + (m^2 - n^2)y_n = 0$.

C.KANDASWAMI NAIDU COLLEGE FOR MEN

DEPARTMENT OF MATHEMATICS

MODEL EXAMINATION

SUBJECT NAME: Functional Mathematics-I **SUBJECT CODE: SM5AA**

DATE: 15.11.2022 **MAXIMUM: 75 Marks**

PART A - (10×2=20 marks)

Answer any TEN questions

1. Two numbers are in the ratio 5:6. If 4 is subtracted from each, they are reduced to the ratio 4:5. Find the smaller number?

2. In a mixture of 50 litres milk and water are in the ratio of 3:2. How much water should be added to make the ratio equal?

3. A piece of wire 66cm long is bent to form an Isocelus triangle. If the ratio of one of the equal sides to the base is 4:3, what is the length of the base?

4. When 75% of a number is added to 75, the result is that number again. Find out that number?

5. A man spends 80% of his income and saves the rest. What percentage of his expenses does he save?

6. The length of a rectangle is increased by 50%. By what percent the width has to be decreased so as to maintain the same area?

7. Prem buys a camera for Rs.6000 and sells for Rs.8000. Find his profit percent?

8. A Grocer bought 10kg of apples for Rs.810, out of which 1kg was found rotten. If he wishes to make a profit of 10%, at what price per kg, should he sell it?

9. If 20% is lost by selling a table for Rs.270, Find the loss?

10. Rs.50000 is kept in a fixed deposit at the rate of 11% for three years with interest to be compounded annually. What is the maturity value?

11. Find the difference between Simple Interest and Compound Interest for 2 years on Rs.4000 at 5% per annum?

12. The Compound Interest on a sum of money for two years is Rs.832, and the Simple Interest for 2 years at the same rate is Rs.800. Find the rate of Interest and Principle?

PART B - (5×5=25 marks)

Answer any FIVE questions.

13. The ratio of the ages of Biju and Roma is 5:2. After 8 years their ages will be in the ratio 2:1. Find the difference between their ages?

14. Rs.1087 is divided among A, B, and C. Such that, when Rs.10, Rs.12, Rs.15 are diminished from the shares of A, B, and C respectively, the remainders are in the ratio of 5:7:9. Find their shares?

15. A man losses 12½% of his money and after spending 70% of the remaining money, he is left with Rs.210. How much did he have at the beginning?

16. A earns 10% more than B, but 15% less than C. If B earns Rs.85, Then what is the earning of C?

17. ⅔ of the goods was sold at a profit of 8% and the remainder at a loss of 4%. In this way, Rs.450 was earned. What was the cost of the goods?

18. On selling 150 mangoes, a person earns a profit equal to cost price of 30 mangoes, Calculate the gain percent?

19. At Simple Interest, a sum doubles itself in 5 years. In how many years, will the same sum, at the same rate become (i) 3 times? (ii) 4 times?

PART C - (3×10=30 marks)

Answer any THREE questions.

20. A product weighting 32kg is made up of three ingredients A, B and C mixed in the ratio 8:5:3 by weight. The prices of the ingredients A, B and C per kilogram are in the ratio 8:5:3. If the price of A per kilogram is Rs.48, what is the cost of the product?

21. Sharadh's marks in an examination is more than Aishwarya's by 20% and less than Chandran's by 28%. What percent of Chandran's marks does Aishwarya get?

22. In a family, Father earns Twice as much as Son and Thrice as much as Daughter. Their incomes increase at the rate 20%, 40%, and 60% respectively. What is the Percentage increase in the total income to the nearest whole number?

23. Students of a class are made to stand in rows. If one student is extra in a row, there would be two rows less. If one student is less in a row, there would be 3 rows more. Find the number of students in the class.

24. Arun kept Rs.25000 in a bank. The bank gave him 10% Compound Interest every year. The amount gets accumulated in his account for five complete years. At what rate of Simple Interest can he get the same amount during the same period for the same Investment?

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DEPARTMENT OF MATHEMATICS

MODEL EXAMINATION

SUBJECT NAME: Algebra **SUBJECT CODE: SM21A**

DATE:10.11.2022 **MAXIMUM: 75 Marks**

PART A - (10×2=20 marks)

Answer any TEN questions

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

2. If α, β, γ are the roots of $x^3 + px^2 + qx + r = 0$, find the condition if $\alpha + \beta = 0$.

3. If α, β, γ are the roots of $x^3 - 14x + 8 = 0$, find $\sum \alpha^2$.

4. Multiply the roots of $x^3 - 3x + 1 = 0$ by 10 find the equation.

5. Use binomial theorem to find the 7th power of 11.

6. Find the sum of $1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \cdots \infty$.

7. Evaluate $\log_e\left(\frac{101}{99}\right)$.

8. Find skew Hermitian matrix of Hermitian matrix $\begin{pmatrix} 1 & 1+i & -2+i \\ 1-i & 2 & 8+i \\ -2+i & 8-i & 0 \end{pmatrix}$.

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

10. Find the inverse of the orthogonal matrix $A = \frac{1}{3}\begin{pmatrix} -1 & 2 & 2 \\ 2 & -1 & 2 \\ 2 & 2 & -1 \end{pmatrix}$.

11. Find the sum of all the divisors of 360.

12. Show that n(n +1)(2n +1) is divisible by 6.

PART B - (5×5=25 marks)

Answer any FIVE questions.

13. Show that the roots of the equations $x^3 + px^2 + qx + r = 0$ are in arithmetic progression if $2p^3 - 9pq + 27r = 0$

14. Find the sum of the cubes of the roots of the equation $x^5 = x^2 + x + 1$.

15. Increase by 7 the roots of the equation $3x^4 + 7x^3 - 15x^2 + x - 2 = 0$ and find the transformed equation.

16. Sum the series to n terms $\frac{8}{1.2.3}\left(\frac{5}{7}\right) + \frac{9}{2.3.4}\left(\frac{5}{7}\right)^2 + \frac{10}{3.4.5}\left(\frac{5}{7}\right)^3 + \cdots$

17. Using Cayley – Hamilton theorem, find the inverse of a matrix $A = \begin{pmatrix} 1 & 2 & -2 \\ 2 & 5 & -4 \\ 3 & 7 & -5 \end{pmatrix}$.

18. If A=$\begin{bmatrix} 7 & 3 \\ 2 & 6 \end{bmatrix}$, find A^n interms of A.

19. Find the highest power of 3 dividing 1000 !.

PART C - (3×10=30 marks)

Answer any THREE questions.

20. Solve the equation $81x^3 - 18x^2 - 36x + 8 = 0$ whose roots are in harmonic progression.

21. Solve $2x^6 - 9x^5 + 10x^4 - 3x^3 + 10x^2 - 9x + 2 = 0$.

22. Find the sum of the series $1 + \frac{1+3}{2!} + \frac{1+3+3^2}{3!} + \frac{1+3+3^2+3^3}{4!} + \cdots \infty$.

23. Find the eigen value and eigen vector of the matrix $A = \begin{pmatrix} 3 & -4 & 4 \\ 1 & -2 & 4 \\ 1 & -1 & 3 \end{pmatrix}$

24. Prove that the product of r consecutive integers is divisible by r!.

C.KANDASWAMI NAIDU COLLEGE FOR MEN

DEPARTMENT OF MATHEMATICS

MODEL EXAMINATION

SUBJECT NAME: Differential Calculus **SUBJECT CODE: SM21B**

DATE:14.11.2022 **MAXIMUM: 75 Marks**

PART A - (10×2=20 marks)

Answer any TEN questions

1. State Leibnitz's theorem for n th derivative

2. If $y = (ax+b)^m$ $find\ y_n$

3. If $xy = ae^x + be^{-x}$ prove that $x^2y_2 + 2y_1 - xy = 0$.

4. If $u = \frac{xy}{x+y}$ show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = u$.

5. Find $\frac{du}{dx}$ when $u = x^2 + y^2$ where $= \frac{1-x}{x}$.

6. Define the terms envelope and evolute.

7. Define circle and center of curvature.

8. Find the p– r equation of the curve $r\sin\theta + a = 0$.

9. Define polar subtangent and polar subnormal.

10. Find the slope of the tangent with the initial line for the cardioid $r = a(1-\cos\theta)$ at $\theta = \frac{\pi}{6}$

11. Find the asymptotes of $x^3 + y^3 = 3axy$.

12. Find the asymptotes of $(x+y)(x-y)(x-2y-4) = 3x + 7y - 6$.

PART B - (5×5=25 marks)

Answer any FIVE questions.

13. If $y = e^{a\sin^{-1}x}$ prove that $(1 - x^2)y_2 - xy_1 - a^2y = 0$.

14. Find y_n when $y = \frac{x^2}{(x-1)^2(x+2)}$.

15. If z= f(x, y) and x = r cosθ, y= r sinθ prove that $\left(\frac{\partial z}{\partial x}\right)^2 + \left(\frac{\partial z}{\partial y}\right)^2 = \left(\frac{\partial z}{\partial r}\right)^2 + \frac{1}{r^2}\left(\frac{\partial z}{\partial \theta}\right)^2$.

16. Find the radius of curvature at the point θ on the curve
$x = a(\cos\theta + \theta\sin\theta), y = a(\sin\theta - \theta\cos\theta)$

17. Find the envelop of the family of circles $(x - \alpha)^2 + y^2 = 2\alpha$ where α is the parameter.

18. Find the angle at which the radius vector cuts the curve $\frac{l}{r} = 1 + e\cos\theta$.

19. Find the asymptotes of $(x + y)^2(x + 2y + 2) = x + 9y - 2$.

PART C - (3×10=30 marks)

Answer any THREE questions.

20. If $y = \left(x + \sqrt{1 + x^2}\right)^m$ prove that $(1 + x^2)y_{n+2} + (2x + 1)xy_{n+1} + (n^2 - m^2)y_n = 0$

21. Find the minimum value of $x^2 + y^2 + z^2$ subject to the condition $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 1$

22. Derive the Cartesian formula for the radius of curvature.

23. Find the angle of intersection of the cardioids $r = a(1 + \cos\theta)$ *and* $r = b(1 - \cos\theta)$.

24. Find the asymptotes of $x^3 + 2x^2y - 4xy^2 - 8y^3 - 4x + 8y = 1$.

C.KANDASWAMI NAIDU COLLEGE FOR MEN

DEPARTMENT OF MATHEMATICS

MODEL EXAMINATION

SUBJECT NAME : ANALYTICAL GEOMETRY **SUBJECT CODE : SM23A**

DATE : 10.11.2022 **MAXIMUM : 75 Marks**

PART –A (10X2=20 marks)

Answer any TEN questions

1. Define conjugate diameters.

2. Find the equation of an ellipse whose focus is the point (3,1) , directrix is x-y+6=0 and eccentricity $\frac{1}{2}$

3. Write the pole of the line lx+my+n=0 with ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1.$

4. Find the condition for the line lx+my+n=0 to touch the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1.$

5. Write the equation of the asymptotes of the hyperbola a$x^2+2hxy+by^2+2gx+2fy+c=0.$

6. Find the angle between the planes 2x-y+2z=3 ; 3x+6y+2z=4

7. Find the equation of the plane passing through the points (2,2,-1),(3,4,2) and (7,0,6).

8. Find the point of intersection of the line $\frac{x+1}{1}=\frac{y+3}{3}=\frac{z-2}{-2}$ $with\ the\ plane\ 3x+4y+5z=5.$

9. Find the perpendicular distance from the point (3,9,-1) to the line $\frac{x+8}{-8}=\frac{y-31}{1}=\frac{z-13}{5}$.

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

11. Write the condition for two spheres to be orthogonal.

12. Find the equation of the sphere on the line joining the point (2,-1,4) and (-2,2,-2) as diameter.

PART –B (5X5=25 MARKS)

Answer any FIVE questions

13. If $xcos\alpha+ysin\alpha-p=0$ be a tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ then prove that $p^2=a^2cos^2\alpha+b^2sin^2\alpha.$

14. If e ,e1 are the eccentricities of a hyperbola and its conjugate then show that $\frac{1}{e^2}+\frac{1}{e1^2}=1.$

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

16. Prove that the lines $\frac{x+1}{-3}=\frac{y+10}{2}=\frac{z-1}{z}$ and $\frac{x+3}{-4}=\frac{y+1}{7}=\frac{z-4}{1}$ are Coplaner find also their point of intersection and the plane containing them.

17. Find the equations of the line which intersects each of the two lines $2x+y-1=0=x-2y+3z3x-y+z+2=0=4x+5y-2z-3$ and is parallel to the line $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$.

18. Show that the plane $2x-y-2z=16$ $touches\ the\ sphere$ $x^2+y^2+z^2-4x+2y+2z-3=0$ and find the point of contact.

19. Find the equation of the sphere passing through the points(2,3,1) ,(5,-1,2),(4,3,-1) and (2,5,3).

PART-C(3X10=30 Marks)

Answer any THREE questions

20. (a) Find the locus of the midpoints of the chords of the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ which subtends a right angle at the centre.

(b) If chords of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ touches $\frac{x^2}{\alpha^2}+\frac{y^2}{\beta^2}=1$ find the locus of their poles.

21. A rectangular hyperbola whose centre is 'C' is cut by any circle of radius 'r' in the four points P,Q,R,S . Prove that $P^2+CQ^2+CR^2+CS^2=4r^2$.

22. Find the area of the triangle whose vertices are the points(1,2,3),(-2,1,-4),(3,4,-2).

23. Find the equation of the sphere which touches the plane $3x+2y-z+2=0$ $at\ the\ point$ $(1,-2,1)$ and cuts orthogonally the sphere $x^2+y^2+z^2-4x+6y+4=0$.

24. Prove that the planes $x=cy+bz$, $y=az+cx$, $z=bx+ay$ pass through one line if $a^2+b^2+c^2+2abc=1.$ $Show\ that$ the equations of this line are $\frac{x}{\sqrt{1-a^2}}=\frac{y}{\sqrt{1-b^2}}=\frac{z}{\sqrt{1-c^2}}$.

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DEPARTMENT OF MATHEMATICS

MODEL EXAMINATION

SUBJECT NAME : DIFFERENTIAL EQUATIONS **SUBJECT CODE : SM23B**

DATE : 14.11.2022 **MAXIMUM : 75 Marks**

PART –A (10X2=20 marks)

Answer any TEN questions

1. Define Linear equations.

2. Define Exact differential equations.

3. Write down clairaut's form.

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

5. Find the particular solution of $(D^2 + 5D + 6)y = e^x$.

6. Define simultaneous linear differential equations.

7. Solve : $y_2 - 4xy_1 + (4x^2 - 3)y = e^{x^2}$.

8. Solve : $ydx - xdy + 3x^2y^2e^{x^3}dx = 0$.

9. Define Singular integral.

10. Define general integral.

11. Find the complete integral of the equation $\sqrt{p} + \sqrt{q} = 1$.

12. Write down the auxiliary equation of Charpit's Method.

PART –B (5X5=25 MARKS)

Answer any FIVE questions

13. Solve : $\frac{dy}{dx} + ycosx = \frac{1}{2}sin2x$.

14. Solve :$x^2P^2 + 3xyp + 2y^2$=0

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

16. Eliminate arbitrary constants from $z = (x + a)(y + b)$.

17. Solve : $xp + p^2$.

18. Solve : $(a^2 - 2xy - y^2)dx - (x + y)^2 dy = 0.$

19. Solve : $(D^2 - 8D + 9)y = 8sin5x.$

PART-C(3X10=30 Marks)

Answer any THREE questions

20. Test the equation $e^y dx + (xe^y + 2y)dy = 0$ $for\ exactness\ and\ solve\ if\ it\ is\ exact.$

21. Solve : $(D^3 - 2D + 4)y = e^x cosx.$

22. Solve : $\frac{dx}{dt} + 2x - 3y = t$; $\frac{dy}{dt} - 3x + 2y = e^{2t}.$

23. Eliminate $f\ and\ \emptyset\ from\ the\ relation\ z = f(x + ay) + \emptyset(x - ay).$

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

C.KANDASWAMI NAIDU COLLEGE FOR MEN

DEPARTMENT OF MATHEMATICS

MODEL EXAMINATION

SUBJECT NAME: Algebraic structure-I **SUBJECT CODE: SM25A**

DATE: 07.11.2022 **MAXIMUM: 75 Marks**

PART A - (10×2=20 marks)

Answer any TEN questions

1. Let G be a group and H is a subgroup of G . For a,b∈ G, when do you say that a ≡ bmod H ?

2. Define cyclic group.

3. What do you mean by i_G (H) ?

4. Define HK where H and K are subgroups of a group G.

5. State Sylow's theorem for abelian groups.

6. Define a normal subgroup.

7. State Cauchy's theorem for abelian groups.

8. Define automorphism for a group.

9. Compute $a^{-1}ba$ where a=(1, 3, 5), (1, 2) b=(1, 5, 7, 9).

10. Define Ideal.

11. Define greatest common divisor.

12. Define Euclidean ring.

PART B - (5×5=25 marks)

Answer any FIVE questions.

13. Prove that there is G one-one correspondence between any two right cosets of a subgroup H in the group G.

14. If H and K are subgroups of G and O(H)>$\sqrt{O(G)}$, O(K)>$\sqrt{O(G)}$, prove that $H \cap K \neq (e)$.

15. Prove that N is a normal subgroup of G if and only if $gNg^{-1} = N$ for every g∈ G.

16. Prove that every permutation is the product of its cycles.

17. Prove that a finite integral domain is a field.

18. Prove that an Euclidean ring possesses a unit element.

19. Let R be a commutative ring with unit element and M is an ideal of R . If R/M is a field, prove that M is a maximal ideal of R.

PART C - (3×10=30 marks)

Answer any THREE questions.

20. Let H and K are subgroups of G . Prove HK is a subgroup of G if and only if HK=KH.

21. State and prove Cayley's theorem.

22. State and prove Cauchy's theorem for abelian group.

23. Prove that of U is an ideal of the ring R , then R /U is a ring and is a homomorphic image of R .

24. State and prove unique factorization theorem .

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DEPARTMENT OF MATHEMATICS

MODEL EXAMINATION

SUBJECT NAME:Real Analysis-I **SUBJECT CODE: SM25B**

DATE:08.11.2022 **MAXIMUM: 75 Marks**

PART A - (10×2=20 marks)

Answer any TEN questions

1. Define countable set and give an example.

2. Find the greatest lower bound of $B = \left\{\frac{1}{2}, \frac{3}{4}, \ldots, \frac{2^n-1}{2^n}, \ldots\right\}$.

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

4. Define Cauchy sequence with example.

5. Define a conditionally convergent series and give an example.

6. What is meant by bounded sequence?

7. Define convergent and divergent sequence**.**

8. Define norm of the sequence.

9. If $|x-2| < 1$, prove that $|x^2-4| < 5$.

10. State Schwarz inequality.

11. Define Continuous function.

12. Show that if 0<x<1, then $\sum_{n=0}^{\infty} x^n$ converges to $\frac{1}{1-x}$.

PART B - (5×5=25 marks)

Answer any FIVE questions.

13. Show that if f : A→ B and if X ⊂ B, Y ⊂ B then $f^{-1}(X \cup Y) = f^{-1}(X) \cup f^{-1}(Y)$.

14. Prove that infinite subset of the countable set is countable.

15. If A is any nonempty subset of R that is bounded above, prove that A has a least upper bound in R.

16. Prove that infinite subset of a countable set is countable.

17. Prove that any bounded sequence of real numbers has a convergent subsequence **.**

18. Prove that if $\sum_{n=1}^{\infty} a_n$ is a convergent series, then $\lim_{n\to\infty} a_n = 0$.

19. Prove that a non-decreasing sequence which is bounded above is convergent.

PART C - (3×10=30 marks)
Answer any THREE questions.

20. Prove that the countable union of countable sets is countable.

21. Prove that a increasing sequence which is bounded above is convergent.

22. State and prove nested interval theorem.

23. State and prove Minkowski inequality.

24. Show that l^{∞} is a metric space.

C.KANDASWAMI NAIDU COLLEGE FOR MEN

DEPARTMENT OF MATHEMATICS

MODEL EXAMINATION

SUBJECT NAME:Dynamics **SUBJECT CODE: SM25C**

DATE:09.11.2022 **MAXIMUM: 75 Marks**

PART A - (10×2=20 marks)

Answer any TEN questions

1. Define: acceleration.

2. State Newton's second law of motion

3. Write the equation of motion of the wedge. When it moves horizontally.

4. Define conservation forces and conservation field of force.

5. Write the principle of conservation of energy.

6. Define : Amplitude.

7. Define : Power.

8. Define: seconds pendulum.

9. State Kepler's third law of planetary motion..

10. Define : impulsive force.

11. Define : Simple pendulum.

12. Define two dimensional motion. Give an example of two dimensional motion.

PART B - (5×5=25 marks)

Answer any FIVE questions.

13. If a point moves so that its angular velocities about two fixed points are the same, prove that it describes a circle.

14. When a particle is subject to the action of conservative forces, show that the increase in K.E. is an interval equal to the workdone in that interval and the sum of the K.E. and P.E. is constant with respect to time.

15. A particle is projected from the ground with a velocity $2\sqrt{ag}$ so that is just clears two walls of equal height a which are at a distance 2a apart. Show that the time of passing between the walls is $2\sqrt{\frac{a}{g}}$.

16. If the velocity of the bob of a conical pendulum is v and its length is l, prove that the inclination of the string to the vertical is given by $\frac{\sin^2\theta}{\cos\theta} = \frac{v^2}{gl}$.

17. Find the period of Simple Harmonic motion and show that it is independent of the amplitude.

18. Find the envelope of a family of trajectories of particles projected from a fixed point O and constant velocity u.

19. State and prove Parallel axis theorem.

PART C - (3×10=30 marks)
Answer any THREE questions.

20. Find the components of velocity and acceleration of a moving particle and tangential and normal direction.

21. Show that the resultant motion of two simple harmonic motions of the same period along two perpendicular lines, is along an ellipse.

22. When two smooth spheres collide directly, find the impulse imparted to each sphere and the change in the total kinetic energy of the spheres.

23. Find the moment of Inertia of
(a) Triangular Lamina and
(b) Thin uniform rod of length $2a$.

24. Discuss the motion of a uniform circular disc rolling down a rough inclined plane.

C.KANDASWAMI NAIDU COLLEGE FOR MEN

DEPARTMENT OF MATHEMATICS

MODEL EXAMINATION

SUBJECT NAME: Discrete Mathematics **SUBJECT CODE: SM25D**

DATE: 10.11.2022 **MAXIMUM: 75 Marks**

PART A - (10×2=20 marks)

Answer any TEN questions

1. If $U = \{1,2,3,4,5,7,9,10\}$, $A = \{1,3,5,9\}$, $B = \{1,2,9,10\}$, $find\ (A \cap \bar{B})$.

2. Define Cartesian product of the sets.

3. State the principle of Mathematical induction.

4. Define Boolean Algebra.

5. Define Disjunctive Normal Form (DNF).

6. Define AND gate.

7. Define Boolean variable.

8. Define connected graph.

9. Define component of a graph.

10. Define Euler circuit.

11. Define equivalent switching circuits.

12. Define generating function.

PART B - (5×5=25 marks)

Answer any FIVE questions.

13. State and prove Demargon's law.

14. Convert $(10010011)_2$ from binary to decimal.

15. Find the complements of the Boolean expenses in disjunctive normal form $x'y + xy'$.

16. In a Boolean algebra (B,+,· ,1), prove that

(a) $(a')' = a\ \ for\ each\ a \in B$.

(b) $a \cdot (a + b) = a, for\ all\ a, b \in B$.

17. Construct a circuit that produces the output $xy + \bar{x}\bar{y}$.

18. If a graph *G* contains exactly two vertices of odd degree then show that there exists a path between three two vertices.

19. Let *G* be a connected graph such that each vertex is of degree two. Prove that *G* is a cycle.

PART C - (3×10=30 marks)

Answer any THREE questions.

20. Find the switching table for the switching function f represented by Boolean expression

$xyz = x'(y + z)$.

21. List some useful generating functions that represent finite sequence when *n* is a positive integer.

22. Prove by mathematical induction : For every positive integer n≥1,

$$1 + \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} + \cdots + \frac{1}{\sqrt{n}} > 2\left(\sqrt{n+1} - 1\right).$$

23. Prove that a simple graph with 'n ' vertices must be connected if it has more than $\frac{(n-1)(n-2)}{2}$ edges.

24. Solve: $a_n = 3a_{n-1} + 2, \forall n \geq 1, a_0 = 2,$ using generating function.

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DEPARTMENT OF MATHEMATICS

MODEL EXAMINATION

SUBJECT NAME: Programming Language in 'C' **SUBJECT CODE: SM45A**
DATE:14.11.2022 **MAXIMUM: 75 Marks**

PART A - (10×2=20 marks)

Answer any TEN questions

1. What is constant?

2. How do you declare string constants?

3. What is the range of char in C?

4. Write any two logical operators in C.

5. List any two control statements in C.

6. Write general form of conditional operator in C.

7. How do you declare Do statement in C?

8. Define one dimensional array.

9. What is an Array?

10. What are the two parts of function definition in C?

11. How do you classify into C functions?

12. What is file name?

PART B - (5×5=25 marks)

Answer any FIVE questions.

13. Write short note on variables in C.

14. What are the precedence of the operators?

15. Explain command line arguments in C.

16. Discuss switch case statement in C.

17. Write a C program to find the area of a circle with radius r.

18. Write a C program to find the solution of the given quadratic equation $ax^2 + bx + c = 0$.

19. Write a program to illustrate about two dimensional arrays.

PART C - (3×10=30 marks)

Answer any THREE questions.

20. Write a program to find even numbers from 1 to 100.

21. Explain Mathematical functions in C.

22. Write a program using while loop to reserve the digits of the number.

23. Explain operations on files in C.

24. Explain categories of function in C.

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DEPARTMENT OF MATHEMATICS

MODEL EXAMINATION

SUBJECT NAME: Value Education **SUBJECT CODE: VAE5Q**

DATE:15.11.2022 **MAXIMUM: 75 Marks**

PART A - (10×2=20 marks)

Answer any TEN questions

1. What is Value Education?

2. Define holistic living.

3. Distinguish Self Confidence and Self Esteem.

4. What is meant by Positive and Creative thinking.

5. Define Human rights.

6. What is meant by National Integration?

7. State the meaning of ecological imbalance.

8. What is Cyber Crime?

9. Define the term ‘Terrorism’.

10. Why female infanticide is practiced?

11. What do you mean by domestic violence?

12. Define Untouchability.

PART B - (5×5=25 marks)

Answer any FIVE questions.

13. What is the role of media in value building?

14. Explain the steps involved in problem solving and decision making.

15. State any five important human rights conferred by our constitution

16. What do you understand by environmental protection its and enrichment.

17. What are the essential qualitie needed for leadership?

18. State the methods of conservation of energy.

19. Write a brief note on peace and non-violence as preached by Gandhiji.

PART C - (3×10=30 marks)

Answer any THREE questions.

20. Explain the purpose and importance of value education in the present world?

21. Write the role of culture and civilization for enrichment of the society.

22. List out the ten points for enlightened citizenship as advocated by Dr.A.P.J.Abdul Kalam

23. Explain the evils of Corruptions, Dowry, Alcoholism and Drug Addiction.

24. What are the atrocities against women? How to tackle it?