Model Question Paper

I B.Sc., Mathematics :: Paper – I Semester – I

(Differential Equations)

(From the Batch admitted in 2016-17)

Time : 3 Hrs. **Max. Marks : 60**

PART – A

Answer any Five questions. Each question carries 4 Marks. 5 x 4M = 20 Marks

1.Solve (e^y +1) cos x dx + e^y sin x dx.

2.Solve $\frac{dx}{y} = \frac{dy}{-x} = \frac{dz}{2x-3y}$.

3. Solve $4y^2p^2 + 2xy(3x+1)p + 3x^3=0$.

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

5.Solve $(D^2 - 3D + 2)y = \cosh x$.

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

7.Solve $[(1+x)^2D^2 +(1+x)D+1]y =4 \cos \log (1+x)$.

8.Solve $(D - 1)x + (D+1)y =0$ and $(2D+2)x +(2D -2)y=t$.

PART – B

Answer all questions. Each question carries 08 Marks. 5 x 8M = 40 Marks

9. A. Solve $x^2y\, dx -(x^3+y^3)dy=0$.

OR

B. Solve $x \frac{d^2 y}{dx^2} + y = y^2 \log x$

10. A. Solve $p^2 +2py\cot x = y^2$.

OR

B. Solve $y = 2xp +x^2 p^4$.

11.A Solve $(D^2 - 4D+3) y= \sin 3x \cos 2x$.

OR

B. Solve $(D^2 - 2D + 4)y = 8(x^2 + e^{2x} + \sin 2x)$.

12.A Solve $(D^2+a^2)y = \tan x$ by the method of variation of parameters.

OR

B.Solve $x^3 \frac{d^3y}{dx^3} + 2x^2 \frac{d^2y}{dx^2} + 2y = 10(x + \frac{1}{x})$.

13.A. Solve $\frac{dx}{dt} = 3x + 2y$, $\frac{dy}{dt} + 5x + 3y = 0$. Where $\frac{d}{dt} = D$.

OR

B. Solve $\frac{dx}{dt} + 4x + 3y = t$, $\frac{dy}{dt} + 2x + 5y = e^t$.

Model Question Paper

I B.Sc., Mathematics :: Paper – II Semester – II

(Solid Geometry)

(From the Batch admitted in 2016-17)

Time : 3 Hrs. **Max. Marks : 60**

PART – A

Answer any Five questions. Each question carries 04 Marks. 5 x 4M = 20 Marks

1.Find the equation of the plane through (4,4,0) and perpendicular to the Planes $x+2y+2z=5$, and $3x+3y+2z-8=0$.

2. A variable plane is at a constant distance 3p from the origin meets the axes in A,B,C. Show that the locus of the centroid of the triangle ABC is $x^{-2}+y^{-2}+z^{-2}=p^{-2}$

3. Find the foot of the perpendicular form (2,-2,3)to the plane $2x-y-2z-9=0$.

4. Find the image of (1,3,4) in the plane $2x-y+z+3=0$.

5. Find the equation of spheres passing through the circle $x^2+y^2=4, z=0$ and is intersected by the plane $x+2y+2z=0$ in a circle of radius3.

6.Find the pole of the plane $x-y+5z-3=0$ w .r .t the sphere $x^2+y^2+z^2=9$.

7. find the vertex of the cone $2x^2+2y^2+7z^2-10yz-10zx+2x+2y+26z-17=0$.

8. Find the equation of the cylinder whose generators are parallel to $x/1=y/2=z/3$ and which passes through the curve $x^2+y^2=16$, $z=0$.

PART – B

Answer all questions. Each question carries 08 Marks. 5 x 8M = 40 Marks

9(a). Find the equation to the plane through the intersection of the planes $x+2y+3z+4=0, 4x+3y+3z+1=0$ and perpendicular to the plane $x+y+z+9=0$.

OR

9(b) Find the bisecting plane of the acute angle between the planes $3x-2y+6z+2=0$,

$-2x+y-2z-2=0$.

10(a) Prove that the lines $x+2y+3z-4=0=2x+3y+4z-5$, $2x-3y+3z-5=0=3x-2y+4z-6$ are coplanar. Also find their point of intersection and the plane containing lines.

OR

10(b). $\frac{x-3}{3}=\frac{y-8}{-1}=\frac{z-3}{1}$, $\frac{x+3}{-3}=\frac{y+7}{2}=\frac{z-4}{4}$ find the length and equations to the line SD between lines.

11(a). If r_1, r_2 are the radii of two orthogonal spneres, then the radius of the circle of their intersection is $\frac{r_1 r_2}{\sqrt{r_1^2+r_2^2}}$

OR

11(b) Find the radical center of the spheres $x^2 + y^2 + z^2 + 4y = 0$,

$x^2 + y^2 + z^2 + 2x + 2y + 2z + 2 = 0$, $x^2 + y^2 + z^2 + 3x - 2y + 8z + 6 = 0$,

$x^2 + y^2 + z^2 - x + 4y - 6z - 2 = 0$

12 (a) Find the angle between the lines of intersection of the plane $x - 3y + z=0$ and the cone $x^2-5y^2+z^2=0$.

OR

12 (b) Find the equation of the right circular cone whose vertex is P(-2,-3,5), axis PQ which makes equal angles with the axes and semi vertical angle is 30°

13 (a) Find the equation of the right circular cylinder whose axis is $\frac{x-2}{2}=\frac{y-1}{1}=\frac{z}{3}$ and which passes through the point (0,0,3)

OR

13(b) Find the equation of the enveloping cylinder of the sphere $x^2+y^2+z^2-2x+4y=1$, whose generators are parallel to the line x=y=z.

GOVT COLLEGE (A), RAJAMAHENDRAVARAM

II B.Sc., Mathematics :: Paper –III Semester – III

ABSTRACT ALGEBRA

(From the Batch admitted in 2016-17)

Model Question Paper

Time:3Hours Maximum Marks:60

SECTION-A

Answer any FIVE questions Each question carries FOUR marks: 5x 4=20M

1. Prove that the set G={1,2,3,4,5,6} is a finite abelian group of order 6 w.r.t x_7

2. In a group G for every a $\in G$, a^2 = e. Prove that G is an abelian group

3. If H_1 and H_2 are two sub groups of a group G, then prove that $H_1 \cap$ H_2 is also a sub group of G

4. If H is any subgroup of a group G, then show that $H^{-1} = H$.

5. If M,N are two normal subgroups of G such that M $\cap N$ ={e} , then prove that every element

of M commutes with every element of N.

6.The necessary and sufficient condition for a homomorphism f of a group G onto a group G^1

with kernel k to be an isomorphism of $\begin{matrix} G\,on \\ ¿G¿^{1} \end{matrix}$ is that k={e}

7.Examine whether the following permutation is even or odd.

$$\begin{pmatrix} 123456789 \\ 614325789 \end{pmatrix}$$

8. Show that the group (G= {1,2,3,4,5,6}, X_7) is cyclic .Also write down all its generators.

SECTION – B

Answer any FIVE questions .Each question carries EIGHT marks 5 x 8 =40M

9 (a). In a group G ($\neq\emptyset$), for a, b, x, y $\in$ G,the equations ax = b and ya = b have unique solutions.

(or)

(b). Prove that a finite semi – group (G,.) satisfying the cancellation laws is a group.

10 . (a) H is a non – empty complex of a group G. Prove that the necessary and sufficient Condition for H to be a subgroup of G is a, b $\in H = ¿ a b^{-1} \in H$ where b^{-1} is the inverse of b in G.

OR

(b) State and prove Lagrange′s theorem .

11.(a). Prove that a sub group H of a group G is a normal sub group of G iff each left coset of H in G is a right coset of H in G.

OR

b) H is a normal subgroup of a group G. Prove that the set $\frac{G}{H}$ of all cosets of H in G w.r.t coset

multiplication is a group.

12. (a). Let G be a group and N be a normal subgroup of G. Let f be a mapping from G to G/N defined f (x) = Nx for x $\in$ G. Then prove that f is a homomorphism of G onto G/N and ker f=N.

OR

(b) State and prove fundamental theorem on homomorphism of groups .

13. (a) If f= (1 2 3 4 5 8 7 6) and g =(4 1 5 6 7 3 2 8)are cyclic permutations then show that $(fg)^{-1} = g^{-1} . f^{-1}$.

OR

(b)Prove that every subgroup of cyclic group is cyclic.

MODEL QUESTION PAPER

GOVT COLLEGE (A), RAJAMAHENDRAVARAM

II B.Sc., Mathematics

Paper –II Semester – IV

PAPER IV :REAL ANALYSIS

(From the Batch admitted in 2016-17)

Time :**3** Hrs Max .Marks :**60**

SECTION-A

I Answer any FIVE of the following . **5 x 4 = 20M**

1. Prove that every convergent sequence is bounded.
2. Prove that the sequence $\{s_n\}$ where $s_n = \frac{1}{n+1}+\frac{1}{n+2}+\ldots+\frac{1}{n+n}$ is convergent.
3. Test for convergence $\sum_{n=1}^{\infty} \left(\sqrt[3]{n^3+1}-n\right)$.
4. If f :S $\rightarrow$ R is uniformly continuous, then show that f is continuous in S.
5. Discuss the applicability of Lagrange s mean – value theorem for f(x) = x (x-1)(x-2) on [0, ½].
6. Find **C** of Cauchy's mean – value theorem for f(x) = $\sqrt{x}$ and g(x)= $\frac{1}{\sqrt{x}}$ in [a, b] where $0<a<b$.

7. If f: [a , b] $\rightarrow$ R is continuous on [a , b], then prove that f is integrable on [a , b] .

8. Evaluate $\int_0^{\pi/4} \left(\sec^4 x-\tan^4 x\right)$ dx.

SECTION-B

II Answer all FIVE questions. **5 x 8 = 40 M**

9. A) State and prove Sandwich theorem or squeeze theorem.

OR

B) State and prove Cauchy's first theorem on limits.

10. A) Test for convergence: i) $\sqrt{n^3+1}-\sqrt{n^3}$ (¿) $\sum_{n=1}^{\infty}$ ¿

ii) $\sqrt{n^4+1}$ ¿ ¿). $\sum_{n=1}^{\infty}$ ¿

OR

B) State and prove Limit comparison test .

11. A) Examine for continuity the function f defined by f(x) = |x| + | x – 1| at x= 0,1.

OR

B) If f: [a , b] → R is continuous on [a , b] then show that f is bounded on [a , b] .

12. A) State and prove Rolle′s theorem.

OR

B) State and prove Lagrange′s mean value theorem

13. A) Prove that f(x) = x^2 is integrable on [0,a] and $\int_0^a x^2\,dx = \frac{a^3}{3}$.

OR

B) State and prove Fundamental theorem of integral calculus.

II B.Sc., Mathematics

Model Question Paper

CBCS / SEMESTER SYSTEM(REGULAR)
SEMESTER :IV , FOUNDATION COURSE
(From the Batch admitted in 2016-17)

Analytical Skills

TIME:2Hrs Max Marks:50M

UNIT- I Answer ALL questions 10 x 1 =10

I A) Study the following table carefully answer the questions.

Subject/ student	History Out of 50	Geography Out of 50	Math Out of 150	Science Out of 100	English Out of 75	Hindi Out of 75
Amit	76	85	69	73	64	88
Bharath	84	80	85	78	73	72
Umesh	82	67	92	87	69	76
Mikhil	73	72	78	69	58	83
Pratiksha	68	79	64	91	66	65
Ritesh	79	87	88	93	82	72

i)What is the approximately the integral percentage of marks obtained by umesh is all the subjects ?

a) 80% b)84% c) 86.% d) 78.%

ii)What is the average percentage of marks obtained by all students in Hindi ?

a) 77.45% b)79.33% c) 75.52.% d) 73.52%

iii) What is the average makes of all the students in mathematics ?

a) 128 b)119 c)112 d) 138

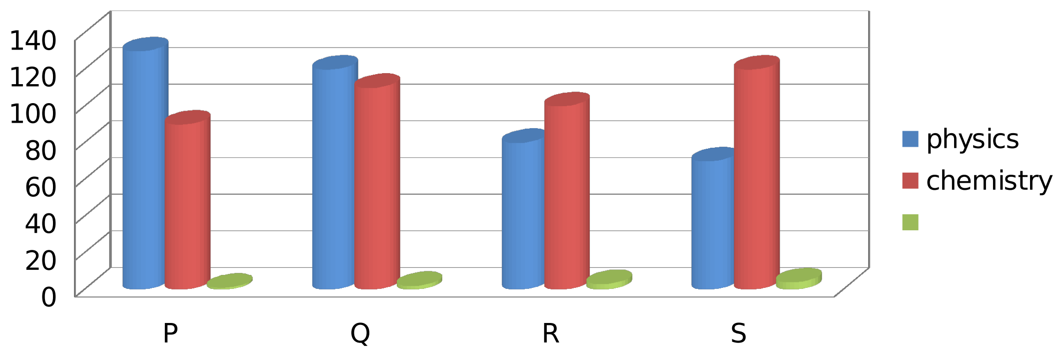
iv)What is the average makes obtained by all the students in geography?

a) 38.26 b)37.26 c)39.16 d)37.96

v) What are the total marks obtained by Rithish in all the subject taken together?

a) 401.75 b) 410.75 c) 402.75 d) 420.75

B.



B)

1)Makes obtained by S in chemistry is what percentage of the total marks obtained by all the students in chemistry ?

a) 25 b) 28.5 c) 35 d) 31.5

2)If the marks obtained by T in physics were increased by 14% of the original makes .what would be his new approximate percentage in physics if the maximum marks in physics were 140?

a) 57 b) 32 c) 38 d) 41

3) Fill in the blank space in order to the make the sentence correct as per the given information. Total marks obtained by T in both the subjects together is more than the marks obtained by

a) Q in chemistry b)R in physics c) S in chemistry d) P in physics

4)What is the respective ratio between the total marks obtained by P is physics and chemistry together to the total marks obtained by T in physics and chemistry together ?

a) 3:2 b) 4:3 c) 5:3 d) 2:1

5)What is the respective ratio between the total marks obtained by Q and S together in chemistry to the total marks obtained by P and R together in physics?

a) 23:25 b) 23:21 c) 17:19 d) 17:23

UNIT- II Answer ALL questions 10 x 1 =1

1) 1,3,5,7,9,? Find the missing term?

a) 10 b) 11 c) 12 d) 13.

2)1,2,10,37,101,442 ? based on addition / subtraction of cubes?

a) 402 b) 206 c) 226 d) 320

3)Find the missing number in the series . 4,18,……………100,180,294.

a) 32 b) 36 c) 48 d) 40

4)Find the wrong number in the given series 1 ,8,27,64,125,215.

a) 27 b) 64 c) 125 d) 215.

5.)0,3,8,15,24, ? 48

a) 41 b) 29 c) 37 d) 35

6) CXDW, EVFU, GTMS, IRJQ . . . .

a) KPLO b) KPMO c) KPNO d) KPOL

7) C , F , I , L O find the next term .

a) R b) S c) T d) U

8) AZY , EXW, IVU, ?

a) MTS b) MQS c) NRQ d) LST

9) AC , FH, K-- , PR , UW

a) L b) J c) M d) N

10) 2, 6 , 18 , 54 , ?

a) 108 b) 140 c) 150 d) 162

UNIT - III Answer ALL questions 10 x 1 =1

1) The value of $25-5\left[2+3\left\{2-2\left(5-3\right)+5\right\}-10\right]\div 4\ is$;

a) 5 b) 23.5 c) 23.75 d) 25

2.)If a,b,c are integers ; $a^2 + b^2 = 45$ and $b^2 + c^2 = 40$, then the values of a , b and c respectively are:

a) 2,6,3 b) 3,2,6 c) 5,4,3 d) none of this

3.) 4003 × 77 -- 21015 = ? × 116

a) 2477 b) 2478 c) 2467 d) 2476

4) Solving 1111.1 + 111.11 + 11. 111 = ?

a) 1111.1 b) 1232.231 c) 1323.132 d) 1233.321

5) $68\times\sqrt{?}-3421=591$

a) 3249 b) 3481 c) 3364 d) 3136

6) Find the value of $\left(\dfrac{343\times 343\times 343-113\times 113\times 113}{343\times 343+343\times 113+113\times 113}\right)$ =

a) 231 b) 230 c) 233 d) 232

7) $\left\{(45)^3+(65)^2\right\}\div ?=1907$

a) 80 b) 70 c) 60 d) 50

8) Find the value of $\sqrt{3}$ up to three decimal places.

a) 1.736 b) 1.732 c) 1.785 d) 1.745

9) By how much is ¾ th of 968 less than 7/8th of 1008

a) 154 b) 146 c) 165 d) 156

10) Find the value of $\sqrt{53824}=?$

a) 202 b) 232 c) 242 d) 332

UNIT-IV Answer ALL questions 10 x 1 =1

1) The average of 1,3,5,7,9,11,13,15,17 -------------- ?

a) 10 b) 9 c) 8 d) 12

2) The mean properties of 4 and 9 is

a) 6 b) 4 c) 9 d) 36

3.) If the sides of two cubes are in the ratio 3 : 5 then the ratio of their volume are …

a) 27:125 b) 125:27 c) 9:25 d) none

4) The ratio of $4^{3.5}$: 2^5 is same as:

a) 2 :1 b) 4:1 c) 7:5 d) 7:10

5) 20 men can do a piece of work in 20days working 8 hrs/ day . In how many days can 25 men can do the same work if they work 16 hrs/ day

a) 10 b) 09 c) 08 d) 07

6) If $\frac{A}{3}=\frac{B}{4}=\frac{C}{5}$ then A: B: C is

a) 3 : 4 : 5 b) 4 : 3 : 5 c) 5: 3: 4 d) 5: 4 : 3

7. I f $x:y=2:3\, then \frac{2x+3y}{2x-3y}$ is

a) $\frac{-13}{5}$ b) $\frac{13}{5}$ c) $\frac{13}{-5}$ d) $\frac{5}{13}$

8. If 4 man can do a piece of work in 10 days in how many days can 8 men do it ?

a) $4\, days$ b) $3\, days$ c) 5 days d) none of this

9. A : B =1: 2; B: C = 3.4 then A : B: C is

a) 6:8:3 b) 3:6:8 c) 3:8:6 d) 8:6:3

10. convert 30 m/sec speed to km/hr

a) 84km/hr b) 96km/hr c) 108km/hr d) 120km/hr

V) Answer ALL questions 10 x 1 =1

1. One –fifth of a human a number is 81% what will be 68% of that number ?

a) 195.2 b) 275.4 c) 225.6 d) 165.8

2. Suresh purchased a car for 25000 Rs and sold it for 34800 Rs . What is the percentage profit the made on the car ?

a) 50% b) 39.2% c) 38.4% d) 38%

3. What is 170% of 1140

a) 1938 b) 1824 c) 1995 d) 1881

4. ----- % of 130 = 10.4

a) 34.6 b) 33 c) 32 d) none

5. A sum of Rs 5000 amount to Rs 6050 in 2yers . what is the rate of interact.
   a) 15% b) 13% c) 11% d) 10.5%
6. .Sum of three consecutive numbers is 2262 . what is 41% of the highest number ?

   a) 301.51 b) 309.55 c) 309.14 d) none

7. What is 25% of 75 % of 3/5th of 4240 is …

   a) 595 b) 424 c) 348 d) 477

8. What percentage of 60 is 15 ?
   a) 25 % b) 30 % c) 35 % d) none
9. What is the simple interest on 200 Rs for 4yers at 6% per annum?

   a) 40Rs b) 46Rs c) 48Rs d) 45Rs

10. 25% of 25% is equal to……………

    a) 0.0625 b) 0.625 c) 0.00625 d) none

MODEL QUESTION PAPER

GOVT COLLEGE (A), RAJAMAHENDRAVARAM

III rd B.Sc., Mathematics(REGULAR)

Vth Semester Model Paper

Paper – V : Linear Algebra

(For the Batches admitted in 2014-15 and 2015-16 only)

Time : 3 Hrs. **<u>Section – A</u>** **Max Marks : 75**

Answer all questions. Each question carries 10 marks. 4 X 10 = 40 M.

1. (a) If S, T are the subspaces of a vector space V(F)

   then show that (i) S $\subseteq$T $\Rightarrow L(S) \subseteq L(T)$. (ii)L(S U T) = L(S) + L(T)

   (OR)

   (b) If W is a subspace of a finite dimensional vector space V(F) then show that

   dim (v/w) = dim v – dim w

2. (a) If U(F) and V(F) are two vector spaces, T:U $\rightarrow$ V is a linear transformation

and U finite dimensional vector space then show that $\rho(T)+\upsilon(T)$ =dim U

(OR)

(b) The set $\{e_1, e_2, e_3\}$ is the standard basis of $V_3(R)$. T: $V_3(R)$$V_3(R)$ is a linear

operator defined by T(e_1)= $e_1 +$ e_2 ,T(e_2)= $e_2 +$ e_3 ,T(e_3)= $e_1 +$ $e_2 +$ e_3 . Show that T is

non-singular and find its inverse.

3. (a) State and prove Sylvester's law of Nullity.

(OR)

(b) State and prove Cayley-Hamilton theorem.

4. (a) State and Prove Cauchy-Schwarz's inequality.

(OR)

(b) Given {(2,1,3),(1,2,3),(1,1,1)} is a basis of R^3; construct an orthonormal basis using

Gram-Schmidt orthogonolisation process.

SECTION – B

Answer any five questions . Each question caries three marks 5 x 3 =15M

5. Show that the intersection of any family of subspaces of a vector space is a subspace.
6. If W is the subspace of $V_4(R)$ generated by the vectors (1,-2,5,-3), (2,3,1,-4) and (3,8,-3,-5) find a basis of W and its dimension.
7. Let U(F) and V(F) be two vector spaces and T:UV is a linear transformation.Then show that Null space N(T) is a subspace of U(F).

8. A linear transformation T on a finite dimensional vector space is invertible iff T is non-singular.
9. Show that the characteristic vectors corresponding to distinct characteristic roots of a matrix are linearly independent.
10. Show that the matrix $A = \begin{bmatrix} 5 & 6 & 8 \\ 0 & 7 & 2 \\ 0 & 0 & 4 \end{bmatrix}$ is a diagonalizable matrix and find the diagonal Matrix.
11. In an inner product space V(F), show that $\|\alpha + \beta\| \le \|\alpha\| + \|\beta\|, \ \forall \ \alpha, \beta \in V$
12. Prove that $S = \{(\frac{1}{3}, -\frac{2}{3}, -\frac{2}{3}), (\frac{2}{3}, -\frac{1}{3}, \frac{2}{3}), (\frac{2}{3}, \frac{2}{3}, -\frac{1}{3})\}$ is an orthonormal set in R^3 with standard inner product.

SECTION – C

Answer all questions. Each question carries 2 marks 10X 2 = 20 M

13. Define vector space.
14. Write necessary and sufficient condition for a non-empty subset W of a vector space V(F) to be a subspace of V.
15. Let W_1, W_2 be two subspaces of a finite dimensional vector space V(F).

    If dim W_1 = m, dim W_2 = n, dim $W_1 \cap W_2$ = p, then find dim (W_1 + W_2).
16. Define linear transformation between two vector spaces.
17. Let $T : V_3(R) \to V_1(R)$ be defined by T(a,b,c) = $a^2 + b^2 + c^2$ Can T be a linear transformation ? Verify.
18. Define singular and non-singular transformations.
19. If a square matrix A satisfies the equation $f(\lambda) = \lambda^3 + p\lambda^2 + q\lambda + 1 = 0$ then find inverse of A.
20. Define inner product vector space.
21. Find a unit vector orthogonal to (4,2,3) in R^3
22. Define orthogonal complement of a nonempty subset W of an inner product space V(F).

MODEL QUESTION PAPER

GOVT COLLEGE (A), RAJAMAHENDRAVARAM

III rd B.Sc., Mathematics(REGULAR)

Semester-V Paper VI – Numerical Analysis

(For the Batches admitted in 2014-15 and 2015-16 only)

Time : 3 Hrs. **Section – A** **Max Marks : 75**

Answer all questions. Each question carries 10 marks. 4 X 10 = 40 M.

1. (a) Using Regula falsi method find the root of the equation x^3-9x + 1 = 0

(OR)

(b) Find a real root of $2x - \log_{10}^{x} = 7$ using Iteration method.

2. (a) Find the root of the equation $e^{-x} = \sin x$ using Newton-Raphson method upto four decimal places.

(OR)

(b) Derive Newton's forward interpolation formula.

3. (a). State and prove Newton's Divided difference interpolation formula

(OR)

(b) Use Stirling's formula to find y_{28} given y_{20} =49225, y_{25} =48316, y_{30} =47236, y_{35} =45926, y_{40} =44306.

4. (a) Derive Legranges formula for unequal intervals.

(OR)

(b) Fit a parabola to the data given below using the method of least squares

X	1.0	1.2	1.4	1.6	1.8	2.0
Y	0.98	1.40	1.86	2.55	2.28	3.20

SECTION – B

Answer any five of the following. Each question carries 3 marks. 5 x 3 = 15M

5. Find the sum $S = \sqrt{3} + \sqrt{5} + \sqrt{7}$ to 5 significant digits and find the absolute and relative Errors.

6. Find a real root of $x \log_{10}^{x} - 1.2 = 0$ by using Bisection Method.

7. Find the smallest root of the equation $f(x) = x^3 - 6x^2 + 11x - 6 = 0$ by Ramanujan's method.

8. Find the value os f(27.5) by using Newton's backward interpolation formula for the data

X	25	26	27	28	29
f(x)	16.195	15.919	15.630	15.326	15.006

9. Apply Gauss forward formula to obtain f(33) given that

x	25	30	35	40
f(x)	0.2707	0.3027	0.3386	0.3794

10. Show that $\delta = \Delta E^{-\frac{1}{2}} = \nabla E^{\frac{1}{2}} \;\; and \;\; \Delta\nabla = \nabla\Delta = \delta^2$.

11. Apply Legranges formula to find f(5) and f(6) given that f(1)=2,f(2)=4,f(3)=8 and f(7) = 128.

12. Find the exponential curve y = ae^{bx} to the data

x	0	2	4
y	5.012	10	31.62

SECTION – C

Answer all questions. Each question carries 2 marks. 10 x 2 = 20M

13. Define the relative error of an approximate number.
14. Round off 27.8793 correct to four significate figures.
15. Write generalized Newtons formula.
16. Define forward difference operator
17. Write Gauss backward interpolation formula
18. Define the first divided difference3 of f(x) for the arguments x_0, x_1
19. Write the formula used to estimate the error of the Lagranges interpolation formula.
20. Write the normal equations to fit a straight line
21. Write the fundamental theorem of difference calculus
22. Define central difference operator.

MODEL QUESTION PAPER

III rd B.Sc., Mathematics

VIth Semester Model Paper

Paper VII –Multiple Integrals& Vector Calculus

(For the Batches admitted in 2014-15 and 2015-16 only)

Time : 3 Hrs. **Section – A** **Max Marks : 75**

Answer all questions. Each question carries 10 marks. 4 X 10 = 40 M.

1. (a) Define Line integral and prove that the sufficient condition for the existence of the Integral. (OR)

(b) Evaluate $\int_C (x^2 + y^2)dx \ \ and \ \ \int_C (x^2 + y^2)dy$ where C is the area of the Parabola $y^2=4ax$ between (0,0) &(a,2a).

2. (a) Change of order of integration in the double integral $\int_0^{2a} \int_{\sqrt{2ax-x^2}}^{\sqrt{2ax}} f(x,y)\,dx\,dy$ (OR)

(b) Evaluate $\iint_E e^{x^2+y^2}\,dydx$ where E is the semi-circular region bounded by the x-axis and the curve $y=\sqrt{1-x^2}$.

3. (a) Prove that the necessary and sufficient condition for f(t) to have constant direction is

f x $\frac{df}{dt} = 0$ (OR)

(b) Prove that Curl(AxB) = A div B – B div A + $(B.\nabla)A - (A.\nabla)B$

4. (a) If $\bar{F} = 2xz\bar{i} - x\bar{j} + y^2\bar{k}$, evaluate $\int_V \bar{F}.dV$ where V is the region bounded by the surfaces x=0,x=2,y=0,y=6,Z=x^2,Z=4.

(OR)

(b) State and Prove Green's theorem in a plane.

SECTION – B

Answer any seven of the following. Each question carries 3 marks.3 x 5 = 15

5. Evaluate $\int_C \frac{dx}{x+y}$ where C is the curve x = at^2, y = 2at, 0t2.

6. Evaluate $\iint xy(x^2+y^2)dxdy$ over [(0,a;0,b)]

7. In the integral $\int_2^4 \int_{4/x}^{(20-4x)/(80-x)} (4-y)dydx$

Change the order of integration and evaluate the integral.

8. Evaluate $\iint \frac{\sqrt{a^2b^2-b^2x^2-a^2y^2}}{\sqrt{a^2b^2+b^2x^2+a^2y^2}}dxdy$ the field of integration being the positive quadrant of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$.

9. Find the directional derivative of the function f = x^2- y^2+2 z^2 at the point P(1,2,3) in the direction of the line PQ where Q(5,0,4).

10. If f = x^2 yz , g = xy-3z^2 find div(grad f x grad g).

11. **Evaluate** $\int_C \bar{F}.dr$ **where** $\bar{F} = 3x^2\,\bar{i} + (2xz-y)\,\bar{j} + z\,\bar{k}$ **along** the straight line C from (0,0,0) to (2,1,3).

12. Show that $\int_S (ax\,\bar{i}+by\,\bar{j}+cz\,\bar{k}).\bar{N}\,ds = \frac{4\pi}{3}(a+b+c)$ where S is the surface of the sphere $x^2+y^2+z^2=1$.

SECTION – C

Answer all questions. Each question carries 2 marks.10 x 2 = 20

13. Evaluate $\int_C \frac{dx}{x+y}$ where C is the curve y= 2x, x is in [1, 2].

14. Define repeated integral of f(x,y) on R = [a,b;c,d].

15. Evaluate $\int\int_C \frac{y^2}{1+x^2} dxdy$ over [-1, 1; 0,2].

16. Define boundary point and boundary of a set.

17. Define Jacobean of two functions f and g.

18. Find a unit vector normal to the surface $\phi(x, y, z) = c$

19. Define solenoidal vector

20. Prove that curl (grad f) = 0 for any scalar point function f.

21. Define scalar potential of an irrotational vector.

22. Define flux of a vector valued function F over a closed surface S.

MODEL QUESTION PAPER

GOVT COLLEGE (A), RAJAMAHENDRAVARAM

III rd B.Sc., Mathematics

VIth Semester Model Paper

Paper VIII(A-1) –Advanced Numerical Analysis

(For the Batches admitted in 2014-15 and 2015-16 only)

Time : 3 Hrs. Section – A Max Marks : 75

Answer all questions. Each question carries 10 marks. 4 X 10 = 40 M.

1. (a) From the table given below, for what value of x ; y is minimum? Also find this value of y.

X	3	4	5	6	7	8
Y	0.205	0.240	0.259	0.262	0.250	0.224

(OR)

(b) Evaluate $\int_2^{10} \frac{dx}{x}$ by dividing the range into 8 equal parts by using Trapezoidal rule.

2. (a) Find the integral value of $f(x)=1+e^{-x} \sin 4x$ on [0,1] by using Boole's rule when n=4.

(OR)

(b) Solve the system of equations by matrix inversion method x+y+z=1,x+2y+3z=6, x+3y+4z=6.

3. (a) Solve the system $5x_1 + 2x_2 + x_3 = 21,\ x_1 + 4x_2 + 2x_3 = 15,\ x_1 + 2x_2 + 5x_3 = 20$ by Jacobi's method.

(OR)

(b) Using Taylor's method find the solutions of $\frac{dy}{dx} = x + y,\ y^{(1)} = 0$ at x = 1.2 with h= 0.1 and compare the result with the value of the explicit solution.

4. (a) Using Runge-Kutta method, find an approximate value of y when x = 0.2 given that $\frac{dy}{dx} = x + y$, y = 1 when x = 0.

(OR)

(b) The differential equation

x	-0.1	0	0.1	0.2
Y	1.09000	1.0000	0.890	0.7605

$\frac{dy}{dx} = x^2 + y^2 - 2$ satisfies the following data

Use Milne's method to find the value of y(0.3).

SECTION – B

Answer any five of the following. Each question carries 3 marks. 3 x 5 = 15

5. Find the derivative of f(x) at x=1.4 from the following table

x	0.1	0.2	0.3	0.4
f(x)	1.10517	1.22140	1.34986	1.49182

6. Show that $\int_0^1 \frac{dx}{1+x} = \log 2 = 0.69315$ using Simpson's 3/8 rule.

7. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Weddle's rule.

8. Solve the equations 2x +3y-z=5, 4x+4y-3z =3,-2x+3y-z=1 by Gauss elimination Method.

9. Solve the following equations by Gauss-Jacobi method.

   10 x – y + z = 12, x – 10 y + z = 12, x + y – 10 z = 12 correct to 3 decimals.

10. Solve by Gauss-Siedel method of iteration the equations 10x+y+z=12, 2x+10y+z=13, 2x+2y+10z =14.

11. Solve $\frac{dy}{dx} = 1 + y^2, y(0) = 0,$ by Picards method.

12. Given $\frac{dy}{dx} = x^3 + y, y(0) = 1$ Compute y(0.02) by Eulers method taking h = 0.01

SECTION – C

Answer all questions. Each question carries 2 marks. 2 x 10 = 20M

13. Write the formula $\left(\frac{dy}{dx}\right)_{x=x_0}$ using Newtons forward interpolation formula.
14. State general quadrature formula.
15. In Booles rule, what is the condition for n.

16. What is the form of L in LU Decomposition method.
17. Solve the following equations by Jacobi method up to first iteration only.
    27x+6y-z=85, 6x+15y+2z=72, x+y+54z=110
18. Write the formula of Taylors series method.
19. Write the formula for y_1 in Runge Kutta method of second order.
20. Write the formula for y_1 in Runge Kutta method of third order.
21. Write Simpsons 1/3 rule.
22. Write the formula for second approximation of y_1 in modified Eulers method.

III-B.Sc. DEGREE EXAMINATIONS
SEMESTER-VI SUBJECT: MATHEMATICS
Paper –VIII(A -2) Cluster Elective – A: Laplace Transformations
MODEL PAPER

Time: 3 hours **Max marks: 75M**

SECTION–A

Answer any FIVE of the following questions. Each carries 3 marks. 5X3 = 15 M

1. Find $\{t^n\}$, where n is a positive integer.
2. Evaluate $\{(t)\}$ *if* $F(t)=$ $(t-1)^2$ when t ¿ $1 \wedge F(t)=0$ *when* $0<t<1$.
3. State and Prove first shifting theorem in Laplace Transforms.
4. Find $\{(3sin2t-2cos2t)\}$

5. Find $L^{-1}\{(3p-2)/(p^2-4p+20)\}$.

6. Find $L^{-1}[e^{4-3p}/(p+4)^{5/2}]$.

7. Prove that $L^{-1}\{(2p+1)/(p+2)^2(p-1)^2\}= \frac{t}{3}\left(e^t-e^{-2t}\right)$.

8. Find $L^{-1}\left\{\frac{p}{\left(p^2+a^2\right)^2}\right\}$.

SECTION – B

Answer the following questions. Each question carries 10 marks. 4x 10 = 40 M

9. a) Find L $\left(sint-cost\right)^3$?

(OR)

a b) Find $L\{F(t)\}$,where F(t)= $\begin{cases} 0\, when\, 0<t<1 \\ t\, when\, 1<t<2 \\ 0\, when\, t>2 \end{cases}$

10. a) State and prove second shifting theorem.

(OR)

b) Let $\{t\}$ be continuous for all $t\geq 0$ and be of exponential order a as $t\rightarrow\infty$ and if $F^1(t)$ is of class A, then show that Laplace transformation of the derivative $F^1(t)$ exists when $p>a$, and $\{F^1(t)\}=pL\{F(t)\}-F(0)$.

11. a) If $F(t)$ is a function of class A and if $L\{F(t)\}=f(p)$, then prove that

$$\{t^nF(t)\}= \left(-1\right)^n \frac{d^n}{d\,p^n} f\left(p\right) \quad \text{where } n=1,2,3,\ldots .$$

(OR)

b) Find L $\left(t^3 cosat\right)$?

12. a) Show that $L^{-1}\left\{\frac{4\,p+5}{\left(p-1\right)^2\left(p+2\right)}\right\}=3\,t\,e^t+\frac{1}{3}e^t-\frac{1}{3}e^{-2t}$.

(OR)

b) Apply convolution theorem to find the inverse Laplace transform of the function

a $\frac{1}{\left(p-2\right)\left(p^2+1\right)}$.

SECTION C

Answer all questions. Each question carries 2 marks. 10 x 2 = 20M

13) Define Laplace transform?

14) Find L $\left(\cos^2 t\right)$?

15) Find L $\left(e^{-2t}\sin 3t\right)$?

16) State change of scale property?

17) Find L $\left\{\int_0^t e^{-t}\, sinht\, dt\right\}$?

18) Find L $\left(tsinat\right)$?

19) Find $L^{-1}\left\{\frac{p^2-3p+4}{p^3}\right\}$?

20) If $L^{-1}\left(f(p)\right)=F(t)$, then prove that $L^{-1}\left[\frac{f(p)}{p}\right]=\int_0^t F(t)\,dt$.

21) Find $L^{-1}\left\{\frac{1}{(p+2)^2}\right\}$?

22) State Convolution Theorem?