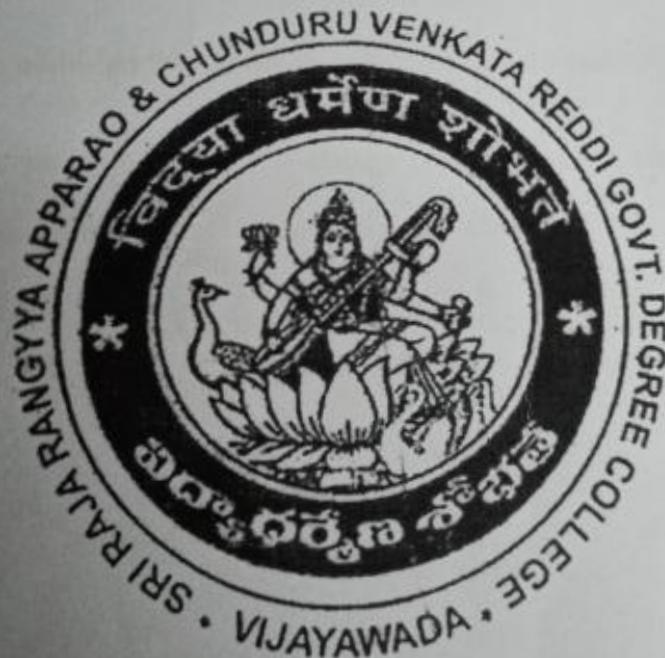


S R R & C V R GOVT. DEGREE COLLEGE

(Autonomous)

VIJAYAWADA-520004, KRISHNA DISTRICT



Minutes of the Meeting Board of Studies

Department of Mathematics

Dated: 25-11-2020

SRR & CVR GOVT. DEGREE COLLEGE (Autonomous)

Machavaram, VIJAYAWADA – 4, Krishna Dist, A. P.

Minutes of the meeting of the Upgradation of Syllabus U. G. (B.O.S.) in the Subject of **Mathematics**, A. Y.: 2020- 2021

The meeting of the Upgradation of Syllabus (B O S) in the subject of **Mathematics** was held on 25-11-2020, SRR & CVR Govt. Degree College (Autonomous), Vijayawada- 520004.

The following members attended the meeting : (Offline / Online / Blended)

1. Smt. K.V. Naga Lakshmi, : (In-charge of the Dept & Chairman, BOS)
2. Prof. Bhavanari Satyanarayana, : (University Nominee)
3. Dr.S. Eswaraiah Setty, : (Subject Expert)
4. Sri. G.V. Bhaskar, : (Subject Expert)
5. B. Ratna Kumari, : (Alumni)
6. Sri.M. Lakshmana Das : (Faculty Member)
7. ^{Dr.} Sri. MD. Masthan : (Faculty Member)
8. ^{Dr.} Kumari.G.Lalitha : (Faculty Member)
9. Smt. S.Renuka : (Faculty Member)

Agenda :

1. Approval of the i. Syllabus, ii. Model Question paper, iii. Blue Print and iv. Question Bank of the Semesters I,II of Ist B.Sc and Re-approval for Sem III & V Mathematics Syllabus of IInd & IIIrd B.Sc, for the academic year 2020-2021.
2. Approval of the duration of the Examination for 3 hours.
3. Approval of the stipulated Credits, Work Load, Internal Marks breakup etc...

4. Approval of Online Examination pattern in case COVID 19 doesn't subside at the time of Examinations (MCQs Pattern).
5. To approve paper setters.
6. To approve other Academic activities of the Department.
7. To give permission to the Chairman for any small changes.
8. To approve Bridge Course syllabus and number of hours.

The Chairperson welcomed the members and had discussion on the Agenda. She appraised the members of the guidelines of the UGC, APSCHE, Krishna University and the CCE regarding the framing of Syllabus, etc., and the recommended evaluation ratio for internal and external examinations. The members discussed in detail the various aspects presented before them and unanimously resolved the following :

The members of BOS Meeting Resolved:

- 1: To approve the syllabus for Semesters I, II, (APSCHE's Syllabus, for the announced Subjects and the existing Syllabus for Other Subjects) of Ist B.Sc. **Mathematics** for the academic year 2020- 2021.

Sem III Details: Re-approval for Sem III Mathematics Syllabus of IInd B.Sc, for the academic year 2020-2021

Sem V Details: Re-approval for Sem V Mathematics Syllabus of IIIrd B.Sc, for the academic year 2020-2021

(Due to COVID - 19 consequences, as per the Staff Council Resolutions, IInd Sem is also included along with the I Semester).

- 2 : To approve the i. Syllabus, ii. Model Question paper, iii. Blue Print and iv. Question Bank of the Semesters I, II, III & V.
- 3 : To approve the validity of this Syllabus for next two years.
- 4 : To follow Autonomous pattern of Total 100 marks as : i. Theory of 60 Marks, and ii. Internal Assessment of 40 marks.
 - To divide the syllabus into FIVE units.
 - In the Question paper Section-A consisting Questions of weightage 4 marks each. Five questions to be answered i.e. $5 \times 4 = 20$ marks and Section-B consisting of questions of weightage 8 marks each, Five questions to be answered $5 \times 8 = 40$ Marks.

- To pass the exam, student must get 40% of 60 (external) and 40% of 40 (internal) and overall 40% combining both internal and external.
- To approve the preparation of Question paper by off-line or on-line or blended by way of MCQs as per directions of the Principal and C.O.E. Examination Department in case the COVID-19 does not subside at the time of the Semester end examinations. The MCQ pattern will be announced by the examination department.

5: To follow Internal Assessment of 40 Marks Uniform pattern breakup resolved by the Autonomous Body / Committee.

(a) Internal exams (two)	- 10
(b) Assignments (two)	- 10
(c) Project	- 10
(d) Attendance	- 05
(e) Seminar	- 05
Total	= 40

I. Details of Members attended:

S No	Name, Designation	Status of the Expert	Offline / Online/ Blended
1	Smt. K.V. Naga Lakshmi, Lecturer in Mathematics, SRR & CVR Govt. Degree College, Autonomous, Vijayawada.	In-charge of the Dept & Chairman, BOS	Offline
2	Prof. Bhavanari Satyanarayana, Acharya Nagarjuna University, Nagarjuna Nagar, Guntur	University Nominee	Offline
3	Dr. S. Eswaraiah Setty, Reader & HOD of Mathematics, Principal, S.G.S College, Jaggaiahpet, Krishna Dist.	Subject Expert	Offline
4	Sri. G.V. Bhaskar, HOD of Mathematics, GDC for Women, Guntur.	Subject Expert	Offline
5	Smt. B. Ratna Kumari, SRR & CVR Govt. Degree College, Vijayawada.	Alumni	Offline

6: To approve the stipulated Credits-5, 6 Hours Work Load, Internal Marks breakup etc.,

7: To approve Online Examination pattern in case COVID 19 doesn't subside at the time of Examinations (MCQs Pattern).

11. To approve Bridge Course syllabus and number of hours.

12. Any other Resolutions, with the approval of the Chair:

i. The chairman is given empowerment to do any small changes.

ii. To approve the panel of paper setters.

iii. The controller of examinations is given empowerment for any changes in selecting paper setter in case if non-availability if examiners as are listed.

iv.

12. To approve any other valid inclusion in B O S, with the permission of the Principal and Controller of Examinations (C O E). Details are given below:

i.

ii.

iii.

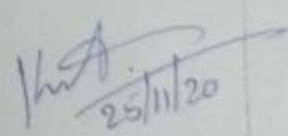
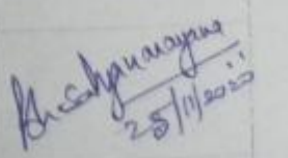
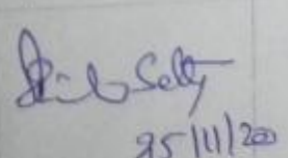
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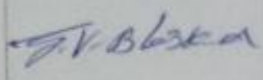
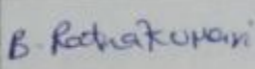
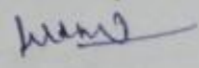
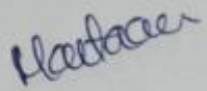
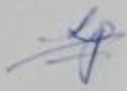
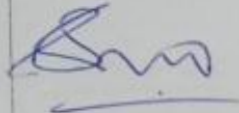
1. Copies of i. Syllabus, ii. Model Question paper, iii. Blue Print and iv. Question Bank of the Semesters are enclosed.

2. Above Resolutions have to be Recorded / Documented in the Individual Departments B O S Meetings Register, with the counter signature of the Principa.

3. If the B O S Meeting is conducted Online, the Recording of the Meeting is to be preserved in C D and has to be submitted to the College.

Signatures of the members of the BOS Meeting:

S No	Name & Designation	Status	Signature
1	Smt. K.V. Naga Lakshmi, Lecturer in Mathematics, SRR & CVR Govt. Degree College, Autonomous, Vijayawada.	In-charge of the Dept & Chairman, BOS	 25/11/20
2	Prof. Bhavanari Satyanarayana, Acharya Nagarjuna University, Nagarjuna Nagar, Guntur	University Nominee	 25/11/2020
3	Dr. S. Eswaraiah Setty, Reader & HOD of Mathematics, Principal, S.G.S College, Jaggaiahpet, Krishna Dist.	Subject Expert	 25/11/20


4	Sri. G.V. Bhaskar, HOD of Mathematics, GDC for Women, Guntur.	Subject Expert	
5	Smt. B. Ratna Kumari, SRR & CVR Govt. Degree College, Vijayawada.	Alumni	
6	Sri.M. Lakshmana Das, Lecturer in Mathematics, SRR & CVR Govt. Degree College (A), Vijayawada.	Faculty Member	
7	Sri. MD. Masthan, Lecturer in Mathematics, SRR & CVR Govt. Degree College (A), Vijayawada.	Faculty Member	
8	Kumari. G.Lalitha Lecturer in Mathematics, SRR & CVR Govt. Degree College (A), Vijayawada.	Faculty Member	
9	Smt. S.Renuka Lecturer in Mathematics, SRR & CVR Govt. Degree College (A), Vijayawada.	Faculty Member	

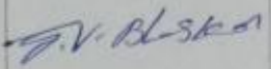
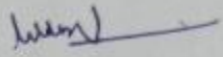

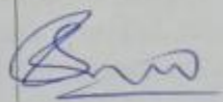
Counter signed by:

Principal

SRR & CVR Govt Degree College (A)

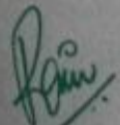
Vijayawada


PRINCIPAL (FAC)
SRR & CVR GOVT. DEGREE COLLEGE
(Autonomous)
Machavaram, VIJAYAWADA-520 004,

4	Sri. G.V. Bhaskar, HOD of Mathematics, GDC for Women, Guntur.	Subject Expert	
5	Smt. B. Ratna Kumari, SRR & CVR Govt. Degree College, Vijayawada.	Alumni	B. Ratnakurari
6	Sri M. Lakshmana Das, Lecturer in Mathematics, SRR & CVR Govt. Degree College (A), Vijayawada.	Faculty Member	
7	Sri. MD. Masthan, Lecturer in Mathematics, SRR & CVR Govt. Degree College (A), Vijayawada.	Faculty Member	Masthan
8	Kumari. G.Lalitha Lecturer in Mathematics, SRR & CVR Govt. Degree College (A), Vijayawada.	Faculty Member	
9	Smt. S.Renuka Lecturer in Mathematics, SRR & CVR Govt. Degree College (A), Vijayawada.	Faculty Member	

Counter signed by:

Principal
SRR & CVR Govt Degree College (A)
Vijayawada



S R R & C V R GOVT DEGREE COLLEGE

(AUTONOMOUS) NAAC B⁺

Department of Mathematics

Ist B.Sc MATHEMATICS SYLLABUS (w.e.f. 2020-21 Admitted Batch)

SEMESTER-I, PAPER-1

DIFFERENTIAL EQUATIONS

Sl. No.	Title of Unit	Sub Topics	References
1	UNIT-I (12 Hours) Differential Equations of first order and first degree:	Linear Differential Equations; Differential equations reducible to linear form; Exact differential equations; Integrating factors; Change of variables.	Text Book : Differential Equations and Their Applications by Zafar Ahsan, published by Prentice-Hall of India Pvt. Ltd, New Delhi-Second edition. Reference Books : 1. A text book of Mathematics for B.A/B.Sc, Vol 1, by N. Krishna Murthy & others, published by S.Chand & Company, New Delhi. 2. Ordinary and Partial Differential Equations by Dr. M.D,Raisinghanian, published by S. Chand & Company, New Delhi. 3. Differential Equations with applications and programs – S. Balachandra Rao & HR Anuradha-
2	UNIT-II (12 Hours) Orthogonal Trajectories Differential Equations of first order but not of the first degree:	Equations solvable for p ; Equations solvable for y ; Equations solvable for x ; Equations that do not contain x (or y); Equations homogeneous in x and y ; Equations of the first degree in x and y – Clairaut's Equation.	
3	UNIT-III (12 Hours) Higher order linear differential equations-I:	Solution of homogeneous linear differential equations of order n with constant coefficients; Solution of the non-homogeneous linear differential equations with constant coefficients by means of polynomial operators. General Solution of $f(D)y=0$. General Solution of $f(D)y=Q$ when Q is a function of x , $1/f(D)$ is expressed as partial fractions. P.I. of $f(D)y = Q$ when $Q = be^{ax}$ P.I. of $f(D)y = Q$ when Q is $b \sin ax$ or $b \cos ax$.	
4	UNIT- IV (12 Hours) Higher order linear differential equations-II:	Solution of the non-homogeneous linear differential equations with constant coefficients. P.I. of $f(D)y = Q$ when $Q = bx^k$ P.I. of $f(D)y = Q$ when $Q = e^{mx} V$, where V is a function of x . P.I. of $f(D)y = Q$ when $Q = xV$,	

		where V is a function of x .	Universities Press.
		P.I. of $f(D)y = Q$ when $Q = x^m V$, where V is a function of x .	4. Differential Equations -Srinivas Vangala & Madhu Rajesh, published by Spectrum University Press.
5	UNIT- IV (12 Hours) Higher order linear differential equations- III:	Method of variation of parameters; Linear differential Equations with non-constant coefficients; The Cauchy-Euler Equation, Legendre's linear equations, miscellaneous differential equations.	

Bibliography :

1. A text book of Mathematics for B.A/B.Sc, Vol 1, by N. Krishna Murthy & others, published by S.Chand & Company, New Delhi.
2. Ordinary and Partial Differential Equations by Dr. M.D.Raisinghania, published by S. Chand & Company, New Delhi.

Co-Curricular Activities(15 Hours)

Seminar/ Quiz/ Assignments/ Applications of Differential Equations to Real life Problem /Problem Solving.

Bridge Course (15 Hours)

Formation of Differential Equations, Degree and order of an ordinary differential equations, Solving Differential equations, variable and separable methods, Homogeneous differential equations, Non Homogeneous differential equations

[Signature]

Bh. Sanyal
25/11/2020

[Signature]
25/11/20

[Signature]

[Signature] 25/11/20

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B. Ratra kumari

S.R.R & C.V.R GOVT DEGREE COLLEGE
(AUTONOMOUS) NAAC B+
Department of Mathematics
Ist B.Sc MATHEMATICS (w.e.f. 2020-21 Admitted Batch)
SEMESTER -I, PAPER - 1
DIFFERENTIAL EQUATIONS
MODEL QUESTION PAPER

Time : 3 hours

Max. Marks: 60

Section - A

Answer any FIVE questions

(5 x 4 = 20 marks)

1. Solve $2xy \, dy - (x^2 + y^2 + 1) \, dx = 0$
2. Solve $(1 + y^2) \, dx = (\tan^{-1} y - x) \, dy$
3. Solve $x = y + p^2$
4. Solve $4y^2 p^2 + 2xy(3x+1)p + 3x^3 = 0$.
5. Solve $(D^2 - 3D + 2)y = \text{Cos h } x$.
6. Solve $(D^3 + 4D)y = \text{Sin } 2x$
7. Solve $(D^2 - 4D + 4)y = x^3$
8. Solve $\frac{d^2 y}{dx^2} - 6\frac{dy}{dx} + 13y = 8e^{3x} \sin 2x$
9. Solve $[(1+x)^2 D^2 + (1+x)D + 1]y = 4 \cos \log(1+x)$.
10. Solve $\frac{d^2 y}{dx^2} + y = \text{cosec } x$ by the method of variation of parameters

Section - B

Answer ALL questions

(5 x 8 = 40 marks)

11. (a). Solve $x(1 + xy) \, dy + y(1 - xy) \, dx = 0$

(OR)

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

12. (a). Solve $(py+x)(px-y) = 2p$

(OR)

(b). Find the orthogonal trajectories of family of curves
 $r = a(1 - \text{Cos } \theta)$ whose 'a' is a parameters

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

(OR)

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

14. (a). Solve $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = xe^x \sin x$

(OR)

(b). Solve $(D^2 + 4)y = x \sin x$

15. (a). Solve $(x^2D^2 - xD + 2)y = x \log x$

(OR)

(b). Solve $\frac{d^2y}{dx^2} + 4y = 4 \tan 2x$ by the method of variation of parameters

Ah. S. Srinivasan
25/11/2020

V. B. Srinivasan
25/11/20

Mansu
25.11.20

K. Srinivasan
25/11/20

S. Srinivasan
25/11/20

K. Srinivasan

B. Ratna Kumari

B. Ratna Kumari

S R R & C V R GOVT DEGREE COLLEGE

(AUTONOMOUS) NAAC B⁺

Department of Mathematics

1st B.Sc MATHEMATICS SYLLABUS (w.e.f. 2020-21 Admitted Batch)

SEMESTER-II, PAPER-2

THREE DIMENSIONAL ANALYTICAL SOLID GEOMETRY

Sl. No.	Title of Unit	Sub Topics	References
1	UNIT-I (12 Hours) The Plane:	Equation of plane in terms of its intercepts on the axis, Equations of the plane through the given points, Length of the perpendicular from a given point to a given plane, Bisectors of angles between two planes, Combined equation of two planes, Orthogonal projection on a plane.	Text Book : Analytical Solid Geometry by Shanti Narayan and P.K. Mittal, published by S. Chand & Company Ltd. 7th Edition.
2	UNIT-II (12 Hours) The Line:	Equation of a line; Angle between a line and a plane; The condition that a given line may lie in a given plane; The condition that two given lines are coplanar; Number of arbitrary constants in the equations of straight line; Sets of conditions which determine a line; The shortest distance between two lines; The length and equations of the line of shortest distance between two straight lines; Length of the perpendicular from a given point to a given line.	Reference Books : 1. A text book of Mathematics for BA/B.Sc Vol 1, by V Krishna Murthy & Others, published by S. Chand & Company, New Delhi. 2. A text Book of Analytical Geometry of Three Dimensions, by P.K. Jain and Khaleel Ahmed, published by Wiley Eastern Ltd., 1999.
3	UNIT-III (12 Hours) The Sphere:	Definition and equation of the sphere; Equation of the sphere through four given points; Plane sections of a sphere; Intersection of two spheres; Equation of a circle; Sphere through a given circle; Intersection of a sphere and a line; Power of a point; Tangent plane; Plane of contact; Polar plane; Pole of a Plane; Conjugate points; Conjugate planes;	3. Co-ordinate Geometry of two and three dimensions by P. Balasubrahmanyam, K.Y. Subrahmanyam, G.R. Venkataraman published by Tata-MC Gran-Hill Publishers Company Ltd., New Delhi.

4	UNIT-IV (12 Hours) The Sphere and Cone:	Angle of intersection of two spheres; Conditions for two spheres to be orthogonal; Radical plane; Coaxial system of spheres; Simplified form of the equation of two spheres. Definitions of a cone; vertex; guiding curve; generators; Equation of the cone with a given vertex and guiding curve; equations of cones with vertex at origin are homogenous; Condition that the general equation of the second degree should represent a cone;	4. Solid Geometry by B.Rama Bhupal Reddy, published by Spectrum University Press.
5	UNIT-V (12 Hours) The Cones:	Enveloping cone of a sphere; right circular cone: equation of the right circular cone with a given vertex, axis and semi vertical angle: Condition that a cone may have three mutually perpendicular generators; intersection of a line and a quadric cone; Tangent lines and tangent plane at a point; Condition that a plane may touch a cone; Reciprocal cones; Intersection of two cones with a common vertex.	

Bibliography :

1. A text book of Mathematics for BA/B.Sc Vol 1, by V Krishna Murthy & Others, published by S. Chand & Company, New Delhi.
2. A text Book of Analytical Geometry of Three Dimensions, by P.K. Jain and Khaleel Ahmed, published by Wiley Eastern Ltd., 1999.

Co-Curricular Activities(15 Hours)

Seminar/ Quiz/ Assignments/Three dimensional analytical Solid geometry and its applications/ Problem Solving.

Dr. Subhanshu Singh
 25/11/2020
 V. B. Reddy
 25/11/20
 M. S. Reddy
 25.11.20
 K. S. Reddy
 25/11/20
 B. Partha Kumar
 25/11/20

S R R & C V R GOVT DEGREE COLLEGE

(AUTONOMOUS) NAAC B⁺

Department of Mathematics

1st B.Sc MATHEMATICS SYLLABUS (w.e.f. 2020-21 Admitted Batch)

SEMESTER-II, PAPER-2

THREE DIMENSIONAL ANALYTICAL SOLID GEOMETRY

BLUE PRINT

DURATION : 3 HRS

Total Marks:60M

SECTION-A

Answer any **Five** questions. Each question carries **4** Marks.

5×4 = 20M

Question	Topics	No. of Questions	Weight age
1	UNIT-1	1	4
2	UNIT-1	1	4
3	UNIT-2	1	4
4	UNIT-2	1	4
5	UNIT-3	1	4
6	UNIT-3	1	4
7	UNIT-4	1	4
8	UNIT-4	1	4
9	UNIT-5	1	4
10	UNIT-5	1	4

SECTION-B

Answer **ALL** Questions. Each question carries **8** MARKS.

5×8 = 40M

QUESTION	Topic	No. of questions	Marks
11.(a) or (b)	UNIT-1	2	8
12.(a) or (b)	UNIT-2	2	8
13.(a) or (b)	UNIT-3	2	8
14.(a) or (b)	UNIT-4	2	8
15.(a) or (b)	UNIT-5	2	8

Ash. Subramanyam
25/11/20

K. S. S. S.
25/11/20

V. V. S. S.
25/11/20

A. S. S. S.
25/11/20

M. S. S. S.
25.11.20

B. R. K. K.

B. R. K. K.

S.R.R & C.V.R GOVT DEGREE COLLEGE
(AUTONOMOUS) NAAC B+
Department of Mathematics
1st B.Sc MATHEMATICS (w.e.f. 2020-21 Admitted Batch)
SEMESTER –II, PAPER – 2
SOLID GEOMETRY

Time : 3 Hrs.

Max. Marks : 60

SECTION – 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 and meets the coordinate 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 from (2,-2,3) to the plane $2x-y-2z-9=0$.
4. Find the image of the point (1,3,4) in the plane $2x-y+z+3=0$.
5. Find the equation of spheres passing through the circle $x^2+y^2+z^2=4, z=0$ and is intersected by the plane $x+2y+2z=0$ in a circle of radius 3.
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 Enveloping cone of sphere $x^2 + y^2 + z^2 + 2x - 2y = 2$ with its vertex (1,1,1)
9. Find the equation the cylinder whose generators are parallel to the line whose dir (1,2,3) which passes through the curve $x^2+y^2=16, z=0$.
10. Find the equation of the right circular cylinder of radius 2 whose axis passes through the point (1,2,3) and has direction ratios (2,-3,6)

SECTION – B

Answer all questions.

Each question carries 08 Marks.

5 x 8M = 40 Marks

11. (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

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

12 (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

(b) Find the S.D between the lines $\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1}$, $\frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$ and also find the equation of S.D between the lines.

13. (a) A plane passes through a fixed point (a,b,c) and cuts the axis in A, B,C show that the locus of centre of the sphere OABC is $\frac{a}{x} + \frac{b}{y} + \frac{c}{z} = 2$.

OR

(b) Show that two circles $x^2 + y^2 + z^2 - y + 2z = 0$, $x - y + z - 2 = 0$ and $x^2 + y^2 + z^2 + x - 3y + z - 5 = 0$, $2x - y + 4z - 1 = 0$ lies on the same sphere and find its equation.

14 (a) Find the limiting points of coaxial system of spheres $x^2 + y^2 + z^2 + 4x - 2y + 2z + 6 = 0$ and $x^2 + y^2 + z^2 + 2x - 4y - 2z + 6 = 0$

OR

(b) If $\frac{x}{1} = \frac{y}{2} = \frac{z}{1}$ represents one of a set of three mutually perpendicular generators of the cone $11yz + 6zx - 14xy = 0$ find the equation of the other two.

15 (a) Find the equation of the tangent plan at the point $(-3,0,-1)$ of the cone $4x^2 - y^2 + 2z^2 + 2xy - 3yz + 12x - 11y + 6z + 4 = 0$.

OR

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

Sh. Subhanurrahman
25/11/2020

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V. B. S. K. M.
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B. Retha Kumar

DEPARTMENT OF MATHEMATICS

UG COURSE OUTCOMES

PAPER-I: DIFFERENTIAL EQUATIONS

Upon completion of the course students should be able

- To analyze real world scenarios to recognize when ordinary differential equations (ODEs) or systems of ODEs are appropriate, formulate problems about the scenarios, creatively model these scenarios (using technology, if appropriate) in order to solve the problems using multiple approaches, judge if the results are reasonable, and then interpret and clearly communicate the results
- To recognize ODEs and system of ODEs concepts that are encountered in the real world, understand and be able to communicate the underlying mathematics involved to help another person gain insight into the situation
- To work with ODEs and systems of ODEs in various situations and use correct mathematical terminology, notation, and symbolic processes in order to engage in work, study, and conversation on topics involving ODEs and systems of ODEs with colleagues in the field of mathematics, science or engineering

PAPER-II: SOLID GEOMETRY

After studying this course, students should be able

- To understand geometrical terminology for angles, triangles, quadrilaterals and circles
- To measure angles using a protractor
- To use geometrical results to determine unknown angles
- To recognise line and rotational symmetries
- To find the areas of triangles, quadrilaterals and circles and shapes based on these

PROGRAMME OUT COMES

- To create interest to learn Mathematics
- To develop Mathematical Skills to understand practical applications
- To develop specific reasons and proofs in daily applications of Mathematics

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S.R.R & C.V.R GOVT DEGREE COLLEGE
(AUTONOMOUS) NAAC B⁺
Department of Mathematics
B.Sc. SECOND YEAR MATHEMATICS SYLLABUS
SEMESTER – III, PAPER – 3
ABSTRACT ALGEBRA

60Hrs

UNIT – 1: (10Hrs) GROUPS:-

Binary Operation – Algebraic Structure – Semi group – Monoid – Group definition and elementary properties Finite and infinite groups – examples – order of a group. Composition tables with examples.

UNIT-2: (14Hrs) SUBGROUPS:-

Complex Definition–Multiplication of two complexes Inverse of a complex–Subgroup definition – examples-criterion for a complex to be a subgroups.

Criterion for the product of two subgroups to be a subgroup-union and Intersection of subgroups.

Co-sets and Lagrange's Theorem:-

Cosets Definition – Properties of Cosets – Index of a subgroups of a finite groups – Lagrange's Theorem.

UNIT-3: (12 Hrs) NORMAL SUBGROUPS:-

Definition of normal subgroups-proper and improper normal subgroup-Hamilton group- criterion for a subgroup to be a normal subgroup-intersection of two normal subgroups-Sub group of index 2 is a normal sub group – simple group – quotient group – criteria for the existence of a quotient group.

UNIT-4: (10 Hrs) HOMOMORPHISM:-

Definition of homomorphism – Image of homomorphism elementary properties of homomorphism – Isomorphism – automorphism definitions and elementary properties – kernel of a homomorphism – fundamental theorem on Homomorphism and applications.

UNIT-5: (14 Hrs) PERMUTATIONS AND CYCLC GROUPS:-

Definitions of permutation – permutation multiplication – Inverse of a permutation – cyclic permutations – transposition – even and odd permutations – Cayley's theorem.

Cyclic Groups:-

Definition of cyclic group – elementary properties – classification of cyclic groups.

Reference Books:

1. Abstract Algebra by J.B. Fraleigh, Published by Narosa Publishing house.
2. A text book of Mathematics for B.A. / B.Sc. by B.V.S.S. SARMA and others, Published by S. Chand & Company, New Delhi.
3. Modern Algebra by M.L. Khanna.

Suggested Activities:

Seminar/Quiz/Assignments/Project on Group theory and its applications in Graphics and Medical image Analysis.

Dr. Sahjanarayana
25/11/2020

K.A.
25/11/20

V. V. B. S. S. S.
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Dr. S. S. S.
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Dr. S. S. S.

Dr. S. S. S.
25.11.20

Dr. S. S. S.

B. Rethakumar

S R R & C V R GOVT DEGREE COLLEGE

(AUTONOMOUS) NAAC B⁺

Department of Mathematics

IInd B.Sc MATHEMATICS SYLLABUS

SEMESTER-III, PAPER-3

ABSTRACT ALGEBRA

BLUE PRINT

DURATION : 3 HRS

Total Marks:60M

SECTION-A

Answer any Five questions. Each question carries 4 Marks.

5×4 = 20M

Question	Topics	No. of Questions	Weight age
1	UNIT-1	1	4
2	UNIT-1	1	4
3	UNIT-2	1	4
4	UNIT-2	1	4
5	UNIT-3	1	4
6	UNIT-3	1	4
7	UNIT-4	1	4
8	UNIT-4	1	4
9	UNIT-5	1	4
10	UNIT-5	1	4

SECTION-B

Answer ALL Questions. Each question carries 8 MARKS.

5×8 = 40M

QUESTION	Topic	No. of questions	Marks
11.(a) or (b)	UNIT-1	2	8
12.(a) or (b)	UNIT-2	2	8
13.(a) or (b)	UNIT-3	2	8
14.(a) or (b)	UNIT-4	2	8
15.(a) or (b)	UNIT-5	2	8

Bh. Subhakarayana
25/11/2020

K. S. S.
25/11/20

V. R. S. S.
25/11/20

S. S. S.
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M. S. S.
25.11.20

B. K. S. S.
B. K. S. S. Kumar

S.R.R & C.V.R Govt.Degree College
(Autonomous) NAAC B+
Department of Mathematics
Semester -III, Paper -3
Abstract Algebra

Time: 3 Hours

Model Question Paper

Max.Marks:60

Section-A

Answer any FIVE Questions

(5x4=20Marks)

1. In a group, inverse of any element is unique
సమూహము నందు ఏదైనా మూలకపు విలోమము ఏకైకము.
2. Prove that the set of integers Z is an abelian group for the operation $*$ defined by $a*b=a+b+1 \forall a,b \in Z$
 Z అనే పూర్ణ సంఖ్యల సమితిలో $*$ అనే పరిక్రియ $a*b=a+b+1 \forall a,b \in Z$ గా నిర్వచించినట్లైతే Z ఎబేరియన్ సమూహము అవుతుందని చూపుము.
3. Show that intersection of two subgroups is also a subgroup
రెండు ఉపసమూహముల చేదనము మరల ఉపసమూహము అవుతుందని చూపుము.
4. If H is any subgroup of a group G , then prove that $H^{-1}=H$
 H అనేది G సమూహమునకు ఒక సమూహము అయితే $H^{-1}=H$ అవుతుందని చూపుము.
5. Show that every subgroup of an abelian group is normal.
ఎబీలియన్ సమూహము యొక్క ప్రతి ఉపసమూహము అభిలంబ ఉపసమూహము అవుతుందని చూపుము.
6. Show that Intersection of any two normal Subgroups of a group is a normal subgroup
ఏదైనా రెండు అభిలంబ ఉపసమూహముల చేదనము మరల అభిలంబ ఉపసమూహము అవుతుందని చూపుము.
7. Prove that the homomorphic image of a group is a group
సమూహము యొక్క సమరూపత ప్రతిబింబము కూడా సమూహము అవుతుందని చూపుము.
8. If f is a homomorphism from a group G in to a group G^1 then $\ker f$ is normal subgroup of G
 f అనునది సమూహము G నుండి G^1 కు సమరూపము అయిన G కి $\ker f$ అభిలంబ ఉపసమూహము అవుతుందని చూపించుము.
9. Express the permutation $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 6 & 5 & 4 & 3 & 1 & 2 \end{pmatrix}$ as the product of disjoint cycles.
 $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 6 & 5 & 4 & 3 & 1 & 2 \end{pmatrix}$ అనే ప్రస్తారమును విముక్త చక్రాల లబ్ధంగా వ్రాయుము.
10. G is a cyclic group of order r and ' a ' is a generator of G . Show that a^m is a generator of G if and only if $(m,r)=1$
 G , n వ తరగతి గల ఒక చక్రియ సమూహము మరియు ' a ', G నకు ఒక జనకమూలకం అయితే a^m అనేది G నకు జనకమూలకం కావడానికి అవశ్యక పర్యాప్త నియమము $(m,r)=1$ అని చూపుము.
11. (a) If G is a group and $a,b \in G$ then prove that the equations $ax=b$ and $ya=b$ have unique solutions in G
 G అనేది ఒక సమూహము మరియు $a,b \in G$ అయితే $ax=b$ మరియు $ya=b$ అనే సమీకరణములకు G లో ఏకైక సాధనలు ఉంటాయని చూపుము.

(or)

(b) Prove that the set G of real numbers other than -1 with operation $*$ such that $a*b = a+b+ab \forall a, b \in G$ is an abelian group.

$G = \mathbb{R} - \{-1\}$ అనే సమితిలో $*$ అనే పరిక్రియ $a*b = a+b+ab \forall a, b \in G$ నిర్వచించినట్లయితే G ఎబీలియన్ సమూహము అవుతుందని చూపుము.

12. (a) State and prove Lagrange's theorem for finite groups

పరిమిత సమూహాలపై లాగ్రాంజ్ సిద్ధాంతమును ప్రవచించి నిరూపించుము.

(or)

(b) Let H be a subgroup of a group G and $a, b \in G$ then prove that (i) $Ha = Hb \Leftrightarrow ab^{-1} \in H$

(ii) $aH = bH \Leftrightarrow a^{-1}b \in H$

H అనేది $E1$ సమూహమునకు ఒక ఉపసమూహము మరియు $a, b \in G$ అయితే

(i) $Ha = Hb \Leftrightarrow ab^{-1} \in H$ (ii) $aH = bH \Leftrightarrow a^{-1}b \in H$ అని చూపుము.

13. (a) If H is a subgroup of G and N is normal subgroup of G , then show that (a) $H \cap N$ is a normal subgroup of H and (b) N is a normal subgroup of HN .

G అనే సమూహమునకు H ఒక ఉపసమూహము మరియు N ఒక అభిలంబ ఉపసమూహము అయితే ఈ క్రింది వానిని నిరూపించుము.

(or)

(b) Prove that a subgroup H of a group G is a normal subgroup of G if and only if each left coset of H in G is a right coset of H in G .

$E1$ సమూహమునకు H అనే ఉపసమూహము అభిలంబ ఉపసమూహము కావడానికి ఆవశ్యక పర్యాప్త నియమము G లో H యొక్క ప్రతి ఎడమ సహసమితి G లో H యొక్క కుడి సహసమితి అవుతుందని చూపుము

14. (a) Show that the necessary and sufficient condition for a homomorphism f of a group $E1$ onto a group ' G ' with kernel K to be an isomorphism of G into G^1 is that

$K = \text{Ker}f = \{e\}$

$f: G \rightarrow G^1$ అనే ఒక సంగ్రస్త సమరూపత తుల్యరూపత కావడానికి ఆవశ్యక పర్యాప్త నియమము

$K = \text{Ker}f = \{e\}$ అని చూపుము.

(or)

(b) Prove that every homomorphic image of a group G is isomorphic to some quotient group of G .

G సమూహము యొక్క సమరూపత ప్రతిబింబము దాని యొక్క వ్యుత్పన్న సమూహములో తుల్యరూపతను కల్గియుంటుందని చూపుము.

15. (a) Let S_n be a symmetric group of n symbols and let A_n be the group of even permutations then show that A_n is a normal subgroup of S_n and $O(A_n) = \frac{1}{2}n!$

S_n అనేది n సంకేతాలు గల సౌష్ఠవ సమూహము. A_n అనేది సరిప్రస్తారాల సమూహము. అయితే A_n అనేది S_n కి అభిలంబ ఉపసమూహము అవుతుందని మరియు $O(A_n) = \frac{1}{2}n!$ అని చూపుము.

(or)

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

చక్రియ సమూహము యొక్క ప్రతి ఉపసమూహము చక్రియ సమూహము అవుతుందని చూపుము.

P. S. Srinivasan
25/11/20

25/11/20

25.11.20

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B. Patra Kumar

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S R R & C V R GOVT DEGREE COLLEGE

(AUTONOMOUS) NAAC B⁺

Department of Mathematics

III B.Sc MATHEMATICS SYLLABUS

SEMESTER-5, PAPER-5

RING THEORY & VECTOR CALCULUS

60 Hrs

UNIT - 1 (12 hrs) RINGS-I :-

Definition of Ring and basic properties, Boolean Rings, divisors of zero and cancellation laws Rings, Integral Domains, Division Ring and Fields, The characteristic of a ring - The characteristic of an Integral Domain, The characteristic of a Field. Sub Rings, Ideals

UNIT - 2 (12 hrs) RINGS-II :-

Definition of Homomorphism - Homomorphic Image - Elementary Properties of Homomorphism - Kernel of a Homomorphism - Fundamental theorem of Homomorphism - Maximal Ideals - Prime Ideals.

UNIT - 3 (12 hrs) VECTOR DIFFERENTIATION :-

Vector Differentiation, Ordinary derivatives of vectors, Differentiability, Gradient, Divergence, Curl operators, Formulae Involving these operators.

UNIT - 4 (12 hrs) VECTOR INTEGRATION :-

Line Integral, Surface Integral, Volume integral with examples.

UNIT - 5 (12 hrs) VECTOR INTEGRATION APPLICATIONS :-

Theorems of Gauss and Stokes, Green's theorem in plane and applications of these theorems.

Reference Books :-

1. Abstract Algebra by J. Fraleigh, Published by Narosa Publishing house.
2. Vector Calculus by Santhi Narayana, Published by S. Chand & Company Pvt. Ltd., New Delhi.
3. A text Book of B.Sc., Mathematics by B.V.S.S.Sarma and others, published by S. Chand & Company Pvt. Ltd., New Delhi.
4. Vector Calculus by R. Gupta, Published by Laxmi Publications.
5. Vector Calculus by P.C. Matthews, Published by Springer Verlag publications.
6. Rings and Linear Algebra by Pundir & Pundir, Published by Pragathi Prakashan.
7. Linear Algebra & Vector Calculus (by Bhavani Satyanarayana, Pradubkumar

Suggested Activities:

Seminar/ Quiz/ Assignments/ Project on Ring theory and its applications

B. Srinivasulu
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V. K. Srinivasulu
25/11/20

K. Srinivasulu
25/11/20

M. Srinivasulu
25.11.20

B. Patra Kumar
25/11/20

S R R & C V R GOVT DEGREE COLLEGE

(AUTONOMOUS) NAAC B⁺

Department of Mathematics

III B.Sc MATHEMATICS

SEMESTER-5, PAPER-5

RING THEORY & VECTOR CALCULUS

BLUE PRINT

DURATION : 3 HRS

Total Marks:60

SECTION-A

Answer any Five questions. Each question carries 4 Marks.

5×4 = 20M

Question	Topics	No.of Questions	Weight age
1	UNIT-1	1	4
2	UNIT-1	1	4
3	UNIT-2	1	4
4	UNIT-2	1	4
5	UNIT-3	1	4
6	UNIT-3	1	4
7	UNIT-4	1	4
8	UNIT-4	1	4
9	UNIT-5	1	4
10	UNIT-5	1	4

SECTION-B

Answer ALL Questions. Each question carries 8 MARKS.

5×8 = 40M

QUESTION	Topic	No. of questions	Marks
11.(a) or (b)	UNIT-1	2	8
12.(a) or (b)	UNIT-2	2	8
13.(a) or (b)	UNIT-3	2	8
14.(a) or (b)	UNIT-4	2	8
15.(a) or (b)	UNIT-5	2	8

P. S. Subramanyam
25/11/2020

V. S. S. S. S.
25/11/20

M. S. S.
25-11-20

K. S. S.
25/11/20

S. S. S.
25/11/20

S. S. S.

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S.R.R & C.V.R GOVT DEGREE COLLEGE

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Department of Mathematics

Semester – V, Paper – 5

RING THEORY AND VECTOR CALCULUS

Time: 3 Hrs

Model Question paper

maximum : 60 Marks

SECTION A – (5 X 4 = 20 Mark)

Answer any FIVE questions.

1. Prove that characteristic of a Boolean ring is '2'.
బూలియన్ వలయమునకు లాక్ష్మణికము '2' అని చూపండి.
2. If F is a field then show that $\{0\}$ and F are the only ideals of F .
క్షేత్రము F కు $\{0\}$, F లు మాత్రమే ఆదర్శములు అగునని చూపుము.
3. If f is a homomorphism from a ring R into a ring S then prove that $\ker f$ is an ideal of R .
వలయము R నుండి వలయము S కు f ఒక సమరూపత అయితే కెర్నల్ f అనేది R లో ఆదర్శము అవుతుంది అని చూపండి.
4. An ideal A of a commutative ring R with unity is prime ideal iff R/A is an integral domain.
వినిమయ వలయము R కి ఐడీయల్ A , అభాజ్య ఐడీయల్ అగుటకు అవశ్యక పర్యాప్త నియము R/A ఒక పూర్ణాంక ప్రదేశము అని చూపండి.
5. If $\vec{r} = a \cos t \vec{i} + a \sin t \vec{j} + at \tan \theta \vec{k}$ then find
(a) $\left(\frac{d\vec{r}}{dt} \times \frac{d^2\vec{r}}{dt^2}\right)$ at $t = 0$.
 $\vec{r} = a \cos t \vec{i} + a \sin t \vec{j} + at \tan \theta \vec{k}$ అయినపుడు $t = 0$ వద్ద
(a) $\left(\frac{d\vec{r}}{dt} \times \frac{d^2\vec{r}}{dt^2}\right)$ వద్ద $t = 0$ ను కనుగొనుము.
6. If $A = t\vec{i} - t^2\vec{j} + (t-1)\vec{k}$, $B = 2t^2\vec{i} + 6t\vec{k}$, find
(a) $\int_0^2 (A \cdot B) dt$
 $A = t\vec{i} - t^2\vec{j} + (t-1)\vec{k}$, $B = 2t^2\vec{i} + 6t\vec{k}$ అయితే

(a) $\int_0^2 (A \cdot B) dt$ ను కనుగొనుము.

7. If $\phi = x^3 - y^3 + x^2z$ then find grade ϕ at $(1, 1, -2)$.

(1, 1, -2) వద్ద $\phi = x^3 - y^3 + x^2z$ అయితే grade ϕ ను కనుగొనుము.

8. Evaluate $\oint_C \vec{F} \cdot d\vec{r}$ where C is the circle $x^2 + y^2 = 1, z = 0$ and $\vec{F} = y\vec{i} + z\vec{j} + x\vec{k}$

$\vec{F} = y\vec{i} + z\vec{j} + x\vec{k}$ అయితే $x^2 + y^2 = 1, z = 0$ అను వక్రము C పై \vec{F} యొక్క రేఖా సమాకలని రాబట్టండి.

9. Evaluate by Green's theorem $\oint_C (y - \sin x)dx + \cos x dy$ where C is the triangle enclosed by the lines $x = 0, x = \frac{\pi}{2}, \pi y = 2x$.

గ్రీన్ సిద్ధాంతము నుపయోగించి $x = 0, x = \frac{\pi}{2}, \pi y = 2x$ రేఖలచే పరిబద్ధమైన త్రిభుజము C లో $\oint_C (y - \sin x)dx + \cos x dy$ విలువను రాబట్టండి.

10. Apply Gauss's theorem to prove that $\int_V rNdS = 3v$.

గౌస్ సిద్ధాంతమునుపయోగించి $\int_V rNdS = 3v$ ను నిరూపించుము.

SECTION B - (5 X 8 = 40 Marks)
Answer the following questions.

UNIT I

11. If $Z(i) = \{a + ib/a, b \in \mathbb{Z}, i^2 = -1\}$ then show that $z(i)$ is an integral domain w.r.t. addition and multiplication of complex numbers.

(a) $Z(i) = \{a + ib/a, b \in \mathbb{Z}, i^2 = -1\}$ అయితే $z(i)$ అనునది సంకలనము మరియు గుణకారం దృష్ట్యా పూర్ణాంక ప్రదేశము అవుతుందని చూపండి.

Or

(b) Show that Z is a principal ideal ring.

Z అనునది ప్రధాన ఆదర్శ వలయమవుతుందని చూపండి.

UNIT II

12. In the ring of integers, determine the maximal ideals.

(a) పూర్ణాంక వలయములో అధికతను అదర్శాలను నిర్ణయింపుము.

Or

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

వలయ సమరూపతా ప్రాథమిక సిద్ధాంతమును ప్రవచించి నిరూపించుము.

UNIT III

13. (a) Find the directional derivative of $\phi = x^2yz + 4xz^2$ at the point $(1, -2, -1)$

(a) $\phi = x^2yz + 4xz^2$ అను స్కలార్ ఫంక్షన్ యొక్క దిశాత్మక ఉత్పన్నమును $(1, -2, -1)$ బిందువు వద్ద $2\vec{i} - \vec{j} - 2\vec{k}$ దిశలో నిర్ణయించుము.

(1, -2, -1) వద్ద $2\bar{i} - \bar{j} - 2\bar{k}$ వక్రానికి స్పర్శరేఖ దిశలో $\theta = x^2yz + 4xz^2$
ప్రమేయానికి దైశిక వ్యుత్పన్నము కనుగొనుము.

- (b) Find $\text{div } F$ and $\text{curl } F$ where $\vec{F} = xy^2\bar{i} + 2x^2yz\bar{j} - 3yz^2\bar{k}$ at (1, -1, 1).
 $\vec{F} = xy^2\bar{i} + 2x^2yz\bar{j} - 3yz^2\bar{k}$ అయితే (1, -1, 1) వద్ద $\text{div } F$ మరియు $\text{curl } F$
కనుక్కోండి.

16. If A, B are two differentiable vector point functions then show that
 $\text{grad } (A \cdot B) = (B \cdot \nabla)A + (A \cdot \nabla)B + B \times (\text{curl } A) + A \times (\text{curl } B)$.
A, B లు రెండు అదిశాలిండు ప్రమేయాలయితే
 $\text{grad } (A \cdot B) = (B \cdot \nabla)A + (A \cdot \nabla)B + B \times (\text{curl } A) + A \times (\text{curl } B)$ అని చూపండి.

UNIT IV

17. If $F = (x + y^2)\bar{i} - 2x\bar{j} + 2yz\bar{k}$, evaluate $\int_S F \cdot N dS$ where S is the surface of
plane $2x + y + 2z = 6$ in the first octant.
 $F = (x + y^2)\bar{i} - 2x\bar{j} + 2yz\bar{k}$, అయి ప్రథమాష్టమంలో $2x + y + 2z = 6$
తలభాగం S అయితే $\int_S F \cdot N dS$ రాబట్టుండి.
18. If $\phi = 45x^2y$, evaluate $\iiint \phi dV$ where V is the closed region bounded by the
plane $4x + 2y + z = 8$, $x = y = z = 0$.
 $\phi = 45x^2y$, అయి $4x + 2y + z = 8$, $x = y = z = 0$ తలాలచే పరిబద్ధమైన
సంవృతాంతరాళం V అయితే $\iiint \phi dV$ కనుక్కోండి.

UNIT V

19. State and prove Gauss's divergence theorem.
గాస్ అవసరణ సిద్ధాంతమును ప్రవచించి నిరూపించుము.

Or

20. Verify Stoke's theorem for $\int_C xy dx + xy^2 dy$ where C is the square in the xy-
plane with vertices (1, 0) (-1, 0) (0, 1) (0, -1).
(1, 0) (-1, 0) (0, 1) (0, -1)లచే xy-తలంలో ఏర్పడు చతురస్రమునకు $\int_C xy dx + xy^2 dy$
నకు స్టోక్స్ సిద్ధాంతం సరిచూడండి.

B. Patra kumar
25/11/2020

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25/11/20

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25/11/20

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B. Patra kumar

S R R & C V R GOVT DEGREE COLLEGE

(AUTONOMOUS) NAAC B⁺

Department of Mathematics

III B.Sc MATHEMATICS SYLLABUS

SEMESTER-5, PAPER-6

LINEAR ALGEBRA

60 Hrs

UNIT - I (12 hrs) : Vector Spaces-I :

Vector Spaces, General properties of vector spaces, n-dimensional Vectors, addition and scalar multiplication of Vectors, internal and external composition, Null space, Vector subspaces, Algebra of subspaces, Linear Sum of two subspaces, linear combination of Vectors, Linear span Linear independence and Linear dependence of Vectors.

UNIT -II (12 hrs) : Vector Spaces-II :

Basis of Vector space, Finite dimensional Vector spaces, basis extension, co-ordinates, Dimension of a Vector space, Dimension of a subspace, Quotient space and Dimension of Quotientspace.

UNIT -III (12 hrs) : Linear Transformations :

Linear transformations, linear operators, Properties of L.T, sum and product of LTs, Algebra of Linear Operators, Range and null space of linear transformation, Rank and Nullity of linear transformations - Rank - Nullity Theorem.

UNIT -IV (12 hrs) : Matrix :

Matrices, Elementary Properties of Matrices, Inverse Matrices, Rank of Matrix, Linear Equations, Characteristic Roots, Characteristic Values & Vectors of square Matrix, Cayley - Hamilton Theorem.

UNIT -V (12 hrs) : Inner product space :

Inner product spaces, Euclidean and unitary spaces, Norm or length of a Vector, Schwartz inequality, Triangle in Inequality, Parallelogram law, Orthogonality, Orthonormal set, complete orthonormal set, Gram - Schmidt orthogonalisation process. Bessel's inequality and Parseval's Identity.

Reference Books :

1. Linear Algebra by J.N. Sharma and A.R. Vasista, published by Krishna Prakashan Mandir, Meerut-250002.
2. Matrices by Shanti Narayana, published by S.Chand Publications.
3. Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low priced edition), New Delhi.
4. Linear Algebra by Stephen H. Friedberg et al published by Prentice Hall of India Pvt. Ltd. 4th Edition 2007.
5. Linear Algebra & Vector Calculus (by Bhavanari Satyanarayana, Pradeep Kumar & B.D. Srinivasulu) published by STUDERA PRESS, New Delhi

Suggested Activities:

Seminar/ Quiz/ Assignments/ Project on "Applications of Linear algebra Through Computer Sciences"

P. S. Satyanarayana
25/11/20

V. B. Srinivasulu
25/11/20

M. S. Srinivasulu
25.11.20

K. S. Srinivasulu
25/11/20

S. S. Srinivasulu
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S. S. Srinivasulu
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B. Ratna Kumari

2016

S R R & C V R GOVT DEGREE COLLEGE

(AUTONOMOUS) NAAC B⁺

Department of Mathematics

III B.Sc MATHEMATICS

SEMESTER-5, PAPER-6

LINEAR ALGEBRA

BLUE PRINT

DURATION : 3 HRSTotal Marks:60

SECTION-A

Answer any **Five** questions. Each question carries **4** Marks.

5×4 = 20M

Question	Topics	No.of Questions	Weight age
1	UNIT-1	1	4
2	UNIT-1	1	4
3	UNIT-2	1	4
4	UNIT-2	1	4
5	UNIT-3	1	4
6	UNIT-3	1	4
7	UNIT-4	1	4
8	UNIT-4	1	4
9	UNIT-5	1	4
10	UNIT-5	1	4

SECTION-B

Answer **ALL** Questions. Each question carries **8** MARKS.

5×8 = 40M

QUESTION	Topic	No. of questions	Marks
11.(a) or (b)	UNIT-1	2	8
12.(a) or (b)	UNIT-2	2	8
13.(a) or (b)	UNIT-3	2	8
14.(a) or (b)	UNIT-4	2	8
15.(a) or (b)	UNIT-5	2	8

Ah. Sahyansingh
25/11/2020

Kishor
25/11/20

P. V. S. S. S. S.
25/11/20

Deepa Saha
25/11/20

Ashish
25.11.20

B. Ratha Kumar

S.R.R & C.V.R GOVT DEGREE COLLEGE

(Autonomous) NAACB+
Department of Mathematics
Semester – V, Paper – 6
Linear Algebra

Time: 3 Hrs

Model Question paper

maximum : 60 Marks

SECTION A – (5 X 4 = 20 Mark)

Answer any FIVE questions.

1. Let p, q, r be the fixed elements of a field F . Show that the set W of all triads (x, y, z) of elements of F , such that $px + qy + rz = 0$ is a vector space of $V_3(F)$.
క్షేత్రము F లో p, q, r లు స్థిరమూలకాలు అయితే, సదిశాంతరాళము $V_3(F)$ కి $w = \{(x, y, z) / px + qy + rz = 0\}$ ఉపాంతరాళమని చూపుము.
2. If S is a subset of a vector space $V(F)$ then prove that
(a) S is a subspace of $V \Leftrightarrow L(S) = S$
 $V(F)$ సదిశాంతరాళానికి S ఒక ఉప పరిమితి అయితే
(a) V కి S ఉపాంతరాళము $\Leftrightarrow L(S) = S$ అని నిరూపించండి.
3. If α, β, γ are linearly independent vectors of a vector space $V(F)$, show that $\alpha + \beta, \beta + \gamma, \gamma + \alpha$ are also linearly independent.
 α, β, γ అను సదిశలు సదిశాంతరాళము $V(F)$ లో ఋజు స్వాతంత్ర్య సదిశలు అయితే
 $\alpha + \beta, \beta + \gamma, \gamma + \alpha$ కూడా ఋజు స్వాతంత్ర్య సదిశలు అని చూపండి.
4. Show that the set $\{(1, 0, 0), (1, 1, 0), (1, 1, 1)\}$ is a basis of $C^3(C)$
సదిశాంతరాళము $C^3(C)$ కి సమితి $\{(1, 0, 0), (1, 1, 0), (1, 1, 1)\}$
ఒక ఆధారమగునని చూపించుము.
5. If the mapping $T : V_3(R) \rightarrow V_2(R)$ is defined by $T(x, y, z) = (x - y, x + z)$ then show that T is a linear transformation.
 $T : V_3(R) \rightarrow V_2(R)$ ని $T(x, y, z) = (x - y, x + z)$ అని నిర్వచించిన T ఋజు పరివర్తన అని చూపండి.
6. If T is a linear Transformation from a vector space $U(F)$ into a vector space $V(F)$ then prove that $R(T)$, the range of T is a subspace of V .
సదిశాంతరాళము $U(F)$ నుండి సదిశాంతరాళము $V(F)$ కు
 T అనునది ఋజు పరివర్తనము అయితే V కు $R(T)$ ఉపాంతరాళము అని చూపండి.

7. Prove that the characteristic vectors corresponding to distinct characteristic roots of a matrix are linearly independent.

మాత్రికలోని లాక్షణిక సదిశలు కలిగి వున్న లాక్షణిక మూలములు ఋజు స్వతంత్రములు అని నిరూపించుము.

8. Find the characteristic roots and the corresponding of the matrix

$$A = \begin{bmatrix} 2 & 1 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & 2 \end{bmatrix}$$

$$A = \begin{bmatrix} 2 & 1 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & 2 \end{bmatrix} \text{ కి లాక్షణిక మూలములు కనుగొనుము.}$$

9. Find the unit vector orthogonal to $(4, 2, 3)$ in R^3 .
 R^3 లో సదిశ $(4, 2, 3)$ కు అభిలంబ యూనిట్ సదిశను కనుగొనుము.
10. State and prove Triangle inequality.

త్రిభుజ అసమానతను ప్రవచించి నిరూపించుము.

SECTION - B - (5 X 8 = 40 Marks)

Answer the following questions.

UNIT I

11. Show that the necessary and sufficient condition for a non empty subset W of a vector space $V(F)$ to be a subspace of V is that $a, b \in F, \alpha, \beta \in W \Rightarrow a\alpha + b\beta \in W$.
 W అనునది $V(F)$ అను సదిశాంతరాళము యొక్క శూన్యేతర ఉపసమితి, W అనునది $V(F)$ కు ఉపాంతరాళము అగుటకు ఆవశ్యక పర్యాప్త నియమము

$$a, b \in F, \alpha, \beta \in W \Rightarrow a\alpha + b\beta \in W$$

Or

12. If W_1 and W_2 are subspaces of a vector space $V(F)$ then show that $W_1 + W_2$ is a subspace of $V(F)$ and $L(w_1 \cup w_2) = w_1 + w_2$.
 W_1 మరియు W_2 లు ఒక సదిశాంతరాళము $V(F)$ యొక్క రెండు ఉపాంతరాళములు. అప్పుడు $W_1 + W_2$ అనేది $V(F)$ కు ఉపాంతరాళము మరియు $L(w_1 \cup w_2) = w_1 + w_2$ అని చూపండి.

UNIT II

13. If w_1 and w_2 are two subspaces of a finite dimensional vector space $V(F)$ then prove that $\dim(w_1 + w_2) = \dim w_1 + \dim w_2 - \dim(w_1 \cap w_2)$.
సదిశాంతరాళము $V(F)$ కు w_1 మరియు w_2 లు రెండు ఉపసదిశాంతరాళములు అయితే $\dim(w_1 + w_2) = \dim w_1 + \dim w_2 - \dim(w_1 \cap w_2)$ అని నిరూపించండి.

Or

14. Let $V(F)$ be a finite dimension vector space and $S = \{\alpha_1, \alpha_2, \dots, \alpha_n\}$ is L.I. subset of V . Then either S itself a basis of V or S can be extended to form a basis of V .
 $V(F)$ అనేది ఒక పరిమిత పరిమాణ సదిశాంతరాళము మరియు $S = \{\alpha_1, \alpha_2, \dots, \alpha_n\}$ అనేది V కు ఒక స్వతంత్ర సదిశల ఉపసమితి. అయితే అనేది V కు ఆధారము అవుతుంది లేదా S ను V కు ఆధారమయ్యే విధముగా విస్తరించవచ్చును.

UNIT - III

13. State and prove Rank - Nullity theorem.

కోటిశూన్యతా సిద్ధాంతమును ప్రవచించి, నిరూపించుము.

Or

14. Find the null space, range, rank and nullity of the transformation $T : R^2 \rightarrow R^3$ defined by $T(x, y) = (x + y, x - y, y)$.

$T(x, y) = (x + y, x - y, y)$ గా నిర్వచించబడిన $T : R^2 \rightarrow R^3$ యొక్క శూన్య అంతరాళము, వ్యాప్తి, కోటి మరియు శూన్యత్వములను కనుక్కోండి.

UNIT - IV

15. State and prove Cayley - Hamilton theorem.

కేలే - హేమిల్టన్ సిద్ధాంతమును ప్రవచించి నిరూపించుము.

Or

16. Solve $x + y + z = 6$, $x - y + z = 2$, $2x - y + 3z = 9$ by matrix inversion method.

$x + y + z = 6$, $x - y + z = 2$, $2x - y + 3z = 9$ ను మాత్రిక విలోమ పద్ధతి ద్వారా సాధించండి.

UNIT - V

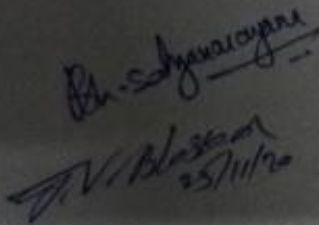
17. State and prove Cauchy - Schwarz's inequality.

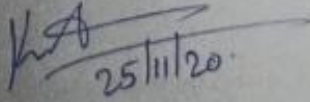
కోషి స్కవార్జ్ అసమానతను ప్రవచించి, నిరూపించుము.

Or

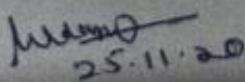
18. Applying Gram - Schmidt orthogonalisation process obtain an orthonormal basis of R^3 from the basis $\{(1,0,1), (1,0,-1), (0,3,4)\}$

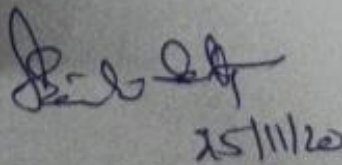
అంతర్లబ్ధాంతరాళము R^3 కి ఆధారము $\{(1,0,1), (1,0,-1), (0,3,4)\}$ అయితే దీని నుండి గ్రామ్-స్కిత్ పద్ధతిన R^3 కు ఒక లంభాబిలంబ ఆధారాన్ని రాబట్టుము.

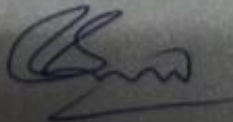

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B. Raktia Kumar;

SRR & CVR GOVT DEGREE COLLEGE (A)

VIJAYAWADA-520004

I YEAR I SEMESTER

MATHS FOR DATA SCIENCE

Objective

The course is a brief overview of the basic tools from Linear Algebra and Multivariable Calculus that will be needed in subsequent course of the program.

Outcome

By completing the course the students will have been reminded of the basic tools of Linear Algebra and Multivariable Calculus needed in subsequent courses in the program notably:

- Fundamental properties of matrices, their norms, and their applications.
- Differentiating/Integrating multiple variable functions and the role of the gradient and the hessian matrix.
- Basic properties of optimization problems involving matrices and functions of multiple variables.

Unit-I

Matrices and Basic Operations, Special structures Matrices and Basic Operations, Interpretation of matrices as linear mappings and some examples. Square Matrices, Determinants Properties of determinants, singular and non-singular matrices, examples, finding an inverse matrix.

Unit-II

Eigen values and Eigenvectors Characteristic Polynomial, Definition of Left/Right Eigen values and Eigenvectors. Caley – Hamilton theorem, singular value Decomposition, Interpretation of Eigen values/vectors.

Unit-III

Linear Systems Definition, Applications, Solving Linear Systems, Linear Inequalities, Linear Programming.

J. Jayalakshmi

K.A.
M.M.S.



Unit-IV

Real-valued functions of two or more variables. Definition, examples, simple demos, applications.

Unit-V

Analysis elements Distance, Limits, Continuity, Differentiability, the gradient and the Gaussian

Optimization problems Simple examples, motivation, the role of the Hessian maxima and minima and related extreme conditions.

Integration Double integrals, Fubini's theorem, properties, applications.

References:

1. Gilbert Strang, Linear Algebra and its Applications. Thomson /Brooks Cole (Available in a Greek Translation).
2. Thomas M. Apostol, Calculus, Wiley, 2nd Edition, 1991 ISBN 960-07-0067-2.
3. Michael Spivak. Calculus, publish or Perish, 2008, ISBN 978-0914098911.
4. Ross L. Finney, Maurice D. Weir . and Frank R. Giordano. Thomas's Calculus, Pearson 12th Edition 2009.
5. David C. Lay, Linear Algebra and Its Applications. 4th Editoin.
6. Yourself saad, Iterative Methods for spare Linear Systems.

Student Activity:

1. Find the Eigenvectors of $A = \begin{pmatrix} 1 & 1 & 1 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{pmatrix}$
2. Find orthogonal $S = \text{Spam}\left\{\begin{pmatrix} 1 & 1 & 1 \\ 1 & 4 & 4 \\ -1 & 4 & 4 \\ -4 & 2 & 2 \end{pmatrix}\right\}$

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SRR & CVR GOVT DEGREE COLLEGE (A)

VIJAYAWADA-520004

DATA SCIENCE

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 2:30 hrs

Marks: 60

Unit No	No. of essay question 8 marks	No. of short answer questions 4 marks	Total no. of questions with choice	Total marks allotted to the units
Unit-I	2	2	4	24
Unit-II	2	2	4	24
Unit-III	2	2	4	24
Unit-IV	2	2	4	24
Unit-V	2	2	4	24
Total no. of questions with choice = 20				
Total no. of marks with choice = 120				

T. Jayalakshmi

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DEPARTMENT OF MATHEMATICS

MODEL PAPER

SEMESTER - I

Paper I : DATA SCIENCE

Time:2;30hrs

Max marks:60

Section - A

Answer any FIVE questions

5x4=20marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

Section - B

Answer ALL questions

5 X 8 = 40M

11. A)

OR

B)

12. A)

OR

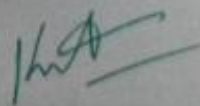
B)

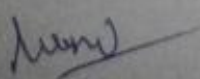
13. A)

OR

B)

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14. A)

OR

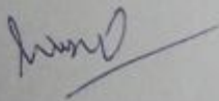
B)

15. A)

OR

B)

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BOS MEETINGONG APPROVED THE FOLLOWING LSIT OF PAPER SETTERS FOR
AUTONOMOUS

<u>S.NO</u>	<u>NAME OF THE LECTURER</u>	<u>DESIGNANTION</u>	<u>COLLEGE</u>
1	Dr.A. Ananta Lakshmi	Lecturer in Mathematics	P.R. Govt. College, Kakinada
2	Dr.P. Subhashini	Lecturer in Mathematics	P.R. Govt. College, Kakinada
3	S. Padmaja	Lecturer in Mathematics	G.D.C, Pitapuram
4	Dr.B. Chitti Babu	Lecturer in Mathematics	GDC, Pentapadu, JP.Gudem,W.G Dt.
5	Dr.Ch. Srinivasa Rao	Lecturer in Mathematics	GDC,Mandapet
6	Ch.S. Haranadh	Lecturer in Mathematics	GDC, Adkiveedu,W.G.Dt.
7	P. Hari Krishna	Lecturer in Mathematics	GDC, Eluru
8	G.V. Bhaskar	Lecturer in Mathematics	GDC for Women, Guntur
9	M. Maha Lakshmi Naidu	Lecturer in Mathematics	GDC(A), Tuni
10	A. Surya Narayana	Lecturer in Mathematics	GDC(A), Rajahmundry
11	BVN. Srirama Murthy	Lecturer in Mathematics	GDC(A), Rajahmundry
12	I. Lakshmi Gayatri	Lecturer in Mathematics	GDC(A), Rajahmundry
13	S. Jaganmohan Rao	Lecturer in Mathematics	GDC, Jaggampea, E.G.Dt.
14	V. Chitti Babu	Lecturer in Mathematics	GDC, Ramachandrapuram.

Dr. Subhashini
25/11/2020

K. S.
25/11/20

S.

V. K. S.
25/11/20

S. S.
25/11/20

M. S.
25.11.20

B. S.

B. Ratna Kumari