Board of Studies- B.Sc. Mathematics

Minutes of the meeting

Board of Studies Meeting	
Date	28/09/2024
Time	11:30 AM
Venue	Room No. 201

S.No	**Name**	**Designation**
1.	Ms. Roshini Anne Koshy Assistant Professor, St. Francis de Sales College (Autonomous), Bengaluru	Chairperson
2.	Dr. Chaluvaraju B Professor, Department of Mathematics, Bangalore University	University Nominee
3.	Dr. Hemalatha. N. C Associate Professor, Oxford College of Engineering, Bengaluru	External Subject Expert
4.	Dr. G.K Jagatheswari Associate Professor PES University – EC Campus, Bengaluru	External Subject Expert
5.	Mrs. Deepa. R Advisory technical service specialist IBM, Bengaluru	Industry Expert
6.	Ms. Swathi M Assistant Professor RNS Institute of Technology, Bengaluru	Alumni
7.	Ms. Rashmi.N Assistant Professor, St. Francis de Sales College(Autonomous), Bengaluru	Member
8.	Ms. Shanmugapriya Venkatesan Assistant Professor, St. Francis de Sales College (Autonomous), Bengaluru	Member
9.	Ms. Roopa. J Assistant Professor, St. Francis de Sales College(Autonomous), Bengaluru	Member

Sl No	Absentees Name	Reason (Optional)
	NIL	

Agenda	Discussion	Action taken
Introduction: Prayer BOS Members Introduction to the Department and Various Programs. Presentation by BOS Chairperson (HOD)	• Meeting commenced at 11:30 AM with an invocation of God's blessings. • Ms. Roshini Anne Koshy introduced about the department, external members and internal members. • Subject In charges presented the draft syllabus.	Done
Discussion of the First Autonomous Batch Syllabus of various programs (Brief highlights) Scheme and Evaluation Components	• Needs to update the framework • Course description and objective should be given first • Blooms taxonomy's word should be added in the CO • Needs to update the Course Matrix • We can have only 4 CO's • No changes suggested in the course Mathematics-I • Suggested not to add the python programming as an enhancement • Python programming and Mathematical logic can be given as skill/value added course. • Suggested not to give more than 6 references. • References should be of prescribed textbooks and web resources • Suggested to add some topics in the course Mathematics-II. • Suggested to use FLOSS for Python programming notes • Suggested to execute at least 3 programs from each unit. • Python programming as a skill/value based course	Suggestions and recommendations are included in the syllabus It is decided to follow the Scheme and Evaluation Components as per the Bangalore University format .
Approval of the syllabus	• As per the above discussion the syllabus is passed for the approval	Discussions and corrections are approved.

OBE – POs and COs are defined	As per the university OBE framework	Suggestions and Recommendations are incorporated in the OBE document
Conclusion: Discussion Vote of Thanks Closing remarks and appreciation.	• Course code can be shortened. • Text books, Reference books, web resources – Latest editions can be followed. • FLOSS can be followed for free notes of Python. • Value added courses/ Skill enhancement courses can be included as extra in the curriculum. • Some topics to be added in the course Mathematics-II. Suggested to add Group theory as the first unit and Mathematical logic can be given as a skill/Value added course. • Assistant Dean concluded with remarks and proposed vote of thanks	Recommendations are incorporated and skill based and value-added courses are included. Done

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Electronics City P.O., Bengaluru - 560 100, Karnataka, INDIA (+91) 8088140679 pro@sfscollege.in www.sfscollege.in

B.Sc. [Mathematics] [3 YEARS]

Syllabus and Scheme

From 2024-2025

BOARD OF STUDIES
[MATHEMATICS]

St. Francis de Sales College
[Autonomous]
Electronics City P.O. Bengaluru 560100
Karnataka, INDIA

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MEMBERS OF THE BOARD OF STUDIES

Sl. No.	Name	Designation
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PREFACE TO THE B.Sc. (Mathematics) 2024-2025 SYLLABUS

ಕರ್ನಾಟಕ ಸರ್ಕಾರದ ನಡಾವಳಿಗಳು

ವಿಷಯ: ಉನ್ನತ ಶಿಕ್ಷಣ ಇಲಾಖೆಯ ವ್ಯಾಪ್ತಿಯಲ್ಲಿನ ವಿಶ್ವವಿದ್ಯಾಲಯಗಳು ಮತ್ತು ಕಾಲೇಜುಗಳಲ್ಲಿ 2024-25ನೇ ಸಾಲಿನಿಂದ ಪದವಿ ಕಾರ್ಯಕ್ರಮಗಳ ಅವಧಿ ಮತ್ತು ಪಠ್ಯಕ್ರಮವನ್ನು ಪರಿಷ್ಕರಿಸುವ ಬಗ್ಗೆ.

ಓದಲಾಗಿದೆ:

1. ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ: ಇಡಿ 260 ಯುಎನ್ಇ 2019 (ಭಾಗ-1) ಬೆಂಗಳೂರು, ದಿನಾಂಕ:07.08.2021.
2. ಸರ್ಕಾರಿ ಆದೇಶ ಸಂಖ್ಯೆ:ಇಡಿ 166 ಯುಎನ್ಇ 2023, ಬೆಂಗಳೂರು ದಿನಾಂಕ:11.10.2023
3. ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿ ಆಯೋಗದ ಮಧ್ಯಂತರ ವರದಿ ದಿನಾಂಕ:18.01.2024.
4. ಕರ್ನಾಟಕ ರಾಜ್ಯ ಉನ್ನತ ಶಿಕ್ಷಣ ಪರಿಷತ್ತಿನ ಟಿಪ್ಪಣಿ ದಿನಾಂಕ: 14.02.2024.
5. ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿ ಆಯೋಗದ ವರದಿಗಳ ದಿನಾಂಕ: 19.01.2024 ಮತ್ತು 10.03.2024.
6. ಸರ್ಕಾರದ ಮುಖ್ಯ ಕಾರ್ಯದರ್ಶಿಯವರ ಕಛೇರಿಯ ಅನಧಿಕೃತ ಟಿಪ್ಪಣಿ ಸಂಖ್ಯೆ: CS/05/SCM/2024, dated: 02.04.2024.

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ಮೇಲೆ ಓದಲಾದ ಕ್ರಮ ಸಂಖ್ಯೆ (1) ರ ದಿನಾಂಕ: 07.08.2021ರ ಆದೇಶದಲ್ಲಿ ಭಾರತ ಸರ್ಕಾರವು ಪ್ರಕಟಿಸಿರುವ ರಾಷ್ಟ್ರೀಯ ಶಿಕ್ಷಣ ನೀತಿಯನ್ನು ರಾಜ್ಯದ ಉನ್ನತ ಶಿಕ್ಷಣ ಇಲಾಖೆಯಡಿ ವಿಶ್ವವಿದ್ಯಾಲಯಗಳು ಮತ್ತು ಸಂಯೋಜಿತ ಕಾಲೇಜುಗಳಲ್ಲಿ 2021-22ನೇ ಶೈಕ್ಷಣಿಕ ವರ್ಷದಿಂದ ಅಗತ್ಯ ಮಾರ್ಗಸೂಚಿಗಳನುಸಾರ ಅನುಷ್ಠಾನಗೊಳಿಸಲಾಗಿರುತ್ತದೆ.

ಮೇಲೆ ಓದಲಾದ ಕ್ರಮ ಸಂಖ್ಯೆ (2) ರ ದಿನಾಂಕ: 11.10.2023ರ ಆದೇಶದಲ್ಲಿ ಹೊಸ ಶಿಕ್ಷಣ ನೀತಿಯನ್ನು ರೂಪಿಸುವ ಉದ್ದೇಶದಿಂದ ಕರ್ನಾಟಕ ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿಯ ಕರಡನ್ನು ಸಿದ್ಧಪಡಿಸಲು ಶ್ರೇಷ್ಠ ಶಿಕ್ಷಣ ತಜ್ಞರಾದ Prof. Sukhdev Torat, ಇವರ ಅಧ್ಯಕ್ಷತೆಯಲ್ಲಿ ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿ ಆಯೋಗವನ್ನು ರಚಿಸಲಾಗಿರುತ್ತದೆ.

ಮೇಲೆ ಓದಲಾದ ಕ್ರಮ ಸಂಖ್ಯೆ (3) ರಲ್ಲಿ ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿ ಆಯೋಗವು ದಿನಾಂಕ: 18.01.2024ರಂದು ಸರ್ಕಾರಕ್ಕೆ ಮಧ್ಯಂತರ ವರದಿಯನ್ನು ಸಲ್ಲಿಸಿರುತ್ತದೆ.

ಮೇಲೆ ಓದಲಾದ ಕ್ರಮ ಸಂಖ್ಯೆ (4) ರಲ್ಲಿ ಕರ್ನಾಟಕ ರಾಜ್ಯ ಉನ್ನತ ಶಿಕ್ಷಣ ಪರಿಷತ್ತು ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿ ಆಯೋಗವು ಸರ್ಕಾರಕ್ಕೆ ಸಲ್ಲಿಸಿರುವ ಮಧ್ಯಂತರ ವರದಿಯನ್ನು ಸಂಪೂರ್ಣವಾಗಿ ಒಪ್ಪಲು ಶಿಫಾರಸ್ಸು ಮಾಡಿರುತ್ತದೆ.

ಮೇಲೆ ಓದಲಾದ ಕ್ರಮ ಸಂಖ್ಯೆ (5) ರಲ್ಲಿ ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿ ಆಯೋಗವು ದಿನಾಂಕ: 19.01.2024ರಂದು REPORT PART-1 ಮತ್ತು ದಿನಾಂಕ: 10.03.2024ರಂದು ನ್ನು REPORT PART-1(a) ಮಧ್ಯಂತರ ವರದಿಗಳನ್ನು ಸರ್ಕಾರಕ್ಕೆ ಸಲ್ಲಿಸಿರುತ್ತದೆ.

ಮೇಲೆ ಓದಲಾದ ಕ್ರಮ ಸಂಖ್ಯೆ (6) ರಲ್ಲಿ ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿ ಆಯೋಗವು ಸರ್ಕಾರಕ್ಕೆ ಸಲ್ಲಿಸಿರುವ ಮಧ್ಯಂತರ ವರದಿಯಲ್ಲಿನ ಶಿಫಾರಸ್ಸುಗಳನ್ನು 2024-25 ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಪದವಿ ಕಾರ್ಯಕ್ರಮಗಳಿಗೆ ಅನುಷ್ಠಾನಗೊಳಿಸಲು ದಿನಾಂಕ: 02.04.2024ರಂದು ಪುನರಾವಣಾ ಆಯೋಗದ ಅನುಮತಿಯನ್ನು ಪಡೆಯಲಾಗಿರುತ್ತದೆ.

ಮೇಲ್ಕಂಡ ಅಂಶಗಳ ಹಿನ್ನೆಲೆಯಲ್ಲಿ, ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿ ಆಯೋಗವು ಸರ್ಕಾರಕ್ಕೆ ಸಲ್ಲಿಸಿರುವ ಮಧ್ಯಂತರ ವರದಿಗಳಲ್ಲಿನ ಶಿಫಾರಸ್ಸುಗಳನ್ನು 2024 25 ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಪದವಿ ಕಾರ್ಯಕ್ರಮಗಳಿಗೆ ಅನುಷ್ಠಾನಗೊಳಿಸಲು ಉದ್ದೇಶಿಸಿ, ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ: ಇಡಿ 260 ಯುಎನ್ಇ 2019 (ಭಾಗ-1)

ಬೆಂಗಳೂರು, ದಿನಾಂಕ:07.08.2021ರ ಆದೇಶವನ್ನು ಪರಿಷ್ಕರಿಸಲು ಸರ್ಕಾರವು ನಿರ್ಧರಿಸಿ, ಅದರಂತೆ, ಈ ಕೆಳಕಂಡ ಆದೇಶ.

ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ: ಇಡಿ 166 ಯುಎನ್‌ಇ 2023, ಬೆಂಗಳೂರು, ದಿನಾಂಕ: 08.05.2024

ಪ್ರಸ್ತಾವನೆಯಲ್ಲಿ ವಿವರಿಸಿರುವ ಅಂಶಗಳನ್ವಯ ರಾಜ್ಯದಲ್ಲಿ ಉನ್ನತ ಶಿಕ್ಷಣ ಇಲಾಖೆಯಡಿಯ ವಿಶ್ವವಿದ್ಯಾಲಯಗಳು ಮತ್ತು ಸಂಯೋಜಿತ ಕಾಲೇಜುಗಳಲ್ಲಿ ಪದವಿ ಕಾರ್ಯಕ್ರಮಗಳಿಗೆ 2024-25ನೇ ಶೈಕ್ಷಣಿಕ ವರ್ಷದಿಂದ ಅನುಬಂಧ-1 ಮತ್ತು ಅನುಬಂಧ-2 ರ ಮಾರ್ಗಸೂಚಿಗಳಿಗನುಸಾರವಾಗಿ ಪದವಿ ಕಾರ್ಯಕ್ರಮಗಳ ಅವಧಿ ಮತ್ತು ಪಠ್ಯಕ್ರಮವನ್ನು ಪರಿಷ್ಕರಿಸಿ ಅನುಷ್ಠಾನಗೊಳಿಸಿ ಆದೇಶಿಸಲಾಗಿದೆ.

1. ಅನುಷ್ಠಾನದ ಮಾರ್ಗಸೂಚಿಗಳು - ಅನುಬಂಧ-1
2. ಪ್ರೋಗ್ರಾಮ್ ವಿನ್ಯಾಸ (Curriculum Structure) - ಅನುಬಂಧ-2

ಕರ್ನಾಟಕ ರಾಜ್ಯಪಾಲರ ಆಜ್ಞಾನುಸಾರ
ಮತ್ತು ಅವರ ಹೆಸರಿನಲ್ಲಿ,

(ಶ್ರೀ ಪ್ರಕಾಶ್ ಬಾಬು)
ಸರ್ಕಾರದ ಉಪ ಕಾರ್ಯದರ್ಶಿ
ಉನ್ನತ ಶಿಕ್ಷಣ ಇಲಾಖೆ (ವಿಶ್ವವಿದ್ಯಾಲಯಗಳು)

ಇವರಿಗೆ,

1. ಸರ್ಕಾರದ ಮುಖ್ಯ ಕಾರ್ಯದರ್ಶಿರವರ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿ, ಕರ್ನಾಟಕ ಸರ್ಕಾರ.
2. ಕುಲಪತಿಗಳು, ಉನ್ನತ ಶಿಕ್ಷಣ ಇಲಾಖೆಯಡಿಯ ಸಾರ್ವಜನಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯಗಳು, ಕರ್ನಾಟಕ.
3. ಸರ್ಕಾರದ ಅಪರ ಮುಖ್ಯ ಕಾರ್ಯದರ್ಶಿಗಳು, ಮಾನ್ಯ ಮುಖ್ಯ ಮಂತ್ರಿಗಳ ಕಛೇರಿ, ವಿಧಾನಸೌಧ, ಬೆಂಗಳೂರು.
4. ಸರ್ಕಾರದ ಅಪರ ಮುಖ್ಯ ಕಾರ್ಯದರ್ಶಿಗಳು ಮತ್ತು ಅಭಿವೃದ್ಧಿ ಆಯುಕ್ತರು, ವಿಧಾನಸೌಧ, ಬೆಂಗಳೂರು.
5. ಸರ್ಕಾರದ ಅಪರ ಮುಖ್ಯ ಕಾರ್ಯದರ್ಶಿಗಳು, ಆರ್ಥಿಕ ಇಲಾಖೆ, ವಿಧಾನಸೌಧ, ಬೆಂಗಳೂರು.
6. ಸರ್ಕಾರದ ಅಪರ ಮುಖ್ಯ ಕಾರ್ಯದರ್ಶಿಗಳು, ಸಿಸುಆಇ (ಇ-ಆಡಳಿತ ಇಲಾಖೆ), ವಿಧಾನಸೌಧ, ಬೆಂಗಳೂರು.
7. ಸರ್ಕಾರದ ಪ್ರಧಾನ ಕಾರ್ಯದರ್ಶಿ, ಶಾಲಾ ಶಿಕ್ಷಣ ಮತ್ತು ಸಾಕ್ಷರತಾ ಇಲಾಖೆ, ಬಹುಮಹಡಿ ಕಟ್ಟಡ, ಬೆಂಗಳೂರು.
8. ಆಯುಕ್ತರು, ಕಾಲೇಜು ಮತ್ತು ತಾಂತ್ರಿಕ ಶಿಕ್ಷಣ ಇಲಾಖೆ, ಶೇಷಾದ್ರಿ ರಸ್ತೆ, ಬೆಂಗಳೂರು-1.
9. ಉಪಾಧ್ಯಕ್ಷರು, ಕರ್ನಾಟಕ ರಾಜ್ಯ ಉನ್ನತ ಶಿಕ್ಷಣ ಪರಿಷತ್, ಬೆಂಗಳೂರು
10. ಕಾರ್ಯ ನಿರ್ವಾಹಕ ನಿರ್ದೇಶಕರು, ಕರ್ನಾಟಕ ರಾಜ್ಯ ಉನ್ನತ ಶಿಕ್ಷಣ ಪರಿಷತ್, ಬೆಂಗಳೂರು.
11. ಕುಲಸಚಿವರು (ಆಡಳಿತ) ಉನ್ನತ ಶಿಕ್ಷಣ ಇಲಾಖೆಯಡಿಯಲ್ಲಿನ ಸಾರ್ವಜನಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯಗಳು, ಕರ್ನಾಟಕ
12. ಕುಲಸಚಿವರು (ಮೌಲ್ಯಮಾಪನ), ಉನ್ನತ ಶಿಕ್ಷಣ ಇಲಾಖೆಯಡಿಯಲ್ಲಿನ ಸಾರ್ವಜನಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯಗಳು, ಕರ್ನಾಟಕ
13. ಮಾನ್ಯ ಉನ್ನತ ಶಿಕ್ಷಣ ಸಚಿವರ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿ, ಉನ್ನತ ಶಿಕ್ಷಣ ಇಲಾಖೆ, ವಿಧಾನಸೌಧ, ಬೆಂಗಳೂರು.
14. ಮಾನ್ಯ ಶಾಲಾ ಶಿಕ್ಷಣ ಮತ್ತು ಸಾಕ್ಷರತಾ ಸಚಿವರ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿ, ವಿಧಾನಸೌಧ, ಬೆಂಗಳೂರು.
15. ಸರ್ಕಾರದ ಅಪರ ಮುಖ್ಯ ಕಾರ್ಯದರ್ಶಿರವರ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿ, ಉನ್ನತ ಶಿಕ್ಷಣ ಇಲಾಖೆ, ವಿಧಾನಸೌಧ, ಬೆಂಗಳೂರು.
16. ಸರ್ಕಾರದ ಉಪ ಕಾರ್ಯದರ್ಶಿ (ವಿಶ್ವವಿದ್ಯಾಲಯಗಳು), ಉನ್ನತ ಶಿಕ್ಷಣ ಇಲಾಖೆ, ಬೆಂಗಳೂರು.
17. ಸರ್ಕಾರದ ಉಪ ಕಾರ್ಯದರ್ಶಿ (ಕಾಲೇಜು ಮತ್ತು ತಾಂತ್ರಿಕ ಶಿಕ್ಷಣ), ಉನ್ನತ ಶಿಕ್ಷಣ ಇಲಾಖೆ, ಬೆಂಗಳೂರು.

Based on the order received from the parent university (given above), the Board of Studies (Mathematics) of St. Francis de Sales College (Autonomous), has decided to adopt the grading scheme of the parent university for its Mathematics Syllabus from 2024 onwards.

ST. FRANCIS DE SALES COLLEGE (AUTONOMOUS)

ABOUT THE COLLEGE

St. Francis de Sales College (Autonomous), popularly known as SFS College, is oneof the leading Institutions of Higher Education in Bengaluru, Karnataka. Founded in2004 with the vision of Excellence, Efficiency, and Transformation, and the Missionof Love of God and Service to Humanity, the College is run by the Missionaries of St. Francis de Sales (MSFS) of the South West India Province, also known as Fransalians. The College is accredited with "A" grade by NAAC, approved by AICTE, recognized under 2(f) & 12(b) by UGC, and certified under ISO 9001:2015.Permanently affiliated to Bangalore University, the College offers several degree programs at the Bachelors, Masters, and Doctoral levels under various disciplines. In2024, St. Francis de Sales College received the Autonomous status, and it remains asa center for quality education, equipping the students with the skills, knowledge, andvalues needed to excel and make a meaningful impact in the world.

VISION AND MISSION

VISION

Excellence, Efficiency and Transformation.

MISSION

Love of God and Service to Humanity.

DEPARTMENT OF MATHEMATICS

The department of Mathematics offers the course to enable the students to lay a strong foundation in various fields of Mathematics. The course enables the students to develop an intellectual level seeking to expose the various concepts in Mathematics. It also aims at enhancing the students reasoning, analytical and problem-solving skills. Mathematics curriculum is intensive and extensive. Software tools like Scilab, Python and Maxima are introduced. Students find better perceptions of the Practical applications of mathematics using their programming skills. The subject papers help the students to envisage an in- depth knowledge of various mathematical methods required in Scientific and Technological Applications. Guest lectures, seminars are organized by the department. Mathematical puzzles, games and exhibitions are organized to Improve and utilize the mathematical skills of the students.

Vision

To achieve excellence and efficiency in mathematics, driving transformative education and research for a better future

Mission

To educate and innovate in mathematics, using our knowledge to serve humanity and address societal needs

ELIGIBILITY CRITERIA

Candidates who have completed two years Pre – University course (Science with Mathematics) of Karnataka State or its equivalent as notified by the Government from time to time are eligible to seek admission for this programme. The students of other states and foreign countries are eligible in accordance with stateand central government guidelines from time to time.

PROGRAMME STRUCTURE AND DURATION

The programme is for Three (03) years consisting of Six Semesters altogether. A candidate shall complete his/her degree within six (06) academic years from the date of his/her admission to the firstsemester. A Student who successfully completes Three (03) years of the programme will be awarded Bachelor's Degree in Science (B.Sc.) with Mathematics as one of the subjects by Bangalore University.

PROMOTION

A candidate who has obtained a minimum of 35% marks in End Semester examination and an aggregate of 40% marks in each subject shall be eligible for a pass or exemption in that subject.

3 majors with a general degree – number of course and credit course wise in all the semesters

Sem	Major 1- Mathematics/ Computer Science	Major 2- Computer Science/ Physics/ Psychology	Major 3- Electronics/ Chemistry/ Journalism	Elective/optional	Language	Compulsory
1	6	6	6		Language 1 3 credits Language 2 3 credits	Compulsory 1 Constitutional Values 2 credits
2	6	6	6		Language 1 3 credits Language 2 3 credits	Compulsory 2 Constitutional Values 2 credits
3	6	6	6	Elective-1 2 credits	Language 1 3 credits Language 2 3 credits	
4	6	6	6	Elective-2 2 credits	Language 1 3 credits Language 2 3 credits	
5	6	6	6			Compulsory 2 Practical Knowledge or skill -2 2 credits
6	6	6	6			Compulsory 2 Practical Knowledge or skill -3 2 credits
Total	36	36	36	04	24	08
Total 144 credits						

PROGRAME OUTCOME (PO)

By the end of the program the students will be able to acquire:

PO 1	**Disciplinary Knowledge:** Bachelor degree with Mathematics as one of major subject in chosen combination is the culmination of in-depth knowledge of Algebra, Calculus, Geometry, Differential equations, and several other branches of pure and applied mathematics. This also leads to study the related areas such as physics, computer science and other allied subjects.
PO 2	**Nature of Mathematics:** Understanding the concise, precise, and rigorous nature of Mathematics and its applications in real-world problems.
PO 3	**Communication Skills:** Enhances the ability to communicate various mathematical concepts effectively using examples and their geometrical visualization. The skills and knowledge gained in this program will lead to the proficiency in analytical reasoning which can be used for modeling and solving of real-life problems.
PO 4	**Critical thinking and analytical reasoning:** The students undergoing this programme acquire ability of critical thinking and logical reasoning and capability of recognizing and distinguishing the various aspects of real life problems.
PO 5	**Problem Solving techniques:** The Mathematical knowledge gained by the students through this programme develop an ability to analyze the problems, identify and define appropriate computing requirements for its solutions. This programme enhances students' overall development and also equip them with mathematical modelling ability, problem solving skills.
PO 6	**Research related skills:** The completing this programmed develop the capability of inquiring about appropriate questions relating to the Mathematical concepts in different areas of Science and Social Science.
PO 7	**Information/Digital Literacy:** The completion of this programme will enable the learner to use appropriate software's to solve system of algebraic equation and differential equations. Gives the knowledge of FOSS tools and its application in Mathematics learning.
PO 8	**Self – directed learning:** The student completing this program will develop ability of working independently and to make an in-depth study of various branches of Mathematics.
PO 9	**Moral and ethical awareness/reasoning:** The student completing this program will develop an ability to identify unethical behavior such as fabrication, falsification or misinterpretation of data and adopting objectives, unbiased and truthful actions in all aspects of life in general and also in Mathematical studies in particular.
PO 10	**Lifelong learning:** This programme provides self-directed learning and lifelong learning skills. This programme helps the learner to think independently and develop algorithms and computational skills for solving real world problems.

PO 11	**Higher studies:** Ability to peruse advanced studies and research in pure and applied Mathematical sciences
PO 12	**Employability:** Study of Mathematics enhances employability for jobs in banking, insurance companies, investing sectors and data analysis and also in various public and private enterprises

Continuous Internal Assessment

UG Programmes:

Theory:

1. Continuous Internal Assessment (C1 & C2) – 20 marks
2. End Semester Examination – 80 marks

Practical:

1. Continuous Internal Assessment (C1 & C2) – 10 marks
2. End Semester Examination – 40 marks

S.NO	ASSESSMENTS	COMPONENTS	MARKS & ATTENDANCE	IA MARKS
1	Unit Test I (25% of Syllabus)	C1	25	2.5
2	**Skill-Based Activities:** Case Study / Seminar / Assignment / Quiz	C2	10	5
3	Mid Semester Examination (50% of Syllabus)	C2	80	5
4	Unit Test II (25% of Syllabus covered after the MSE)	C1	25	2.5
5	**Attendance** • 75.00%-79.99% - 1 Mark • 80.00%-84.99% - 2 Marks • 85.00%-89.99% - 3 Marks • 90.00%-94.99% - 4 Marks • 95.00%-100.00% - 5 Marks	C1	Minimum of 75%	5
		Total		**20 marks**
SEC & PRACTICAL SUBJECTS				
1	**Attendance** • 75.00%-79.99% - 1 Mark • 80.00%-84.99% - 2 Marks • 85.00%-89.99% - 3 Marks • 90.00%-94.99% - 4 Marks • 95.00%-100.00% - 5 Marks	C1	Minimum of 75%	5
2	Mid Semester Examination / Model Practical Examination	C2	40	5
		Total		**10 marks**

GRADING SYSTEM

Table of Conversion of % Marks to grade point:

% Marks	Grade Point
96-100	10
91-95	9.5
86-90	9.0
81-85	8.5
76-80	8.0
71-75	7.5
66-70	7.0
61-65	6.5
56-60	6.0
51-55	5.5
46-50	5.0
41-45	4.5
40	4

Final Result/Grade Description:

Semester/ Programme % of Marks	Semester GPA/ Programme/ CGPA	Grade Alpha Sign	Result/Class Description
90.1-100	9.01-10.00	O	Outstanding
80.1-90.0	8.01-9.0	A+	First Class Exemplary
70.1-80.0	7.01-8.00	A	First Class Distinction
60.1-70.0	6.01-7.00	B+	First Class
55.1-60.0	5.51-6.00	B	High Second Class
50.1-55.0	5.01-5.50	C	Second Class
40.0-50.0	4.00-5.00	P	Pass Class
Below 40	Below 4.0	F	Re-Appear

EXTERNAL EVALUATION

THEORY COURSE

There shall be a written semester examination at the end of each semester for all theory courses of duration of 3 hours with maximum 80 marks. The question paper pattern is as follows.

FORMAT OF QUESTION PAPER OF MATHEMATICS-I Duration of Exam: 3 Hours				Maximum Marks: 80	
Section	Topic	No. of questions	To be answered	Marks for each question	Maximum marks for the section
A	Matrices	3	10	2	20
	Differential Calculus-I	3			
	Integral Calculus	3			
	Analytical Geometry	3			
B	Matrices	5	3	5	15
C	Differential Calculus-I	5	3	5	15
D	Integral Calculus	5	3	5	15
E	Analytical Geometry	5	3	5	15

PRACTICALS

FORMAT OF QUESTION PAPER OF MATHEMATICS PRACTICAL –I					
Duration of Exam: 3 Hours				Maximum Marks : 40	
Lab Records - 6 Marks Viva - 6 marks					
Write the python code and solve manually one question from each unit					
Unit	Topic	No. of questions	To be answered	Marks for each question	Maximum marks
1	Matrices	2	1	7	7
2	Differential Calculus-I	2	1	7	7
3	Integral Calculus	2	1	7	7
4	Analytical Geometry	2	1	7	7
Total					28

FORMAT OF QUESTION PAPER OF MATHEMATICS-II

Duration of Exam: 3 Hours Maximum Marks : 80

Section	Topic	No. of questions	To be answered	Marks for each question	Maximum marks for the section
A	Group theory	3	10	2	20
	Polar co-ordinates	3			
	Differential Calculus-II	3			
	Differential Equations	3			
B	Group Theory	5	3	5	15
C	Polar co-ordinates	5	3	5	15
D	Differential Calculus-II	5	3	5	15
E	Differential Equations	5	3	5	15

FORMAT OF QUESTION PAPER OF MATHEMATICS PRACTICAL –II

Duration of Exam: 3 Hours Maximum Marks : 40

Lab Records - 6 Marks
Viva - 6 marks

Write the python code and solve manually one question from each unit

Unit	Topic	No. of questions	To be answered	Marks for each question	Maximum marks
1	Group Theory	2	1	7	7
2	Polar co-ordinates	2	1	7	7
3	Differential Calculus-II	2	1	7	7
4	Differential Equations	2	1	7	7
Total					28

DEPARTMENT OF MATHEMATICS

COURSE MATRIX AS PER SEP 2024

	Subjects	Paper/ Subject Code	Total Teaching hours	Duration of Exam (hrs.)	Marks			Credits
					IA	Uni. Exam	Total	
SEM I	Mathematics – I(Theory)	24BSC13A/B	60	3	20	80	100	4
	Mathematics – I(Practical)	24BSC16A/B	60	3	10	40	50	2
SEM 2	Mathematics –II (Theory)	24BSC23A/B	60	3	20	80	100	4
	Mathematics – II(Practical)	24BSC26A/B	60	3	10	40	50	2
	Total Credits							**12**

SEMESTER I

Course Code	24BSC13A/B	**Course Title**	MATHEMATICS – I
Course Type	DSC	**Contact Hours**	4 Hours per Week **Total**: 60 Hours
Credit	4	**Domain**	MATHEMATICS
Duration of Exam: 03 Hours			Maximum Marks: 100 (SA 80 + IA 20)

Course Objectives: This course will enable the students to

1. Understand the algebraic concepts of Matrices and elementary transformation of Matrices.
2. Analyze the Eigen values and Eigen vectors, Cayley-Hamilton theorem
3. Comprehend the fundamental concepts of successive differentiation and partial derivatives of two or more variables of Differential Calculus
4. Analyze the concepts of reduction formulae of Integral Calculus and its applications and the concepts of length, area, surface area and volume of solids of revolution.
5. Understand the concepts of analytical geometry in three dimension and equations of sphere, right circular cylinder and cone.

Course Outcomes: On completion of this course, students are able to:

CO1: Recall basic concepts of algebra, formulae and rules of calculus

CO2: Describe the process of reduction formulae in Integration, interpretation of successive derivatives, properties of matrices.

CO3: Apply techniques of calculus in various physical and geometrical situations. Application of Matrices in fields like economics, statistics and other science subjects

CO4: Develop the applications of algebra, calculus and analytical geometry

CO5: Determine the method of solving problems on calculus and analytical geometry.

SYLLABUS

I	**Unit-I: Matrices**	**15 Hours**
	Recapitulation of Symmetric and Skew Symmetric matrices, Elementary row and column transformations, Row reduced echelon form, Rank of a matrix, Normal form of a matrix, Inverse of a matrix by elementary operations. Solution of system of linear equations; Criteria for existence of non- trivial solutions of homogeneous system of linear equations, Solution of non-homogeneous system of linear equations. Eigen values and Eigen vectors of square matrices of order 2 and 3, Cayley-Hamilton theorem (without proof), Finding A^2, A^3, A^4 and inverse of matrices by Cayley-Hamilton theorem.	

II	**Unit-II: Differential Calculus-I** **15 Hours** Successive Differentiation: nth Derivatives of Standard functions e^{ax+b} $(ax+b)^n$, $\log(ax+b)$, $\sin(ax+b)$, $\cos(ax+b)$, $e^{ax}\sin(bx+c)$, $e^{ax}\cos(bx+c)$, Leibnitz theorem (without proof) and examples based on Leibnitz theorem. **Partial Derivatives:** Functions of two or more variables-explicit and implicit functions, partial derivatives of higher order, Homogeneous functions- Euler's theorem, total derivatives, differentiation of implicit and composite functions, Jacobians and standard properties and problems.
III	**Unit-III: Integral Calculus** **15 Hours** Recapitulation of definite integrals and its properties. Reduction formulae of standard Integrals, $\int sin^n$ x dx, $\int cos^n$ x dx , $\int tan^n$ x dx, $\int cot^n$ x dx, $\int sin^n$ x cos^mx dx, $\int_0^{\frac{\pi}{2}} Sin^n\, x\, dx$, $\int_0^{\frac{\pi}{2}} cos^n\, x\, dx$, $\int_0^{\frac{\pi}{2}} Sin^n\, x\, dx$ cos^m x dx Problems. Differentiation under integral sign by Leibnitz rule problems. Computation of length of an arc, area of plane curves, surface area and volume of solids of revolution for standard curves in Cartesian and polar forms.
IV	**Unit-IV: Analytical Geometry** **15 Hours** Direction cosines and ratios, Equation of spheres in different forms (general, standard, central and diametric forms in both Cartesian and Vector forms), tangent plane to a sphere, derivation of condition for orthogonal of spheres and problems, standard equation of right circular cone and right circular cylinder (in both Cartesian and Vector forms) and problems, Derivations of paraboloid, ellipsoid, Hyperboloid of one and two sheets.

Text Books

1. B S Vatsa, Theory of Matrices, New Age International Publishers.
2. A R Vasista, Matrices, Krishna Prakashan Media.
3. R. K. Ghosh, K. C. Maity, An Introduction to Analysis Differential Calculus Part - I, 13th Edition, New Central Book Agency Pvt. Ltd., 2018.
4. Shanti Narayan, Differential Calculus, S. Chand & Company, New Delhi.
5.. Higher Engineering Mathematics- B.S. Grewal, Khanna Publishers, Delhi.
6. G B Thomas and R L Finney, Calculus and analytical geometry, Narosa Publishing House, Sixth Edition, Thirteenth reprint, 1998

Reference Books

1. Matrices, Shanthi Narayan & P K Mittal, 5th edition, New S Chand and Co. Pvt. Ltd., 2013.
2. Higher Engineering Mathematics-B V Ramana, McGraw Hill Publications, Noida,2006
3. S Narayanan & T. K. Manicavachogam Pillay, Calculus – Volume I and II, S.Viswanathan (Printers & Publishers) Pvt Limited.

4. Differential Calculus - Shanti Narayan & P K Mittal, S. Chand & Company, New Delhi, 2014.
5. Analytical solid geometry - Shanti Narayan & P K Mittal, S. Chand & Company, New Delhi, 2014.
6. Comprehensive solid geometry- SP Mahajan & Ajay Aggarwal, 1st edition, Anmol Publications, 2000.

WEB RESOURCES

a. https://onlinecourses.nptel.ac.in/noc24_ma93/
b. https://www.my-mooc.com/en/categorie/mathematics
c. http://ocw.mit.edu/courses/mathematics

COURSE ARTICULATION MATRIX

24BSC13A/B: MATHEMATICS -I												
Course Outcomes	Program outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	2	2	-	1	-	1	1	2
CO2	2	1	-	1	2	1	-	1	-	-	-	-
CO3	2	1	1	1	1	1	1	2	-	1	-	-
CO4	2	2	1	1	-	-	-	-	-	-	1	1
CO5	2	2	-	2	1	-	-	-	-	-	1	-

Teaching Pedagogy: Lectures by conventional method, problem solving, group discussions, use of ICT and conducting competitions like quiz, seminars etc. Visit to libraries of higher educational institute.

24BSC16A/B: MATHEMATICS PRACTICAL- I

Practical	24BSC16A/B: MATHEMATICS PRACTICAL- I
Teaching Hours: 4 Hours/Week	Credits: 2
Duration of Exam: 03 Hours	Maximum Marks: 50 (SA 40 + IA 10)

Course Learning Outcomes: This course will enable the students to

CO1: Learn Free and Open-Source Software (FOSS) tools for computer programming mainly Python

CO2: Learn the program language and its algorithms.

CO3: Acquire knowledge of applications of python codes to solve problems of Algebra, Calculus and Analytical Geometry.

Practical/Lab Work to be performed in Computer Lab using Python

1. Introduction to Python
2. Basics of software with simple examples.
   i. compare two numbers using if statements
   ii. sum of natural numbers using while loop
   iii. finding the factors of a number using for loop
   iv. to check the given number is prime or not
   v. find the factorial of a number
   vi. simple programs to illustrate logical operators (and or not)
3. Computation of a rank of matrix by row reduced and normal forms
4. Solving the system of homogeneous and non- homogeneous linear equations
5. Computation of inverse of a matrix by using Cayley Hamilton theorem
6. Finding the n^{th} derivative of a function without Leibnitz theorem
7. Finding the n^{th} derivative of a function with Leibnitz theorem
8. Partial differentiation of some standard functions and Jacobian
9. Verification of Euler's theorems with examples
10. Program to find Jacobians
11. Program to find reduction formula with or without limits

12. Program to compute surface area of solids.
13. Program to compute Volume of solids of revolution
14. Program to find equation and plot sphere, cone, cylinder.
15. Program to find equation and plot paraboloid, ellipsoid and hyperboloid.

Note: Every problem must be solved manually in the lab and verified with the output

Reference:

1. https://www.geeksforgeeks.org/python-math-library-gamma-function/
2. https://pypi.org/project/flare-floss/

24BSC16A/B: MATHEMATICS PRACTICAL-I												
Course Outcomes	Program outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	2	3	2	2	2	-	1	1	2
CO2	2	-	-	2	3	1	2	1	-	2	2	1
CO3	1	1	1	-	2	2	1	2	-	1	2	1

SEMESTER II

Course Code	24BSC23A/B	**Course Title**	MATHEMATICS – II
Course Type	DSC	**Contact Hours**	4 Hours per Week **Total**: 60 Hours
Credit	4	**Domain**	MATHEMATICS
Duration of Exam: 03 Hours			Maximum Marks: 100 (SA 80 + IA 20)

COURSE OBJECTIVES:

This course will enable the students to

1. Understand the concepts of Groups, subgroups and cyclic groups.
2. Analyze the polar co-ordinates and its dimensions to trace the standard curves.
3. Understand the concepts of limits, continuity and differentiability in depth and mean value theorems and its importance.
4. Analyze the concepts and methods to solve first order first degree and higher order ordinary differential equations.

Course Outcomes: On completion of this course, students are able to:

CO1: Recognize the mathematical objects called Groups.
CO2: Explain the significance of the notions of Cosets, normal subgroups and factor groups.
CO3: Application of differential equations in various fields by mathematical modeling.
CO4: Apply and analyse the concept of differentiation and fundamental theorems in differentiation and various rules.
CO5: Interpret the extreme values of functions of two variables.

Syllabus

I	**Unit-I: Groups-I:**	**15 Hours**
	Definition of a group with examples and properties, congruence, problems. Subgroups, Cayley table, center of groups, order of an element of a group and its related theorems, cyclic groups, Coset decomposition, Lagrange's theorem and its consequences. Fermat's theorem and Euler's ϕ function.	

II	**Unit-II: Polar Co-ordinates** **15 Hours** Polar coordinates, angle between the radius vector and tangent. Angle of intersection of two curves (polar forms), length of perpendicular from pole to the tangent, pedal equations. Derivative of an arc in Cartesian, parametric and polar forms, curvature of plane curve-radius of curvature formula in Cartesian, parametric and polar and pedal forms-centre of curvature, asymptotes, evolutes and envelops.
III	**Unit-III: Differential Calculus-II** **15 Hours** **Recapitulation of Limits, Continuity, Differentiability and properties**. Properties of continuous functions. Intermediate value theorem, Rolle's Theorem, Lagrange's Mean Value theorem, Cauchy's Mean value theorem and examples. Taylor's theorem & Maclaurin's series of two variables, Maxima and Minima of two variables, Lagrange multipliers, indeterminate forms and evaluation of limits using L Hospital's rule.
IV	**Unit-IV: Ordinary Differential Equations-I** **15 Hours** **Recapitulation of differential equations of first order and first degree, Linear Differential equations and equations reducible to linear form (Bernoulli's equation),** Exact Differential equations, Necessary and sufficient condition for the equations to be exact, Orthogonal trajectories of Cartesian and polar curves. Differential equations of the first order and higher degree: Equations solvable for *p, x, y*. Clairaut's equation; general and singular solution.

Text Books

1. S. K. Mapa, Higher Algebra Abstract & Linear, 14th Edition, Levant Books, 2019.
2. A Course in Abstract Algebra, Vijay K Khanna and S K Bhambri, Vikas Publications, 2018.
3. R. K. Ghosh K. C. Maity, An Introduction to Analysis Differential Calculus Part - I, 13th Edition,New Central Book Agency Pvt. Ltd., 2018.
4. S. Bandyopadhyay, S. K. Maity, Application of Calculus Theory and Problems, 4th Edition, Academic Publishers, 2019.
5. Shanti Narayan, Differential Calculus, S. Chand & Company, New Delhi.
6. M. D. Raisinghania, Ordinary and Partial Differential Equations, S Chand and Co. Pvt. Ltd.,2014.

Reference Books

1. J. A. Gallian, Contemporary Abstract Algebra, 4th Edition, Narosa Publishing, 2011.
2. Higher algebra, Bernard & Child, Arihant, 2016
3. Schaum's Outline of Calculus - Frank Ayres and Elliott Mendelson, 5th ed. USA:Mc. Graw Hill., 2008.
4. V. Sundarapandian, Ordinary and Partial Differential Equations with Laplace Transforms,Fourier Series and Applications, Tata McGraw Hill Education Pvt., Ltd., 2013.
5. G. F. Simmons, Differential Equation with Applications and Historical Notes, 2nd Edition,McGraw-Hill Publishing Company, 1991

COURSE ARTICULATION MATRIX

24BSC23A/B: MATHEMATICS -II												
Course Outcomes	Program outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	2	2	2	-	1	-	1	1	-
CO2	2	1	-	1	2	1	-	1	-	-	-	2
CO3	2	1	1	1	1	1	1	2	-	1	-	-
CO4	2	2	1	1	-	-	-	-	-	-	2	-
CO5	2	2	-	2	1	-	-	-	-	-	1	2

24BSC26A/B: MATHEMATICS PRACTICAL- II

Practical	24BSC26A/B: MATHEMATICS PRACTICAL- II
Teaching Hours: 4 Hours/Week	Credits: 2
Duration of Exam: 03 Hours	Maximum Marks: 50 (SA 40 + IA 10)

Course Outcomes: This course will enable the students to

CO1: Learn Free and Open-Source Software (FOSS) tools for computer programming mainly Python

CO2: Learn the programming language and its algorithms.

CO3: Acquire knowledge of applications of python codes to solve problems of Algebra, Calculus and Differential equations

Practical/Lab Work to be performed in Computer Lab using Python

1. Program to construct Cayley's table and test abelian for given finite set.
2. Program to find all possible cosets of the given finite group.
3. Program to find generators and corresponding possible subgroups of a cyclic group.
4. Programs to verification of Lagrange's theorem with suitable examples.
5. Program to verify the Euler's ϕ function for a given finite group.
6. Program to verify the given function is Homomorphism and Isomorphism. Finding the angle between the radius vector and tangent
7. Finding the angle between two curves
8. Finding the radius of curvature of the given curve
9. Plotting of standard Cartesian, polar and parametric curves
10. Program to find limit and continuity of functions
11. Program to verify Rolle's, Lagrange's and Cauchy's mean value theorem
12. Program to find Maclaurin's expansion.
13. Program to find maxima and minima of a function.
14. Program to find limits by L'Hospital's rule.
15. Solution of Exact differential equation.
16. Solving non- linear differential equations for p, x and y
17. Finding the general and singular solutions of Clairaut's equation

Note: Every problem must be solved manually in the lab and verified with the output.

WEB RESOURCES

1. http://www.nptelvideos.in/2012/11/mathematics.html
2. https://www.my-mooc.com/en/categorie/mathematics
3. http://ocw.mit.edu/courses/mathematics

Python: The complete Reference, 4th Edition, Martin C Brown, Mc. Graw Hill, 2018

https://www.geeksforgeeks.org/python-math-library-gamma-function/

24BSC26A/B: MATHEMATICS PRACTICAL-II												
Course Outcomes	Program outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	2	3	2	2	2	-	2	1	2
CO2	2	-	-	2	3	1	2	1	-	2	2	1
CO3	1	1	1	-	2	2	1	2	-	1	2	1

Teaching Pedagogy: Lectures by conventional method, problem solving, group discussions, use of ICT and conducting competitions like quiz, seminars etc. Visit to libraries of higher educational institutes.

SKILL ENHANCEMENT COURSE /VALUE ADDED COURSE/CERTIFICATE COURSE/PROJECT/INTERNSHIP/FIELD WORK

First Semester:

Value Added Course: Python Programming

Skill Development Course: Communication

Club activities under Math πrates club

Industrial Visit

Seminar

Guest Lectures/Workshop

Second Semester:

Skill Development Course: Digital skills

Certificate course on Applications of Mathematical Logic and Boolean Algebra

Extension activities

Field Work/Summer Internship/Project

Club activities under Math πrates club

Student National Seminar

Guest Lectures/Workshop