



# Surana College

AUTONOMOUS

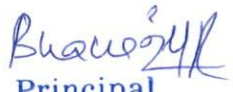
16, South End Road | Bengaluru-04  
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## Minutes of Meeting of Board of Studies

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Principal  
Surana College  
(AUTONOMOUS)  
No. 16, South End Road,  
Bangalore - 560 004.

# Minutes of Meeting

3

DATE : 21-03-2022

PLACE : Board Room

Surana College

*Bhano 24/11*  
Principal  
Surana College  
(AUTONOMOUS)  
No. 16, South End Road,  
Bangalore - 560 004.

1) Prof. Mahalakshmi A.L, Assistant Professor, Department of Commerce welcomed everyone to the BOS meeting and gave introduction of the members

2) Prof. Mini, K. Abraham, Chairperson, Department of Commerce, Surana College briefed about the college and the department.

3) Followed by explanations of course matrix for the I Sem and II Sem as well as evaluation policy which is as per BU

4) Dr. R.K. Sreekantha, Principal, BSVP college, Subject expert suggested manual valuation for the Academic Year 2021-22

5) Dr. Mohammed Farooq Pasha, Assistant Professor, GFGC Kengeri confirmed about Business Ethics for the II Sem. In addition he said we need to prepare students for life and not just for job.

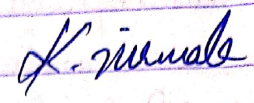
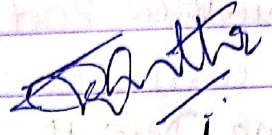
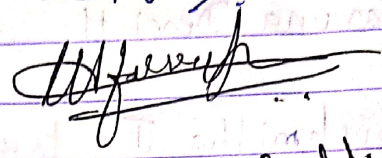
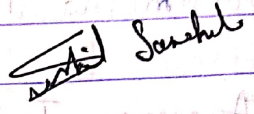
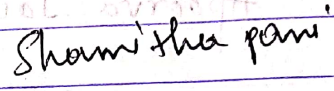
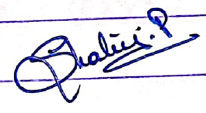
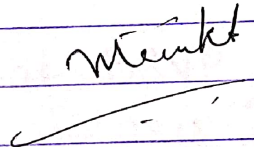

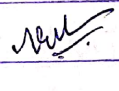
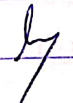
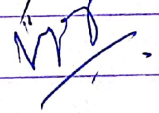

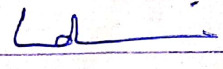
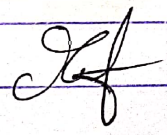
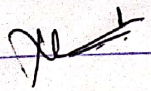
6) Mr. Sushil Samhet, Managing Director, Goldman Sachs and Ms. Shamita Pani, EFA Deloitte gave suggestions regarding Skill Development course as per industry requirement

7) Prof. Shalini, ISBR college gave her insights about inclusion of practical aspects of skill development

8) All the BOS members approved I sem syllabus which is as per BU and II sem syllabus as well as course matrix which is yet to be finalized by BU

9) Prof. Neera V thanked everyone for sparing their precious time and sharing their valuable insights.

Date: 21-08-2022

1. Dr. K. Nirmala 
2. Dr. R. K. Sreekanth 
3. Dr. Md. Farooq Pasha. 
4. Mr. Sushil Sancheti 
5. Ms Shamitha. Pani 
6. Mrs. Shalini Prakash. 
7. Prof. Mini. K Abraham 
8. Prof. Mahalakshmi. A L 
9. Prof Meera. V 
10. Prof Sunitha. C. R 
11. Prof Vijay. S. N 
12. Prof. Aparna. M 
13. Dr. B. G Lakshmi 
14. Prof Manjushree G.S 
15. Prof Narresh. K. V 

16. Prof. Ashwini .K

Ashwini

17 Prof Dhanu .B.C

Dhanu B.C

18 Prof. Karuna .Devi .H

Karuna

19 Prof. Sushmitha .J

Sushmitha

20 Prof Apoorva Jain

Apoorva

# Minutes of Meeting

9

Date : 08-07-2022

Venue: Board room, Suana college (Autonomous)

- 1) Prof. Mini K. Abraham, Chairperson, Department of Commerce, Suana College (Autonomous) welcomed BOS members to the meeting. A brief introduction was given by the members.
- 2) Proceedings of the first BOS meeting was reviewed and confirmed that they were all complied.
- 3) The agenda of the meeting and its objective was discussed.
- 4) Dr. R. K. Sreekantha, Principal, BSVP college, subject expert suggested to follow Bangalore University syllabus for 3<sup>rd</sup> and 4<sup>th</sup> semester.
- 5) Dr. Mohammed Farooq Pasha, Assistant Professor, GFGC Kengeri spoke about being consistent with the syllabus during the initial stage of Autonomous.
- 6) It was suggested not to change the syllabus for First Year [A.Y 2022-23]. Also advised to continue the syllabus for minimum three years.

- 7) Mrs. Shalini, Deputy Chairperson, Alumni Association, PES University discussed about value added skills required.
- 8) Ms. Shamitha Pani T.C gave her valuable inputs with regard to B.Com professional - ACCA
- 9) Dr. Bhavani M.R. stated that 2021-22 is the maiden batch. No major changes will be made in the syllabus. Industry Integrated - FunTech is been introduced to engage the fast learners.
- 10) The BOS members approved the following:
- No major changes to be made in the syllabus. The changes will be restricted to the addition/deletion in module
  - 3<sup>rd</sup> and 4<sup>th</sup> sem syllabus will be followed as per Bangalore University
  - All commerce subjects will be taught by the Commerce faculties



Date: 08-07-2022

01. Dr. K. Nirmala

K. Nirmala

02. Dr. R.K. Sreekanth

R.K. Sreekanth

03. Dr. Mohammed Farooq Pasha

M.F. Pasha

04. Mr. Sushil Sancheti

05. Ms. Shamitha Pani T.C.

Shamitha Pani

06. Mrs Shalini Prakash

Shalini P

07. Prof. Mini K. Abraham

Mini K

08. Prof. Mahalakshmi A.L

M.A.L.

09. Prof. Meera V

Meera V

10. Prof. ~~Suresh~~ Vijay S. Narayan

Vijay S.

11. Prof. Aparna M

Aparna M

12. Dr. B.G. Lakshmi

B.G. Lakshmi

13. Prof. Manjushree G.S

Manjushree G.S

14. Prof. Naresh K.V

Naresh K.V

15. Prof. Ashwini K

Ashwini K

16. Prof. Dhanu B.C

Dhanu B.C

17. Prof. Kauna Devi.H

Kauna

18. Prof. Sushmitha J

Sushmitha

19. Prof. Apoorva Jain

Apoorva



**SURANA COLLEGE  
(AUTONOMOUS)**

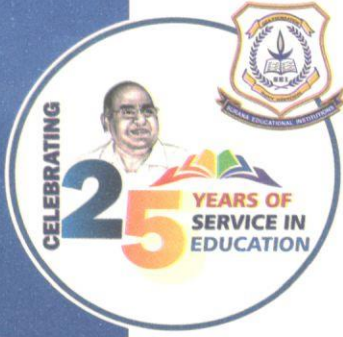
**REACCREDITED WITH 'A+' GRADE BY NAAC**

**AFFILIATED TO  
BANGALORE UNIVERSITY**

**BACHELOR OF BUSINESS ADMINISTRATION, B.B.A.**

**II BOS MEETING  
MINUTES OF MEETING**

*Bhanoj*  
Principal  
Surana College  
(AUTONOMOUS)  
No. 16, South End Road,  
Bangalore - 560 004

**SURANA COLLEGE**

ESTD. 1995

Moulding Character &amp; Careers

Permanently Affiliated to Bangalore University  
Re-accredited by NAAC with A+ Grade  
Recognized under 2(f) & 12(B) of UGC  
Accredited by IAO & Certified by ISO

DATE: 8/07/2022

VENUE: BOARD ROOM,

SURANA COLLEGE (AUTONOMOUS),

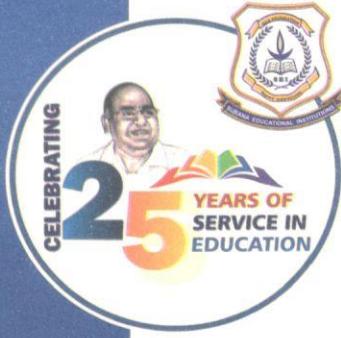
SOUTH END ROAD,

BANGALORE-04

TIME: 11.00 AM

**AGENDA OF II BOS MEETING**

SL NO	AGENDA
1	Welcome address by the Chairperson of BOS
2	Presentation of draft of scheme & Syllabus of I & II, III & IV Semester BBA for the academic year 2022-23.
3	Recommendations & Suggestions of BOS
4	Vote of Thanks.



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RAJAT YATRA

## MINUTES OF MEETING

DATE: 8/07/2022

VENUE: BOARD ROOM,

SURANA COLLEGE (AUTONOMOUS),

SOUTH END ROAD,

BANGALORE-04

TIME: 11.00 AM

ATTENDANCE: Enclosed.

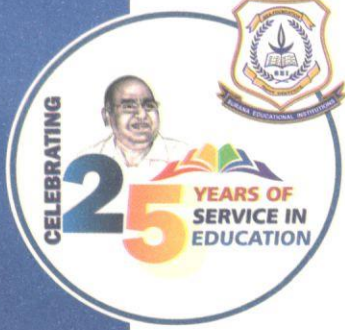
1. Prof Muralidhar V- HOD-Chairman welcomed the BOS members, Principal and introduced all faculty members.
2. Prof Muralidhar V-HOD-Chairman Briefed the BOS members with his presentation on I year Course matrix, Syllabus & II-year 2022-23 course matrix along with semester interventions.
3. From the academic year 2022-23, Business Analytics is offered as Value-Added Certificate course which enhances employability among students.
4. The following changes were proposed.

SEMESTER	2021-22	2022-23
I SEM	Management Innovation	Business Management & Innovation
I SEM	Marketing Management*	Organizational Behaviour
II SEM	Human Resource Management *	Managerial Economics

**NOTE:**

\*Marketing Management will be taught in III SEM.

\* Human Resource Management will be taught in IV Sem by replacing Business Analytics (Business Analytics is provided as value added certificate course.)



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RAJAT YATRA

5. It was decided to follow the III Sem & IV Sem as per the course matrix announced by the higher education council without any modification for the academic year 2022-23.
6. BOS members had discussion & shared their suggestions & recommendations as below:
  - a) Members accepted the proposed changes as they were in cue with current content.
  - b) **Business management & Innovations:** Nature, types of Innovations, recent leadership styles to be added. Last module to be named as creativity & Innovations.
  - c) **Managerial Economics:** Law of Supply, Utility analysis, revenue analysis, BEP analysis to be added. Module 5 & 6 to be merged & renamed as Market Structure. Start-up ecosystem to be added in the form of case study.
  - d) **Business Environment:** Concepts like Global environment, Transdisciplinary approach, Geopolitics, geo-technology to be added. How a Bill gets introduced & passed, Activities related to Import-Export to be added in skill development.
  - e) **Digital fluency:** Concepts to be included regarding Data mining and capturing with reference to finance sector. Introduce Digital Citizenship themes as a value added.
7. Creation of Business Ecosystems through Simulation activities.
8. Skill development activities with emersion of transdisciplinary areas.
9. The meeting Concluded with Vote of thanks.



## SURANA COLLEGE

16, South End Road | Bangalore-04  
Tel: 080-26642292 | 080-22446141

[www.suranacollege.edu.in](http://www.suranacollege.edu.in) | ISO Certified | NAAC A+ Grade

### DEPARTMENT OF MANAGEMENT (BBA)

#### BOARD OF STUDIES

Sl no	NAME OF FACULTY	Representatives	Signature
1.	<b>Dr K Nirmala</b> Chairperson Department of Commerce Bangalore University, Bangalore-56	University Nominee	
2.	<b>Dr. Ramachandra. K</b> Principal School of Commerce & Management, Maharani Cluster University, Bangalore-01	Subject Expert	
3.	<b>Dr. Chandana H.S</b> Assistant Professor, School of Commerce & Management, Maharani Cluster University, Bangalore-01	Subject Expert	
4.	<b>Mr. Pavan Kumar G</b> Founder EQ-Addwise LLP Bangalore-18	Alumni Representative	
5.	<b>Mr. Srinag K R</b> Partner Vijayalakshmi Agarbathi works, Yelachenahalli, Bangalore-62	Industry Expert	
6.	<b>Dr. Bhavani M R,</b> Head of the Institution	Principal	
7.	<b>Mr. Muralidhar V</b> Associate Professor	HOD-Chairman	
8.	<b>Mrs Sheetal N Acharya</b> Assistant Professor	Member	
9.	<b>Mr. Kiran Anandan</b> Assistant Professor	Member	
10.	<b>Mr. Shreeharsha C</b> Assistant Professor	Member	
11.	<b>Mrs Anoor Ashwini Anand</b> Assistant Professor	Member	
12.	<b>Mr. Subramanya V</b> Assistant Professor	Member	



**SURANA COLLEGE  
(AUTONOMOUS)**

No. 16, Southend Road, Bangalore - 560 004

**GRADE A+ REACCREDITED BY NAAC**

**COMPUTER SCIENCE AND APPLICATIONS (BSc - CS / BCA)**

**BOARD OF STUDIES MEETING AGENDA [19/3/2022]**

- 1) Presentation and Approval of regulations of BCA/BSc - CS programme
- 2) Presentation and Approval of syllabus of I and II Semester of BSC-CS/BCA based on NEP 2020 Framework
- 3) Presentation and Approval of Evaluation policy
- 4) Approval of BOE/Paper Setters/Examiners/Valuers
- 5) Presentation and Approval of Question paper model and matrix
- 6) Deliberations by BOS members
- 7) Approval of proceedings of meeting
- 8) Any other matter with the permission of the chair

A. J. ... 19/03/22

CHAIRPERSON

[HEAD OF THE DEPARTMENT]



BOARD OF STUDIES

MEETING - 1

DATE: 19/3/2002

BOARD OF STUDIES MEMBERS

1. Dr T. Somasekhara  
University Representation

2. Dr Prashanti  
Subject Matter Expert

B. G. Prashanti  
19/3/02

3. Dr Kavitha S ~~W~~  
Subject Matter Expert

4. Mrs Sushanth  
Industry Expert



5. Dr A. Srinivas  
Head of Department of CS

A. Srinivas  
19/03/2002

6. Prof Geetha A. M



7. Prof Vidya A

8. Prof R. Sreenivas Rao

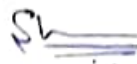


9. Prof Padmageetha B G

10. Prof Rashmi Eshwar

11. Prof Sheavani B

12. Prof Ashwini S



13. Prof Mithili Devi N

Date 19/3/2022

REGULATIONS

**AGENDA 1:** Dr A. Seerivas, Head of the Department extended warm welcome to the BOS Members and introduced Dr. Somasekhar, University representative, Dr. Prashanti, Subject Matter Expert, St. Joseph College, Dr. Kavitha, Subject Matter Expert, Dayanand Sagar College of Arts, Commerce and Science, Mr. Sushanth Sarker, Industry Expert, ITC INFOTECH, Dr. Sreenidhi to the gathering.

**AGENDA 2:** Dr A. Seerivas, HOD presented Regulations of BCA/BSC- CS programmes and NEP guidelines and regulations to be followed for 2021-2022.

**AGENDA 3:** Syllabus of I and II Semester of BCA/BSC- CS is followed as per NEP BU syllabus. Prof. R. Sreenivas Rao presented composition of core courses, AECC, SEC, OE and DSE and languages of entire 4 years BCA and BSC/CS Programme to the BOS Members.

**AGENDA 4:** Prof. Vidya narrated the best practices of the department and various certificate courses provided by the department. Various skill enhancement course for teaching staff in collaboration with Eduskills, ICT Academia

NEP Framework of evaluation methods to be followed for the academic Year 2021-2022. For theory subject 60:40 ratio of [SEE - Semester End exams and IA marks] and for practicals 50:50 ratio of [Exam & IA] was agreed.

AGENDA 4. The list of BOE / paper setters / Examiners / values were presented before the BOS. BOS suggested to have more comprehensive database of Examiners and approved the list.

AGENDA 5. BOS approved that Question papers to be prepared in lines with NEP model question paper pattern. Question paper to consist of 3 sections.

SECTION A - 2 Marks - 4 OUT OF 6

SECTION B - 5 Marks - 4 OUT OF 6

SECTION C - 3 Marks - 4 OUT OF 6

BOS suggested department to prepare blueprint of Question paper to help students to understand the importance of the topics.

Format for distribution of marks for practical exams was discussed.

Question paper to be framed in accordance with modified BLOOM'S TAXONOMY.

AGENDA 6: All BOS Members ratified in consensus approved regulations, curriculum, Evaluation policy, BOE Members and question paper and matrix. Few suggestions

from the board are:

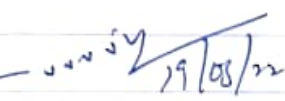
- 1) Implementation of Term paper
- 2) ~~So~~ Using Crypto Tools for Network paper
- 3) Database certifications to be given more weightage w.r.t Research projects in VIII Semester
- 4) To include one value added course (Diploma/certificate) in the curriculum for every semester with 2 credits.
- 5) To provide BCA with specialisation on Data Science, Big Data, Cloud computing

#### AGENDA 7:

All the members in consensus approved and recommended to place the same in Academic council for next approvals

#### AGENDA 8:

Prof Geetha A.M with permission of chair proposed vote of Thanks. All BOS members were thanked for their kind cooperation and the meeting came to an end.

AJ  19/08/22  
CHAIRPERSON



**SURANA COLLEGE**  
**(AUTONOMOUS)**  
No. 16, Southend Road, Bangalore - 560 004

**GRADE A+ REACCREDITED BY NAAC**

**COMPUTER SCIENCE AND APPLICATIONS (BCA / BSc - CS)**

**BOARD OF STUDIES MEETING AGENDA - 7<sup>TH</sup> JULY 2022**

- 1) Presentation and Approval of regulations of BCA/BSc - CS programme.
- 2) Presentation and Approval of syllabus of I and III Semester of BCA/BSC-CS Autonomous.
- 3) Presentation and Approval of Evaluation policy
- 4) Approval of BOE/Paper Setters/Examiners/Valuers
- 5) Presentation and Approval of Question paper model and matrix
- 6) Deliberations by BOS members
- 7) Approval of proceedings of meeting
- 8) Any other matter with the permission of the chair

  
CHAIRPERSON

[ HEAD OF THE DEPARTMENT ]

BOARD OF STUDIES

8

MEETING - 2

DATE :- 07/07/2022

BOARD OF STUDIES MEMBERS

1. Dr. T. Somashekar  
[University Representation]

  
07/07/22

2. Dr. Prashanthi  
[Subject matter Expert]

B. G. Prashanthi  
07/07/22

3. Dr. Kavitha. S  
[Subject Matter Expert]



4. Mr. Sushanth  
[Industry Expert]



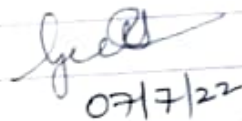
5. Dr. Srinidhi, [Elite Alumni]

Srinidhi. B.S.

6. Dr. A. Srinivas  
[Head of the Department]

A. Srinivas  
07/07/22

7. Prof Geetha A.M.

  
07/07/22

8. Prof Vidya A

Vidya  
07/07/22

9. Prof Sreenivas Rao R

R. Sreenivas Rao

10. Prof Padmageta B.G



11. Prof Rashmi Eshwar



12. Prof Ashwini

13. Prof Shravani



14. Prof Sandeep.



Date 07/07/2022

PROCEEDINGS :

AGENDA :

1. Presentation and Approval of regulations of BCA/Bsc-PMCS program
  2. Presentation and Approval of syllabus of I and III semester BCA/Bsc (Autonomous) 2022-23
  3. Approval of Evaluation Policy.
  4. Presentation and Approval of (Evaluation) policy, question paper model and matrix
  5. Approval of BOE / Paper Letters / Examiners' values.
  6. Deliberations by BOE members.
  7. Approval of proceedings of meeting
-

PROCEEDINGS :

Introduction / Welcome - Dr. A. Srinivas, Head of the department extended warm welcome to the BOE members and re-introduced Dr. Somashekar who is an university representative, followed by Dr. Kavita and Dr. Prashanthi as the subject experts, Dr. Srinidhi - elite Alumni and Sushanth Sarkar as Industry expert to the gathering.

AGENDA 1: Regulations of BSC / BCA regulations. → 1<sup>st</sup> sem BSC and BCA will have same syllabus for P&T and 3<sup>rd</sup> sem BCA & BSC with same DBMS syllabus.

→ Practical marks: changes to  $30^{IA} + 20$  from  $25^{E} + 25^{IA}$

→ Swapping of III sem Bsc - JAVA with DBMS and V sem BSC - DBMS with JAVA.

AGENDA 2: Discussion regarding Blow up Syllabus with BCA / BSC - CE (Autonomous)

Prof. Gata presented the Blow up syllabus to the BOE members and the staff, the following suggestions was given by the respective BOE:

1. Dr. Somashekar T suggested for including quality text books in the syllabus and make sure that the availability of



the text-books in the library.

## I SEM BLOW UP SYLLABUS

2. Discussion started with Digital computer fundamentals subject for semester I-BCA. Mr. Sushanth and Dr. Srinidhi suggested few updations in the subject in unit 4. Including AR/VR concepts and removing secondary memory from unit-1.

MAJOR CHANGES - [OMT] with [Digital computer fundamentals]

3. Continued with C - P&T i.e.; Problem solving techniques using C for I sem BCA and EC. Programs / Lab part was discussed. Dr. Kavita and Dr. Prashanthi suggested for minor changes in the part A 2<sup>nd</sup> and 3<sup>rd</sup> programs.

Dr. Somashekar suggested to include checking the [st. no] for program 8 of part A - to find out the series; checking the conditions for multiplication of 2 matrices.

4. DBMS - unit 1 same as NEP, File organization replaced with PL/SQL. Introduction to Mongo-db for case studies. [suggested by Prashanthi] and discussing for NOSQL. ~~in~~ <sup>with AWS</sup> the last unit.

→ unit 3 current trends replacement, was suggested by Mr. Sushanth and Dr. Srinidhi. After the discussion with staff it was concluded that they will be learning the same with IV semester - cloud computing. All the members were convinced with DBMS syllabus. It was approved with correction and suggestions with Appreciation by BOS.

## 2023 2024 B. PHARM SYLLABUS

- Syllabus changes :
  - consider assembly with [Linux Boot camp]
- Starting with Python Programming - III sem
- Presented syllabus of Python in the proposed syllabus because university (NIP) syllabus has not yet released.
- Query by Mr. Sushant - Is this python concerning in future semesters, and the query was addressed by the staff that in future time they will be learning AI and machine learning where they will use python in Lab part.
- update relational database in Python

### ⇒ operating systems :

- suggestions : Dr. Prashant suggested instead of windows / mobile OS in self study, Android VS IOS comparative study can be given as an option for self study.

### 8) SEC → LINUX BOOT CAMP : ( <sup>to</sup> skill enhancement )

Most of the topics related to unix OS. BOS - university expert appreciated the department for introducing LINUX BOOT CAMP subject.

Total - 30 hours ( 2 credits for subject )

7) Data Communication and networks:

- { units - All routing algorithms - few can be replaced with routing protocol and CADA should be introduced in the routing part.
- suggestions by Dr. Praekanthi.
- and lab part can have one connection oriented and one connectionless can be done.
- Dr. Kavitha and Dr. Saminaka gave feedback that the syllabus was vast.
- Mr. Sushanth and Dr. Sri: nidhi → queried if this will be continued for the further semesters. and suggested for introduction of few more topics.
- \* Reduce one of the IEEE standards for unit 5.
- Conclusion: Since already the syllabus is vast, members of BOS decided to freeze the proposed syllabus. No changes.

Syllabus approval was successfully completed.

AGENDA 3: Approval of evaluation policy was done by the BOS members.

AGENDA 4: Presentation and approval of question paper model and matrix:

Discussions were on with course matrix for I and III semester computer science subjects. Course matrix evaluation was followed by question paper pattern.

Section A.

I.  $[2 * 4 = 8M]$  → 2 marks for 4 questions each.  
 questions to be framed on 'understanding and applying'.  
 total 6 questions → (2 choice)  
 [1, 2, 3, 4, 5, 6]

Section B

II.  $[5M * 4Q = 20M]$  → 5 marks for 4 questions each.

total 6 questions will be given (2 choice)  
 [7, 8, 9, 10, 11, 12]

Section C

III.  $[8M * 4Q = 32M]$  → 8 marks for 4 questions each.  
 total 6 questions (2 choice)  
 [13, 14, 15, 16, 17, 18]

AGENDA:6. Deliberations by BOE:

All BOE members in consensus approved regulations, curriculum, evaluation policy, BOE members, matrix, question paper pattern. Few suggestions from the board given are updated in agenda 2 while discussing the syllabus of I and III sem in detail.

Total: 7 subjects were considered (blow up syllabus) and deliberations were noted.

3 subjects for I sem: Digital CF, P&T and DBMS.

4 subjects for III sem: python, OS, Linux boot camp, DCN.


AGENDA :

- F. Approval of proceedings of meeting:  
All members in consensus approved and recommended to place the same Academic Council for next approvals.

AGENDA 8 :

- with the permission of chair person,  
\* Prof. Geetha presented the blow up syllabus in front of the board for discussion.  
\* Prof. Shrawani updated the proceedings - deliberations done by BOE and approvals details along with minutes.  
\* Prof. Rashmi proposed VOTE OF THANKS after summarizing the BOE meeting

All BOE members were thanked for their participation, kind co-operation and the meeting ended successfully with everyone's satisfaction.

A J  07/07/2022

Dr. A. Srinivas

CHAIR PERSON.

Head of the department  
dept. of Computer Science  
Sri Lanka College (Autonomous)



**SURANA COLLEGE**  
(AUTONOMOUS)  
BANGALORE UNIVERSITY

**Department of MBA & Research Centre**

Re-accredited by NAAC with A+ Grade, ISO 9001: 2015 & IAO Certified  
Affiliated to Bangalore University, Approved by AICTE  
# CA - 17, Tumkur Mysore Ring Road, Kengeri Satellite town, Bangalore 60

**Board of Studies**

MEETING INVITATION

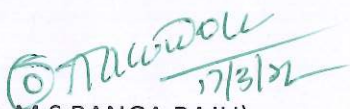
17 March 2022

We are happy to Invite you to the 1<sup>st</sup> Board meeting of BOS is scheduled on 18 March 2022 at our Kengery Campus at 200 pm.

Agenda:

1. Welcome
2. Introduction of Members
3. About Surana College MBA Program
4. Presenting the Governing Regulations of MBA Program
5. Presenting the Evaluation Policy of MBA Program
6. Presenting the BOE Policy
7. Presenting the Question Paper Setting and evaluation Policy
8. Remarks and Suggestion by the Members
9. Approval of Proceedings
10. Vote of Thanks and Adjourning the meeting

Request all members to make it convenient to attend the same and support in building quality Education system.

  
(Dr. M S RANGA RAJU)  
DIRECTOR  
DIRECTOR  
SURANA COLLEGE  
M.B.A. PROGRAMME  
CA-17, Kengeri Satellite Town,  
BANGALORE - 560 060.

## Proceedings:

Agenda 1: Dr. M.S.R - Director extended warm welcome to the BOS Members.

Agenda 2: Dr MSR - Director Introduced all the members present in meeting.

Agenda 3: Dr MSR Narrated the pathway of Suvana College and Best practices followed to the August gathering

Agenda 4: to Agenda 7

Dr. MSR made a presentation on how Agenda 4 to Agenda 7 is followed at Suvana College during Autonomous State.

All the Regulations concerning to Agenda 4 to 7 is followed as per BU regulation for first year including syllabus.

However Teaching, learning and Evaluation Best practices will be incorporated.

Agenda 8:

All the Members in consensus accepted and appreciated the effort.

Agenda 9:

All the member in consensus approved and recommended to place the same in Academic Council for next approvals.

Agenda 10: Minutes of Meeting (MOM)

Dr MSR extended Vote of Thank and adjourned meeting after six months on convenient date.

Action Taken Report:

The minutes of meeting along with recommended document is forwarded to place in next Academic Council.

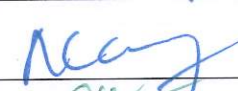
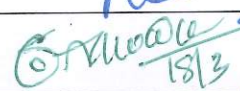
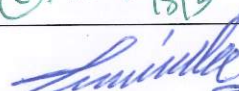
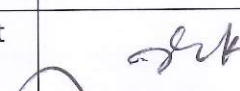

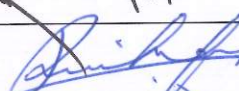
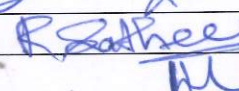
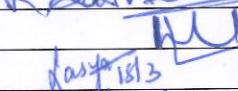
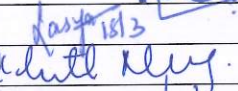
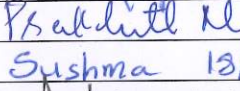
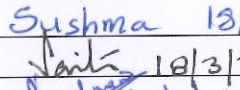
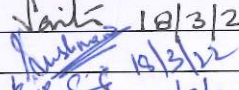
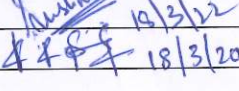
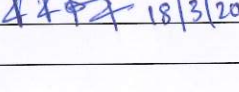


**SURANA COLLEGE**  
(AUTONOMOUS)  
BANGALORE UNIVERSITY

**Department of MBA & Research Centre**

**Board of Studies**

18 March 2022 at 200 pm

No	Name of Member	Signature
1	Dr Nagaraj- University Nominee Professor, CBSMS Bangalore University	
2	Dr M S Ranga Raju – Director MBA Surana College	 18/3
3	Dr G P Naik – Industry Representative Principal Consultant and MD Talent Avenues, Bangalore	 18/03/2022
4	Dr Srikanth P – External Subject Expert Professor-Finance Christ University	 18/03/2022
5	Dr K R Ravi – External Subject Expert Professor-Marketing ISME, Bangalore	 18/03/2022
6	Rinku M – Alumni Nominee Head- Industry Institute Connect	 18/3/22
7	Dr Satheesh Kumar R, Head- Research	 18/3/22
8	Tabreez Pasha, Head- Marketing	 18/3/22
9	Lasya K R, Head- Finance Domain	 18/3
10	Prakruti N Udupa, Faculty	 18/03/2022
11	Sushma Rawath, Faculty	 18/3/22
12	Savitha Sastry, Faculty	 18/3/22
13	Sushma Deepak, Faculty	 18/3/22
14	Sowmya, Head Placement	 18/3/2022
15	Dr Bhavani M R, Principal	
16	Dr Vani Shree Dean- Research and Consultancy Special Invitee	





## Surana College (Autonomous)

# CA - 17, Tumkur Mysore Ring Road, Kengeri Satellite town, Bangalore 60

Approved by AICTE, Affiliated to Bangalore University

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### 2<sup>ND</sup> BOS MEETING

28 June 2022

1030am.

### AGENDA:

1. Welcome
2. Reading minutes of previous meeting
3. Report on First semester activities
4. Second Semester onwards Curriculum structure and Syllabus for batch 2021-23
5. Curriculum structure for Batch 2022-24
6. BOE -Existing and NEW INNOVATIVE methods
7. Any other with the permission of chair
8. Vote of Thanks
9. Adjourning the meeting

  
(Dr. M S RANGA RAJU)

DIRECTOR  
DIRECTOR  
SURANA COLLEGE  
M.B.A. PROGRAMME  
CA-17, Kengeri Satellite Town,  
BANGALORE - 560 060.

28.06.2022

10.30 am

## Proceedings of Meeting :

### Agenda 1:

Director Dr. M.S. Ranga Raju extended warm welcome to the members present in the meeting.

### Agenda 2:

Previous Meeting Minutes was read by the Director.

### Agenda 3:

Program chair Mrs. Sushma Rawath made a brief presentation on first semester activities.

### Agenda 4:

Second semester curriculum after 2nd semester for Batch 2021-23 was presented to the Board

→ Option 1: No change in the BU curriculum structure

→ Option 2: Rearranging <sup>with existing & new</sup> courses to BU curriculum structure with 4th semester dedicated for

different options to match the stated PEO's of Outcome Based Education System.

### Comments by Board Members:

B.U. Nominee: Continue with B.U. flow for 1<sup>st</sup> Batch.

Industry Expert: If B.U. ReglM. Permits may go for change

Subject Experts: — do —

Consensus outcome: If BU Regulation Permits may go for change If not continue with 1<sup>st</sup> Batch

### Agenda 5: w/o. Change as per BU regulation

curriculum structure for 2<sup>nd</sup> Batch 2022-24 of Autonomous presented by the Director to the Board.

Option 3: Rearranging courses and adding new courses to achieve PEO's for Outcome Based Education.

### Comments by Two Board Members

B.U. Nominee: follow B.U. regulation ~~and~~

Industry Expert: may be implemented without

Subject Experts: BU regulation & structure violations.

Consensus outcome: Board members suggested to conduct courses without overlooking B.U. regulation and course titles.

### Agenda 6: Evaluation system:

a. Concept of Course Autonomy discussed.

Not recommended to Implement

b. Introducing Q.P. for 100 marks with 160 marks paper set

Not recommended to Implement

c. Weightage ISA: ESA = 40:60 discussed, suggested to wait for NEP guidelines

d. Introduction of Test generator / QV12 based

ESA and ISA discussed, Not recommended

e. Introduction of Practice based Experience evaluation to award ISA & ESA.

Not Recommended.

f. Introduction of Credit transfer from

MOC authorised Platforms to a maximum of 10-15% of overall credit discussed.

Suggest to wait till PA-NEP

### Agenda 7: guidelines

- No Agenda Item.

### Agenda 8:

Vote & trace extended by Dr Ms R

### Agenda 9:

Meeting Adjourned.



**Surana College**  
(AUTONOMOUS)  
BANGALORE UNIVERSITY  
**Department of MBA & Research Centre**

Board of Studies  
28 June 2022 at 11.00 am

Sl.No.	Name of the Member	Signature
1.	Dr. Y. Nagaraju – University Nominee Professor, CBSMS, Bangalore University	<i>Nagaraj</i>
2.	Dr. M S Ranga Raju – Director MBA Surana College	<i>M S Ranga Raju</i> 28/6/22
3.	Dr. G P Naik – Industry Representative, Principal Consultant and MD Talent Avenues, Bangalore	<i>G P Naik</i>
4.	Dr. Srikanth P – External Subject Expert Professor – Finance Christ University	<i>Srikanth P</i>
5.	Dr. K Ravi – External Subject Expert Professor – Marketing ISME, Bangalore	<i>K Ravi</i>
6.	Rinku M – Alumni Nominee Head – Industry Institute Connect	<i>Rinku M</i>
7.	Dr. Satheeshkumar R, Head - Research	<i>Satheeshkumar R</i>
8.	Tabreez Pasha, Head - Marketing	<i>Tabreez Pasha</i>
9.	Lasya K R, Head - Finance	<i>Lasya K R</i>
10.	Prakruthi N Udupa, faculty	– Abscut –
11.	Sushma Rawath, Faculty	<i>Sushma Rawath</i>
12.	Savita Shastri, Faculty	<i>Savita Shastri</i>
13.	Sushma Deepak, Faculty	– Abscut –
14.	Sowmya, Head – Placement	<i>Sowmya</i>
15.	Dr. Bhavani M R, Principal	– Abscut –
16.	Dr. Vani Shree Dean – research and Consultancy Special Invitee	– Abscut –



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**SURANA COLLEGE**

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## DEPARTMENT OF BIOTECHNOLOGY

### Proceedings of meeting Board of Studies (BoS) in Biotechnology

The Board of studies meeting in the department of Biotechnology was held on 22/3/2022 at 11.00 am in department of Biotechnology, Surana College Basavangudi, Autonomous, Bangalore 560004. Chairman, Dr Farzana Tasneem MI extended a warm welcome to members of BOS.

**The list of BOS Members are enclosed**

**The Following agenda is discussed, Verified, and approved in the Meeting:**

**Agenda 1:** BOS members discussed and approved to retain the existing NEP Syllabus BU for I and II Semester with the modification, Syllabus copy is enclosed.

Agenda 1: Introduction of NEP Model for BSc Programme

Agenda 2: Presentation and Approval of regulations of BSc Biotechnology -syllabus 1<sup>st</sup> sem

Agenda 3: Presentation and Approval of Question paper model -matrix for both Theory and Practical's with scheme

Agenda 4: Deliberation by BOS members

Agenda 5: It was suggested that to add Skill Enhancement course for first year

Agenda 6: Approval of Panel of Examiners

Agenda 7: Presentation of Evaluation policy

Agenda 8: Any further clarification by Chairman.

Vote of Thanks

SURANA COLLEGE

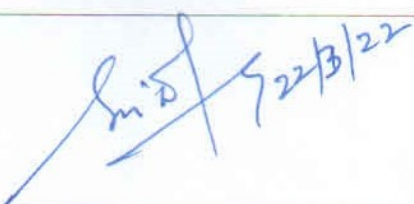
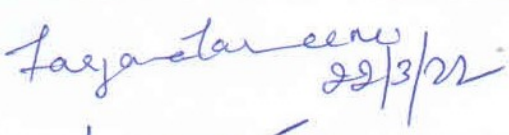


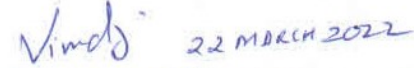
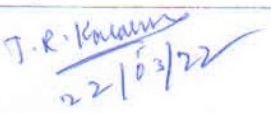

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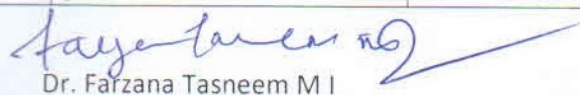
Bangalore University

DEPARTMENT OF BIOTECHNOLOGY

BOS MEMBERS

DATE :- 22<sup>nd</sup> March 2022.

Sl.no	Name of the Faculty	Designation	Signature
1	Dr. Srinivas C University Nominee	Professor Head Dept of Biotechnology and Microbiology Bangalore University Jnanabharthi	 22/3/22
2	Dr. Farzana Tasneem M I Chairperson	Assistant Professor HOD, Dept of Biotechnology Surana College	 22/3/22
3	Dr. Shivaji Bole Subject Expert	Associate Professor Dept of Biotechnology The Oxford College of Science Bangalore University	 22/3/22
4	Prof. Suman Prasad Subject Expert	Associate Professor Head, Dept of Biotechnology NMKRV Bangalore University Autonomous	 Suman Prasad
5	Dr. Vinod Jyothi Kumar Industry expert	Head Operations Biocon	 Vinod 22 MARCH 2022
5	Dr. Kumaraswamy T Allumni	Associate Professor Dept of Environment Science Bangalore Central University	 T.R. Kumaraswamy 22/03/22
6	Dr. Seethalaxmi	Assistant Professor Dept of Biotechnology Surana College	 22/3/2022

  
Dr. Farzana Tasneem M I

Chairperson

Dr. Bhavani MR

Principal

**DEPARTMENT OF BOTANY**  
**PROCEEDINGS OF THE MEETING OF BOARD OF STUDIES IN BOTANY**

The Board of studies meeting of Department of Botany was held on 22<sup>nd</sup> March, 2022 at 11.00 AM in Room number 207 of Surana College, Autonomous, Basavangudi, Bengaluru-560004. Chairperson, Prof. Chandrashekarappa HOD, Department of Botany and Dr. Malini Shetty A.G., Faculty of the Department of Botany extended warm welcome to Members of BOS.

The list of BOS members is enclosed.

The following agenda was discussed, verified, and approved in the meeting:

**Agenda-1:** BOS members discussed and approved to retain the existing NEP syllabus of BU for I and II semester with the modification. Syllabus copy is enclosed.

**Agenda-2:** It was suggested that Plants and Human Welfare as Open Elective in Semester I.

**Agenda-3:** Presentation and approval of regulations of Botany (BSc.CBBt)

**Agenda-4:** Presentation and approval of Syllabus of I and II Semester of Botany (BSc.CBBt) based on NEP 2020 Framework

**Agenda-5:** Presentation and approval of Evaluation Policy.

**Agenda-6:** Approval of BOE/Paper Setters/Examiners/Valuers.

**Agenda-7:** Presentation and approval of Question paper Model and matrix

**Agenda-8:** Deliberations by BOS members.

**Agenda-9:** Approval of proceedings of the meeting

**Agenda-10:** Any other matter with the permission of the Chairperson

  
Principal  
Surana College  
(AUTONOMOUS)  
No. 16, South End Road,  
Bangalore - 560 004.



# SURANA COLLEGE

(Autonomous)

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16, South End Road, Bangalore 560004

Tel: 080-26642292 | 080-22446141

www.suranacollege.edu.in

Dr. Malini Shetty A.G., Department of Botany, Malini.ag@suranacollege.edu.in.

## DEPARTMENT OF BOTANY

### PROCEEDINGS OF THE MEETING OF THE BOARD OF STUDIES IN BOTANY

The Board of Studies meeting of Department of Botany was held on 7<sup>th</sup> July, 2022 at 11.00am in Board Room of Surana College, Autonomous, Basavanagudi, Bengaluru-560004. Dr. Malini Shetty A.G Asst. Prof., Department of Botany extended warm welcome to the Members of BOS.

The list of BOS members is enclosed.

**The following agenda was discussed, verified, and approved in the meeting.**

**Agenda-1:** All the BOS members discussed NEP Syllabus of BU for III and IV semester and suggested slight modifications and rearrangement of few topics and to visit Research Centre related to Conservation as a part of IV semester practicals and approved the syllabus. Syllabus copy is enclosed.

**Agenda-2:** Presentation and approval of Regulations of Botany

**Agenda-3:** Presentation and approval of Syllabus of III and IV semester of Botany based on NEP 2020 Framework.

**Agenda-4:** Presentation and approval of Evaluation Policy.

**Agenda-5:** Approval of BOE / Paper Setters / Examiners / Valuers.

**Agenda-6:** Presentation and approval of Question paper model and matrix.

**Agenda-7:** Deliberations by BOS members.

**Agenda-8:** Approval of Proceedings of the Meeting.

*Bhavanth*

Principal  
Surana College  
(AUTONOMOUS)

No. 16, South End Road,  
Bangalore - 560 004.

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# Surana College (Autonomous)

South End Road, Bangalore 560004.

## Department of Chemistry

### Minutes of meeting

#### 1<sup>st</sup> BOS meeting

Date 21-03-2022

Time 10 am onwards

#### 1. Welcome

Dr. Sumaiya Tabassum, BOS chairperson, Dept of chemistry, Surana College welcomed the members of the BOS, Dr. Shanker, Prasanna Kumar S. G, Savita, Dr. Kaushik Geethesh, Dr. Spoorthi, Mr. Ashok H G for the 1<sup>st</sup> BOS meeting held on 21<sup>st</sup> March, 2022.

#### 2. Introduction of Members

Dr. Sumaiya Tabassum introduced the members of the BOS.

#### 3. About Surana College UG Chemistry Program

Dr. Sumaiya Tabassum explained about the introduction of the UG program in Surana College following the NEP policy 2020 from the academic year 2021-22.

The institution was conferred with autonomous from the year 2021-22 and hence new syllabus was presented for the BOS

The best practices of the College were also presented in front of the BOS team.

#### 4. Presenting the Governing Regulations of UG Program

The governing rules and the Salient features of four years multidisciplinary UG programme in accordance with NEP 2020 was presented to the members within the framework of Bangalore University regulations.

#### 5. Presenting the Evaluation Policy of UG Program

The evaluation pattern and the total marks for each course shall be based on continuous assessments and semester-end examinations.

As per the decision taken at the Karnataka State Higher Education Council, it is decided to have a uniform pattern of 40:60 for IA and Semester End theory examinations respectively and 50:50 for IA and Semester End practical examinations.

Total Marks for each course = 100%

Continuous assessment (C1) = 20% marks

Continuous assessment (C2) = 20% marks

Semester End Examination (C3) = 60% marks.

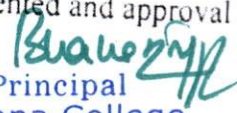
There shall be no minimum in respect of internal assessment marks and it was decided that the Internal assessment marks may be recorded separately.

It was also decided that if a candidate who has failed or rejected the result shall retain the internal assessment marks.

#### 6. Finalization of the UG syllabus for the I & II semester under NEP 2020 for the academic year 2021-22

The complete chemistry UG syllabus in accordance with NEP 2020 was presented and approval was requested.

#### 7. Presenting the BOE Policy

  
Principal  
Surana College  
(AUTONOMOUS)  
No. 16, South End Road,  
Bangalore - 560 004.

59

A member of BOE is selected in accordance with BU policy and they should have at least 5 years of teaching experience. The industry expert and the alumni can also be the members of BOE to give constructive feedback.

#### **8. Presenting the Question Paper Setting and evaluation policy**

Question Paper is to be set in accordance to BU regulations as per NEP 2020 and the evaluators should have at least three years of experience in teaching.

#### **9. Remarks and Suggestion by the Members**

The feedback with respect to the syllabus, the regulations for UG chemistry program was accepted by all the members.

The effort of the internal BOE members was also appreciated by the external BOE members.

#### **10. Approval of Proceedings**

The Mom was prepared accordingly and the proceedings of the 1<sup>st</sup> BOS was approved by all the members and sent to the members of academic council for final approval.

#### **11. Vote of Thanks and Adjourning the meeting**

Dr. Sumaiya Tabassum presented the vote of thanks and the meeting was adjourned after the next six months on a convenient date of the members.



**SURANA COLLEGE**  
(Autonomous)  
16, South End Road  
BANGALORE - 560 004

**PG DEPARTMENT OF COMMERCE**

**Board of Studies**

**Meeting Invitation**

17<sup>th</sup> March 2022

We are happy to invite you to the 1<sup>st</sup> Board meeting of BOS which is scheduled on 19<sup>th</sup> March 2022 at our SouthEnd Campus at 11:30 am.

- 1) Approval of the Regulations pertaining to M.Com
- 2) Approval of the Curriculum pertaining to M.Com
- 3) Approval of the Course structure
- 4) Approval of the subject titles of M.Com I & II semesters
- 5) Approval of the syllabus of each M.Com subject offered in I & II semesters
- 6) To approve the question paper pattern for the academic year 2021-22
- 7) Approval of BOE members as per the list enclosed
- 8) Any other matter with the permission of the chair

Request all members to make it convenient to attend the same and support in building quality Education System.

  
Nagavalli MN  
Coordinator

# Proceedings of the meeting - BOS - 19<sup>th</sup> March 2022


1

- 1) Mrs. Nagaravalli M.N - Coordinator, PG Department of commerce extended warm welcome to the BOS members.
- 2) Mr. Prashanth Idguzzi suggested syllabus need to be employable friendly, industry tieups & collaboration, tie ups with outside (foreign) universities & colleges which enhances reputation of college.
- 3) Dr. N.K. Satyapal Sharma suggested changes can be implemented from 2<sup>nd</sup> year as complete syllabus currently adopted is the BU prescribed one.
- 4) Dr. N.K. Satyapal sharma suggested if needs 2<sup>rd</sup> & 4<sup>th</sup> semester can be changed, as of now 1<sup>st</sup> & 2<sup>nd</sup> semester is accepted without change.
- 5) Dr. Sudha B.S. suggested to share their expertise within organisation & also neighbouring organisations.
- 6) Dr. Sarvamangala R. suggested if any minor changes needed can be done.
- 7) Dr. Sarvamangala R. suggested get MOU done for certification courses with FKCCI/MSME/SMSSIC/KASSIA/BCIC so that it works out well & beneficial to students.
- 8) MOM: Minutes of Meeting  
All the BOS members present in consensus approved & recommended to place the above regulation & syllabus in academic course for next approval.


9) Prof. Shiva T thanked all members of BOS.

BOS meeting concluded at 1:15

### Signatures

1)   
[Dr. Sarvamangal R. - BV]

8) Bhargava

2)   
[Dr. Sudha B.S.]

9) Shiva T

3)   
[Dr. N.K. Satya Pal Sharma]

10) 

4)   
[Mrs. Divya Prasanna]

Mr. Pranth<sup>sha</sup> Adgani  
Attended virtually

5)

6) Minkal

7) Mahalabehni AL

### Action taken Report

The minutes of meeting along with recommended doc is forwarded to place in next Academic Council meet



## SURANA COLLEGE (Autonomous)

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#CA-17, Kengeri Satellite Town, Bengaluru, Karnataka 560060.

### PG Department of Psychology

#### BOARD OF STUDIES

Date: 28.06.2022

Time: 11 AM – 1 PM


Venue: Board Room, Surana College

#### Members Present:

1. Dr Sudharshan H L- HOD, Department of Psychology, Surana College
2. Dr. Sreenivas. M, Chairman, Dept of Psychology, Bangalore University
3. Dr. Rohini Shivananda – Faculty, Dept of Psychology, Bangalore University
4. Dr. Swaroop R, Industrial representative, Asst Professor, Jain University
5. Dr Brinda M, Asst Professor, External Subject Expert-Industrial and Organizational Behaviour, Dept of Psychology, Bangalore University
6. Mrs Meera N, Alumni Nominee- Industrial and Organizational Behaviour
7. Mrs. Bhanu BS, Faculty
8. Mr. Ravi K Agrahara, Faculty
9. Ms. Sridevi P, Faculty
10. Mr. Saptarshee Mazumdar, Faculty

#### Agenda for the meeting:

1. Welcome
2. Introduction of the members
3. Presenting the syllabus for the II semester 2021 – 2023 and I semester 2022 – 2023
4. Approval of Diploma in Self-Management
5. Approval of the updated BOE Members
6. Approval of Proceedings
7. Vote of thanks and adjourning the meeting.

  
Principal  
Surana College  
(AUTONOMOUS)  
No. 16, South End Road,  
Bangalore - 560 004.

## **Meeting Proceedings:**

### Agenda 1 and 2:

The members of BOS was welcomed by Prof. Ravi K Agrahara followed by the introduction of the members present.

### Agenda 3:

- Presentation of the syllabus for the second semester 2021 – 2023 and for the first semester 2022 – 2024 highlighted on unit 5 in each course to be modified as open unit, wherein students design the syllabus and the assessment mode for this unit.
- There was no modification in the syllabus prescribed by the Bangalore University.
- The number of courses, course titles, syllabus and credits were retained.
- Members suggested to provide topics in unit 5 of each course from which students shall explore the topics of their interest.
- It was suggested that the students do book reviews as their unit 5 learning.
- Recommendations were made to emphasise the application of unit 1 to 4 in unit 5 for all the courses.
- Members insisted to ask one question from the unit 5 in the final semester end examinations.

### Agenda 4:

- Presentation of Diploma in Self-Management was done.
- The framework and scheme of evaluation of the diploma was designed as per the university regulations.
- Objectives, eligibility and requirements were discussed and suggestion were provided for the same by the members.
- Nomenclature of the course offered was reviewed.

### Agenda 5:

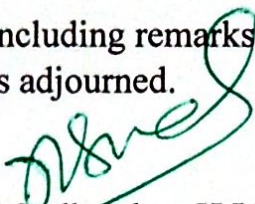
- The BOE list of members were updated.
- The list was called out in the meeting and reviewed.

### Agenda 6:

- The syllabus document of second semester and first semester was approved.
- Diploma in Self-Management was approved.
- Updated list of BOE members were approved.

### Agenda 7:

Concluding remarks and vote of thanks was proposed by Dr. Sudharshan H L and the meeting was adjourned.

  
(Dr Sudharshan H L)  
HOD, PG Department of Psychology







GPS Map Camera



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Karnataka 560060, India

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Karnataka 560060, India

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Karnataka 560060, India

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Karnataka 560060, India

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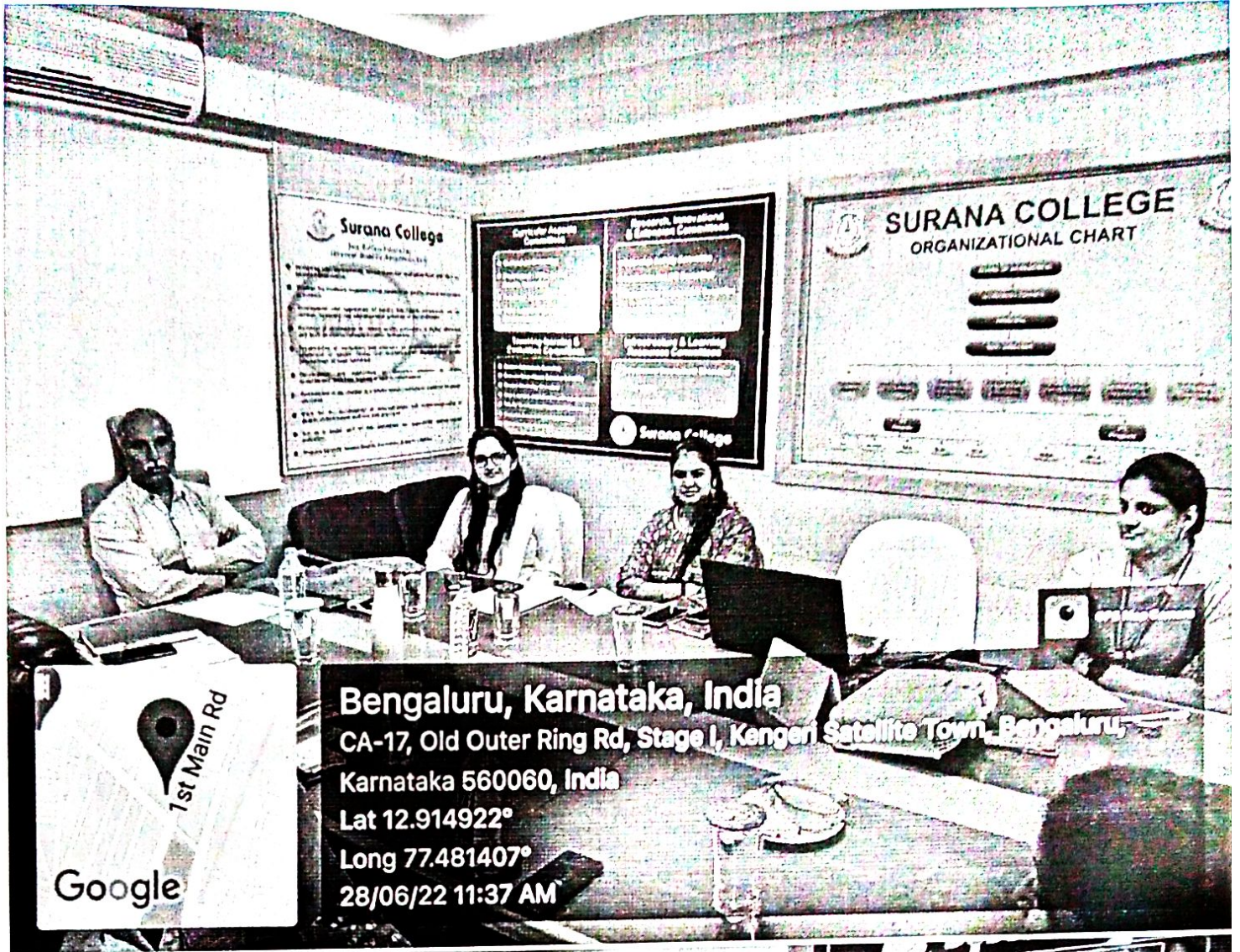
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Karnataka 560060, India  
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## SURANA COLLEGE

Centre for Post Graduate Studies and Research  
(Autonomous)

BANGALORE UNIVERSITY

Department OF Psychology

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CA-17, Old Outer Ring Rd, Stage I, Kengeri Satellite Town, Bengaluru, Karnataka 560060.

### BOARD OF STUDIES MEETING INVITATION

22/03/2022

We are happy to Invite the 1<sup>st</sup> Board Meeting of BOS which is scheduled on 22/03/2022 at our Kengeri Campus at 11.30AM.

#### Agenda:

1. Welcome
2. Introduction of the members
3. About Surana college M.Sc Programme
4. Presenting the Governing rules of M.Sc Programme
5. Presenting the Evaluation policy of M.Sc Programme
6. Presenting the BOE policy
7. Presenting the Question paper setting and Evaluation policy
8. Remarks and suggestion by the members
9. Approval of Proceedings
10. Vote of thanks and adjourning the meeting.

Request all members to make it convenient to attend the same and support in building quality Education system

(Dr Sudharshan HL)

HOD , Department OF Psychology

Head Of Department  
Dept. of MSc-Psychology  
Surana College  
Kengeri, Bangalore - 560 060



# SURANA COLLEGE

Centre for Post Graduate Studies and Research  
(Autonomous)

BANGALORE UNIVERSITY

Department OF Psychology

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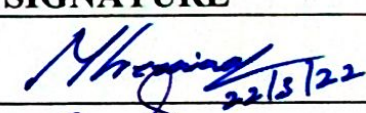
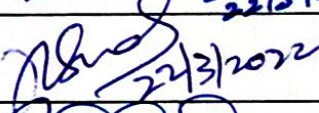
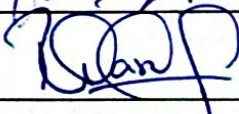

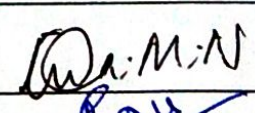
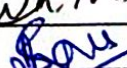
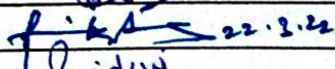
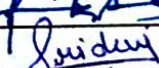
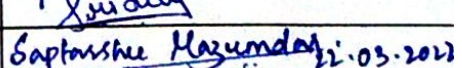
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## BOARD OF STUDIES

MEETING INVITATION

22/03/2022 at 11.30 am

SL.NO	NAME OF THE MEMBER	SIGNATURE
1	Dr. Sreenivas. M, Chairman, Dept of Psychology, Bangalore University	 22/3/22
2	Dr Sudharshan HL- HOD, Department of Psychology, Surana PG Centre	 22/3/2022
3	Dr. Swaroop R, Industrial representative, Asst Professor, Jain University	
4	Dr Rohini S, External Subject Expert-Clinical, Asst Professor ,Dept of Psychology, Bangalore University	
5	Dr Brinda M, Asst Professor, External Subject Expert-Industrial and Organizational Behaviour, Dept of Psychology, Bangalore University	
6	Dr Vibhashree ,Alumni Nominee- Clinical, Asst Professor, Mount Carmel	
7	Mrs Meera N, Alumni Nominee- Industrial and Organizational Behaviour	
8	Mrs. Bhanu BS, Faculty	
9	Mr. Ravi K Agrahara, Faculty	 22.3.22
10	Ms. Sridevi.P, Faculty	
11	Mr. Saptarshee Mazumdar, Faculty	 22.03.2022
12	Dr Bhavani M R, Principal	

## PROCEEDINGS:

→ Agenda 1: Dr. Sudarshan H.L. — Head of the Department extended a warm-hearted welcome to all B.O.S members.

→ Agenda 2: Dr. Sudarshan H.L. introduced all the members present in the meeting.

→ Agenda 3: The regulations and syllabus was presented before the members of the BOS, followed by a brief

→ discussion which led to the following conclusions:

- (a) Guidelines remain the same for the next two years.
- (b) Change of syllabus to be put on hold for the next three years.

→ Agenda 5 to 7: The evaluation Policy, BOE Policy and Question Paper setting policy were presented, discussed and approved.

→ Agenda 8: The new scheme of pedagogy, i.e. flipped classroom (synchronous-asynchronous) classes was discussed and approved with suggestions as listed below:

- (a) Have MOUs with Organizations and clinical set-ups to serve the purpose of proper documentation.
- (b) Curate assessments that adhere to the new scheme of pedagogy.
- (c) Structured supervision of students' progress.

→ Agenda 9: The following suggestions for quality improvement were made by the BOS members:

- (a) Introduce Teacher Training Program.
- (b) Build a sense of empowerment among students.



PROCEEDINGS:

- (c) Bring in alumni to train the present students and equip them with the real-life skills required.
- (d) It is better to perform club activities in the presence of a crowd and not in front of the students' own classmates.

→ Agenda 10: Dr Sudarshan H.L. delivered the vote of thanks and adjourned the meeting.

**SURANA COLLEGE**  
(Autonomous)  
SOUTHEND ROAD, BANGALORE - 560004



**Syllabus for mathematics**  
**Undergraduate(UG) programme**  
**I and II semester**

Framed according to Bangalore university NEP (National Education Policy) syllabus -2021

*Bhauzipp*  
Principal  
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No. 16, South End Road,  
Bangalore - 560 004.



ESTD. 1995  
**SURANA COLLEGE**

Moulding Character & Careers

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Recognized under 2(f) & 12(B) of UGC  
Accredited by IAO & Certified by ISO

RAJAT YATRA

**SURANA COLLEGE**  
(AUTONOMOUS)  
#16, Southend road, Bangalore-04  
BANGALORE UNIVERSITY  
DEPARTMENT OF MATHEMATICS

**BOARD OF STUDIES**

23<sup>rd</sup> MARCH 2022

Sl.No	Name of Member	Signature
1.	<b>Prof. B.Chelvaraju, University Nominee</b> Department of Mathematics, Bangalore university	<i>B. Chelvaraju</i> 23/03/22
2.	<b>Dr. Bhagya.S -Subject Expert</b> NMKRV College (Autonomous), Bangalore-04	<i>Bhagya.S</i> 23/3/22
3.	<b>Dr.S.B.Satyanarayana -Subject Expert</b> Vijaya College, R.V Road, Bangalore	<i>Satyanarayana</i> 23/3/22.
4.	<b>Prof.T.R.Marulasiddappa(Chairperson,BOS)</b> Surana college, South end road, Bangalore-04	<i>T.R. Marulasiddappa</i> 23/3/22
5.	<b>Prof.Veena.V(Member)</b> Surana college, Southend road, Bangalore-04	<i>Veena.V</i> 23/3/22
6.	<b>Ms.Anusha.R-Industry Representative</b> System Engineer, Infosys Pvt limited	<i>Anusha.R</i> 23/03/22
7.	<b>Mr.Kushal.S-Alumni Nominee</b> Assistant, ISRO, Bangalore.	<i>Kushal.S</i> 23/03/22



# SURANA COLLEGE

(AUTONOMOUS)

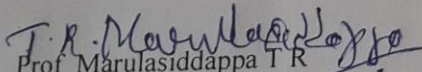
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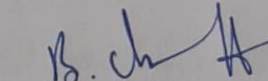
BANGALORE UNIVERSITY  
DEPARTMENT OF MATHEMATICS

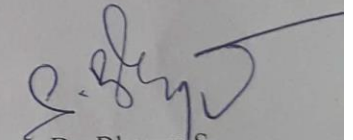
## PANEL OF EXAMINERS / PAPER SETTERS FOR 1<sup>ST</sup> TO 6<sup>TH</sup> SEMESTER B.Sc.

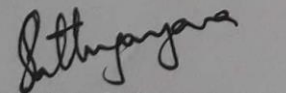
1. Dr. S Bhagya - NMKRV College for Women B-04
2. Dr. Sumithra S R - Govt. Science College, Autonomous.
3. Dr. Radhakrishna .D- HOD Vijaya College, RV Road B-04
4. Dr. S.B Sathyanarayana - Vijaya College, RV Road B-04
5. Dr. Arathi M S - Jain University
6. Prof. H S Mahesh - RPA FGC B-10
7. Prof. T C Ramesh - HOD, Sheshadripuram, Yelahanka
8. Prof. K L S Sharma - HOD, BHS College, B-11
9. Dr. Shailaja.M - GFGC, Vijayanagar
10. Dr. Maheshwari P G - GFGC, Vijayanagar
11. Dr. Yamini J- GFGC, Vijayanagar
12. Prof. Sundramma .P- HOD, National College, Basavanagudi
13. Prof. Sumana S - RPA FGC, B-10
14. Prof. Shoba T - Sheshadripuram FGC Yelahanka,
15. Prof. Sheeba S - NMKRV (Autonomous), B-04
16. Prof. Swathi V Hebbar - Dayanada Sagar College
17. Prof. Shobha V - GFGC, Kengeri
18. Prof. Chandrashekar - KLE College, B-10
19. Dr. Lakshmi Janardhan, GFGC, B-40
20. Dr. Karan Kumar - KLE College, B-10
21. Dr. Madhukar, St Joseph College (Autonomous), Bangalore.

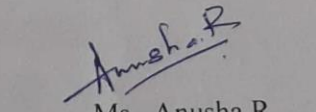
### Signature of the Board Members

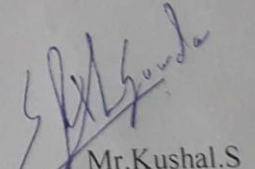
  
Prof Marulasiddappa T R  
(Chairperson BOS)

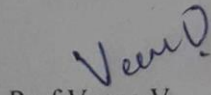
  
Dr. B Cheluvraju  
(University Nominee)

  
Dr. Bhagya S  
(Subject Expert)

  
Dr S.B. Sathyanarayana  
(Subject Expert)

  
Ms. Anusha R  
(Industry Representative)

  
Mr. Kushal S  
(Alumni)

  
Prof Veena V  
(Member)

**DEPARTMENT OF MATHEMATICS**  
**Proceedings of the meeting of Board Of studies in Mathematics**

The Board Of Studies meeting in Department of Mathematics was held on 23<sup>rd</sup> march 2022 at 1:00 PM, at Computer science lab, Surana College, Autonomous, Basavanagudi, Bengaluru 560004. Chairperson Prof Marulasiddappa T R ( H O D ) , Department of Mathematics extended a warm welcome to members of BOS.

The List of BOS members is enclosed.

**The following agenda was discussed, verified, and approved in the meeting:**

**Agenda-1:** BOS members discussed and approved to retain the existing NEP syllabus of BU for I and II semester with the modification syllabus copy is enclosed.

**Agenda-2:** It was suggested that Mathematics (minor) and Business mathematics to be retained as open elective for semester-I and II

**Agenda-3:** Presentation and Approval of regulations B.Sc ( Mathematics) programme.


**Agenda-4:** Presentation and Approval of Syllabus of I and II semester B.Sc ( Mathematics) based on NEP 2020 framework.

**Agenda-5:** Presentation and Approval of Evaluation Policy.

**Agenda-6:** Approval of BOE/Paper Setters/ Examiners/ Valuers.

**Agenda-7:** Presentation and Approval of Question Paper Model and Matrix.

**Agenda-8:** Approval of Proceedings of meeting.

  
Principal  
Surana College  
(AUTONOMOUS)  
No. 16, South End Road,  
Bangalore - 560 004.

## Preamble

The subject wise expert committee to draft model curriculum contents in Mathematics constituted by the Department of Higher Education, Government of Karnataka, Bangalore vide GO No. ED 260 UNE 2019 (PART-1) DATED 13.08.2021 is pleased to submit its partial report on the syllabus for the First Year (First & Second Semesters) B.Sc.(Basic/Honors) Mathematics and detailed Course Structure for B.Sc.(Honors) Mathematics and M.Sc. (One Year) Mathematics.

The committee discussed various models suggested by the Karnataka State Higher Education Council in its joint meetings with the Chairpersons of Board of Studies of all state universities in Karnataka and resolved to adopt Model IIA (Model Program Structure for the Bachelor of Science (Basic/Hons.) for the subjects with practical's with Mathematics as Major/Minor.

To achieve the core objectives of the National Education Policy 2020 it is unanimously resolved to introduce computer based practical's for the Discipline Core (DSC) courses by using Free and Open Source Software's (FOSS) tools for implementation of theory based on DSC courses as it is also suggested by the LOCF committee that the papers may be taught using various Computer Algebra

System (CAS) software's such as Mathematica, MATLAB, Maxima and R to strengthen the conceptual understanding and widen up the horizon of students' self-experience. In view of these observations the subject expert committee suggested the software's Python/ Maxima/ Scilab/ Maple/ MatLab/ Mathematica for hands on experience of implementation of mathematical concepts in computer based lab.

The expert committee suggests the implementation this curriculum structure in all the Departments of Mathematics in Universities/Colleges in Karnataka.

The subject expert committee designed the Course Learning Outcome (CO) to help the learners to understand the main objectives of studying the courses by keeping in mind of the Programme outcomes (PO) of the graduate degree with honors in Mathematics or a graduate degree with Mathematics as a major subject.

As the Mathematics subject is a vast with several branches of specializations, it is difficult for every student to learn each branch of Mathematics, even though each paper has its own importance. Hence the subject expert committee suggests number of elective papers (for both Discipline electives and Open

Electives) along with Discipline Core Courses. The BoS in Mathematics of universities may include additional electives based on the expertise of their staff and needs of the students'.

A student can select elective paper as per her/his needs and interest. The subject expert committee in Mathematics suggests that the concerned Department/Autonomous

Colleges/Universities to encourage their faculty members to include necessary topics in addition to courses suggested by the expert committee.

2

## B.Sc. Mathematics (Honors)

**Programme Outcomes (PO): By the end of the program the students will be able to:**

PO 1	<b>Disciplinary Knowledge:</b> Bachelor degree in Mathematics 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 computer science and other allied subjects.
PO 2	<b>Communication Skills:</b> 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 3	<b>Critical thinking and analytical reasoning:</b> 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 4	<b>Problem Solving :</b> 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 modeling ability, problem solving skills.
PO 5	<b>Research related skills:</b> The completing this programme develop the capability of inquiring about appropriate questions relating to the Mathematical concepts in different areas of Mathematics.

PO 6	<b>Information/digital Literacy:</b> The completion of this programme will enable the learner to use appropriate softwares to solve system of algebraic equation and differential equations.
PO 7	<b>Self –directed learning:</b> The student completing this program will develop an ability of working independently and to make an in depth study of various notions of Mathematics.
PO 8	<b>Moral and ethical awareness/reasoning:</b> : 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 mathematical studies in particular.
PO 9	<b>Lifelong learning:</b> 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 word problems.
PO 10	Ability to peruse advanced studies and research in pure and applied Mathematical sciences.

## Assessment

### Weightage for the Assessments (in percentage)

Type of Course	Formative Assessment/ I.A.	Summative Assessment (S.A.)
Theory	40%	60 %
Practical	50%	50 %
Projects	40 %	60 %
Experiential Learning (Internship etc.)	--	--



**Contents of Courses for B.Sc. with Mathematics as Major Subject &  
B.Sc.(Hons) Mathematics**

**Model IIA**

Semester	Course No.	Theory/ Practical	Credits	Paper Title	Marks	
					S.A.	I.A.
I	MATDSCT1.1	Theory	4	Algebra - I and Calculus - I	60	40
	MATDSCP1.1	Practical	2	Theory based Practical's on Algebra - I and Calculus - I	25	25
	MATOET1.1	Theory	3	(A) Mathematics –I (B) Business Mathematics –I	60	40
II	MATDSCT2.1	Theory	4	Algebra - II and Calculus - II	60	40
	MATDSCP2.1	Practical	2	Theory based Practical's on Algebra - II and Calculus - II	25	25
	MATOET2.1	Theory	3	(A) Mathematics –II (B) Business Mathematics-II	60	40
<b>Exit Option with Certificate</b>						
III	MATDSCT3.1	Theory	4	Ordinary Differential Equations and Real Analysis-I	60	40
	MATDSCP3.1	Practical	2	Theory based Practical's on Ordinary Differential Equations and Real Analysis-I	25	25
	MATOET3.1	Theory	3	(A) Ordinary Differential Equations (B) Quantitative Mathematics	60	40
IV	MATDSCT4.1	Theory	4	Partial Differential Equations and Integral Transforms	60	40
	MATDSCP4.1	Practical	2	Theory based Practical's on Partial Differential Equations and Integral Transforms	25	25
	MATOET4.1	Theory	3	(A) Partial Differential Equations (B) Mathematical Finance	60	40
<b>Exit Option with Diploma</b>						
V	MATDSCT5.1	Theory	3	Real Analysis and Complex Analysis	60	40
	MATDSCP5.1	Practical	2	Theory based Practical's on Real Analysis and Complex Analysis	25	25
	MATDSCT5.2	Theory	3	Ring Theory	60	40
	MATDSCP5.2	Practical	2	Theory based Practical's on Ring Theory	25	25
	MATDSET5.1	Theory	3	(A) Vector Calculus (B) Mechanics (C) Mathematical Logic	60	40
VI	MATDSCT6.1	Theory	3	Linear Algebra	60	40
	MATDSCP6.1	Practical	2	Theory based Practical's on Linear Algebra	25	25

	MATDSCT6.2	Theory	3	Numerical Analysis	60	40
	MATDSCP6.2	Practical	2	Theory based Practical's on Numerical Analysis	25	25
	MATDSET6.1	Theory	3	(A) Analytical Geometry in 3D (B) Number Theory (C) Special Functions (D) History of Bhâratiya Gaṇita	60	40
<b>Exit Option with Bachelor of Arts, B.A./ Bachelor of Science, B.Sc. Degree</b>						
VII	MATDSCT7.1	Theory	3	Discrete Mathematics	60	40
	MATDSCP7.1	Practical	2	Theory based Practical's on Discrete Mathematics	25	25
	MATDSCT7.2	Theory	3	Advanced Ordinary Differential Equations	60	40
	MATDSCP7.2	Practical	2	Theory based Practical's on Advanced Ordinary Differential Equations	25	25
	MATDSCT7.3	Theory	4	Advanced Analysis	60	40
	MATDSET 7.1	Theory	3	(A) Graph Theory (B) Entire and Meromorphic Functions (C) General Topology (D) Bhâratiya Trikoṇṃiti Śâstra	60	40
	MATDSET 7.2	Theory	3	Research Methodology in Mathematics	60	40
VIII	MATDSCT8.1	Theory	4	Advanced Complex Analysis	60	40
	MATDSCT8.2	Theory	4	Advanced Partial Differential Equations	60	40
	MATDSCT8.3	Theory	3	Fuzzy Sets and Fuzzy Systems	60	40
	MATDSET 8.1	Theory	3	(A) Operations Research (B) Lattice theory and Boolean Algebra (C) Mathematical Modeling (D) <i>Ankapâśa</i> (Combinatorics)	60	40
	MATDSET 8.2	Research Project	6 (3 + 3)	Research Project* OR Any Two of the following electives (A) Finite Element Methods (B) Cryptography (C) Information Theory and Coding (D) Graph Theory and Networking	120 OR 60 60	80 OR 40 40
<b>Award of Bachelor of Science Honours, B.Sc.(Hons) Degree in Mathematics</b>						

**One Year M.Sc. degree in Mathematics (Two Semesters)**

Semester	Course Number	Theory/ Practical	Credits	Title of the Course	S.A.	I.A.
I	PGMATDSCT1.1	Theory	3	C++ Programming for Mathematics	60	40
	PGMATDSCP1.1	Practical	2	Computer Practical's on C++ Programming for Mathematics	25	25
	PGMATDSCT1.2	Theory	3	Computational Numerical Methods	60	40
	PGMATDSCP1.2	Practical	2	Computer Practical's on CNM	25	25
	PGMATDSCT1.3	Theory	4	Functional Analysis	60	40
	PGMATDSET1.1	Theory	3	(A) Fluid Mechanics –I (B) Computational Fluid Mechanics (C) Contact Geometry (D) Fuzzy Topology (E) Ramanujan Theta Function and Continued Fractions	60	40
	PGMATDSET1.2	Theory	3	(A) Advanced Graph Theory (B) Partition Theory (C) Algebraic Number Theory (D) Riemannian Geometry	60	40
II	PGMATDSCT2.1	Theory	4	Measure Theory	60	40
	PGMATDSCT2.2	Theory	4	Differential Geometry	<b>60</b>	<b>40</b>
	PGMATDSCT2.3	Theory	3	Mathematical Methods	60	40
	PGMATDSET2.1	Theory	3	(A) Fluid Mechanics –II (B) Magneto hydrodynamics (C) Finsler Geometry and Relativity (D) Mathematical Modeling	60	40
	PGMATDSET2.2	Project	6	Research Project	120	80

- In lieu of the research Project, two additional elective papers/Internship may be offered **Abbreviation for MATDSCT1.1 /MATDSCP1.1**

MAT – Mathematics ; DSC – Discipline Core; T – Theory/ P – Practical; 1 – First Semester; .1 – Course 1

PGMATDSCT1.1 : PG- Post Graduate ; MAT- Mathematics; DSC- Discipline Core; T- Theory  
1 –First Semester; .1 – Course 1

**CURRICULUM STRUCTURE FOR UNDERGRADUATE DEGREE PROGRAM Name**  
**of the Degree Program : B.Sc. (Honors)**  
**Discipline/Subject : Mathematics Starting**  
**Year of Implementation :2021-22**

**PROGRAM ARTICULATION MATRIX**

Semester	Course No.	Programme Outcomes that the Course Addresses	Pre-Requisite Course(s)	Pedagogy*	Assessment**
I	MATDSCT1.1	PO 1, PO 2, PO 3	-	MOOC	CLASS TESTS
II	MATDSCT2.1	PO 1, PO 2, PO 3, PO 8	MATDSCT1.1	PROBLEM SOLVING	SEMINAR
III	MATDSCT3.1	PO 1, PO 4, PO7, PO 8	-----	SEMINAR	
IV	MATDSCT4.1	PO 1, PO 4, PO7, PO 8	MATDSCT3.1	PROJECT BASED LEARNING	QUIZ
V	MATDSCT5.1	PO 1, PO 2, PO 3, PO 5	----	ASSIGNMENTS	ASSIGNMENT
V	MATDSCT5.2	PO 3, PO 4, PO 7, PO10	MATDSCT2.1	GROUP DISCUSSION	TERM EXAM
VI	MATDSCT6.1	PO 6, PO 7, PO 10.	MATDSCT5.2		
VI	MATDSCT6.2	PO 3, PO 4, PO 5, PO 8, PO 9, PO 10.	MATDSCT1.1 & MATDSCT2.1	VIVA-VOCE	
VII	MATDSCT7.1	PO 3, PO 4, PO5, PO 7, PO 9.	MATDSCT1.1 & MATDSCT2.1		
VII	MATDSCT7.2	PO 2, PO 4, PO 5, PO 10	MATDSCT3.1		
VII	MATDSCT7.3	PO 2, PO 4, PO 5, PO 10	MATDSCT3.1	VIVA-VOCE	
VIII	MATDSCT8.1	PO 2, PO 4, PO 5, PO 10	MATDSCT5.1		
VIII	MATDSCT8.2	PO 2, PO 4, PO 5, PO 10	MATDSCT4.1	VIVA-VOCE	
VIII	MATDSCT8.3	PO 2, PO 4, PO 5, PO 10	MATDSCT7.3		

\*\* Pedagogy for student engagement is predominantly Lecture. However, other pedagogies enhancing better student engagement to be recommended for each course. This list includes active learning/ course projects / Problem based or Project based Learning / Case Studies / Self Study like Seminar, Term Paper or MOOC.

\*\*\* Every Course needs to include assessment for higher order thinking skills (Applying/ / Evaluating / Creating). However, this column may contain alternate assessment methods that help formative assessment ( i.e. assessment for Learning).

## B.Sc. with Mathematics as a Minor in the 3<sup>rd</sup> Year

Semester	Course No.	Theory/ Practical	Credits	Paper Title	Marks	
					S.A.	I.A.
V	MATDSCMT5.1	Theory	3	Complex Analysis	60	40
	MATDSCMP5.1	Practical	2	Theory based Practical's on Complex Analysis	25	25
VI	MATDSCMT6.1	Theory	3	Numerical Analysis	60	40
	MATDSCMP6.1	Practical	2	Theory based Practical's on Numerical Analysis	25	25

### Abbreviation for MATDSCMT5.1 / MATDSCMP5.1

MAT – Mathematics; **DSC** – Discipline Core; **M** – Minor; **T** – Theory /**P** – Practical;

**5** – Fifth Semester; **.1** – Course 1

**Credit Distribution for B.Sc.(Honors) with Mathematics as Major in the 3<sup>rd</sup> Year  
(For Model IIA)**

Subject	Semester	Major/ Minor in the 3 <sup>rd</sup> Year	Credits					
			Discipline Specific Core (DSC)	Open Elective (OE)	Discipline Specific Elective (DSE)	AECC &Langu ages	Skill Enhancement Courses (SEC)	Total Credi ts
Mathematics	I – IV	Major	4 Courses (4+2)x 4=24	4Courses 3 x 4 =12	---	(4+4=8) Courses 8x(3+1)= 32	2 Courses 2x(1+1)= 4	72
Other Subject		Minor	24	--	--	--	--	24
<b>96</b>								
Mathematics	V & VI	Major	4 Courses4x(3+2) =20	-----	2Courses 2 x 3 =06	---	2Courses 2 x 2 =4	30
Other Subject		Minor	10	--	--	--	--	10
<b>(96+40)=136</b>								
Mathematics VII & VIII		Major	2 Courses 2x(3+2)=10 3 Courses 3 x 4 = 12 1Course 1 x 3 =3 Total=25	-----	2Courses 2 x 3 =6 Res.Meth1 x 3 = 3 2 Courses 2 x 3 =6 Total=15	----	----	40
<b>Total No. of Courses</b>			14	04	07	08	04	
<b>136+40=176</b>								

**Syllabus for B.Sc. with Mathematics as Major Subject &  
B.Sc. (Hons) Mathematics**

**SEMESTER – I**

<b>MATDSCT 1.1: Algebra - I and Calculus – I</b>	
<b>Teaching Hours : 4 Hours/Week</b>	<b>Credits: 4</b>
<b>Total Teaching Hours: 56 Hours</b>	<b>Max. Marks: 100 (S.A.-60 + I.A. – 40)</b>

**Course Learning Outcomes:** This course will enable the students to

- Learn to solve system of linear equations.
- Solve the system of homogeneous and non homogeneous linear of m equations in n variables by using concept of rank of matrix, finding eigen values and eigenvectors.
- Sketch curves in Cartesian, polar and pedal equations.
- Students will be familiar with the techniques of integration and differentiation of function with real variables.
- Identify and apply the intermediate value theorems and L'Hospital rule.

**Unit-I: Matrix:** Recapitulation of Symmetric and Skew Symmetric matrices, Algebra of Matrices; Row and column reduction to Echelon form. Rank of a matrix; 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, Cayley-Hamilton theorem (without Proof) find  $A^{-1}, A^{-2}, A^{-3}$  for Matrices of order 2 and order 3 using C-H theorem

**14 Hours**

**Unit-II: Differential Calculus-I :** Limits, Continuity, Differentiability and properties, **Successive Differentiation:**  $n^{\text{th}}$  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 and its applications.

**14 Hours**

**Unit-III: Differential Calculus-II:** Intermediate value theorem, Rolle's Theorem, Lagrange's Mean Value theorem, Cauchy's Mean value theorem and examples. Taylor's theorem, Maclaurin's series, Indeterminate forms and evaluation of limits using L'Hospital rule.

**14 Hours**

**Unit -IV: Polar Co-ordinates:** 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- center of curvature, tracing of curves-standard curves.

**14 Hours**

**Reference Books:**

1. University Algebra – N.S. Gopala Krishnan, New Age International (P)Limited, 2015.
2. Theory of Matrices – B S Vatsa, New Age International Publishers, 2010.
3. Matrices – A R Vasista, Krishna Prakashana Mandir, 2014.
4. Differential Calculus – Shanti Narayan, S. Chand & Company, NewDelhi, 1998.
5. Applications of Calculus, Debasish Sengupta, Books and Allied (P) Ltd.,2019.
6. Calculus – Lipman Bers, Holt, Rinehart &Winston, 1969.
7. Calculus – S Narayanan & T. K. Manicavachogam Pillay, S. Viswanathan Pvt.Ltd., vol. I &II, 2009.
8. Schaum’s Outline of Calculus – Frank Ayres and Elliott Mendelson, 5<sup>th</sup> ed. USA: Mc.Graw, 2008.

<b>MATDSCP 1.1: Practical’s on Algebra – I and Calculus – I</b>	
<b>Practical Hours : 4 Hours/Week</b>	<b>Credits: 2</b>
<b>Total Practical Hours: 56 Hours</b>	<b>Max. Marks: 50 (S.A.-25 + I.A. – 25)</b>

**Course Learning Outcomes:** This course will enable the students to

- Learn Free and Open-Source Software (FOSS) tools for computer programming
- Solve problem on algebra and calculus theory studied in MATDSCP 1.1 by using FOSS software’s.
- Acquire knowledge of applications of algebra and calculus through FOSS.

**Practical/Lab Work to be performed in Computer Lab (FOSS)**

**Suggested Software’s:** Maxima/Python.

1. Introduction to Python/Maxima.
2. Basic commands in Python/Maxima.
3. Simple examples using Python/Maxima.
4. Matrices –Algebra of matrices.
5. Computation of rank of matrix.
6. Solving the system of homogeneous and non-homogeneous linear algebraic equations.
7. Computation of inverse of matrix using Cayley-Hamilton theorems.
8. Finding the angle between the radius vector and tangent and angle between two curves.
9. Finding the radius of curvature of the given curve.
10. Verification of mean value theorems.
11. Find the Taylor’s and Maclaurin’s expansion of the given function.
12. Indeterminate forms and evaluation of limits using L-Hospital Rule.
13. Finding the  $n^{th}$  derivative.
14. Tracing of standard curves.



## Open Elective Course

(For students of Science stream who have not chosen Mathematics as one of Core subjects)

MATOET 1.1: Mathematics – I	
Teaching Hours : 3 Hours/Week	Credits: 3
Total Teaching Hours: 42 Hours	Max. Marks: 100 (S.A.-60 + I.A. – 40)

**Course Learning Outcomes:** This course will enable the students to

- Learn to solve system of linear equations.
- Solve the system of homogeneous and non-homogeneous  $m$  linear equations by using the concept of rank of matrix, finding eigen values and eigenvectors.
- Students will be familiar with the techniques of differentiation of function with real variables.
- Identify and apply the intermediate value theorems and L'Hospital rule.
- Learn to trace some standard curves.

**Unit-I: Matrices:** Recapitulation of Symmetric and Skew Symmetric matrices, Algebra of Matrices; Row and column reduction, Echelon form. Rank of a matrix; 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, Cayley-Hamilton theorem (Without Proof) find  $A^{-1}, A^{-2}, A^{-3}$  for Matrices of order 2 and order 3 using C-H theorem

**14 Hours**

**Unit-II: Differential Calculus-I:** Limits, Continuity, Differentiability and properties **Successive Differentiation:**  $n^{\text{th}}$  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 and its applications.

**14 Hours**

**Unit III ;Differential Calculus-II:** Intermediate value theorem, Rolle's Theorem, Lagrange's Mean Value theorem, Cauchy's Mean value theorem and examples. Taylor's theorem, Maclaurin's series, Indeterminate forms and evaluation of limits using L'Hospital rule

**14 Hours**

### Reference Books:

1. University Algebra - N.S. Gopala Krishnan, New Age International (P)Limited, 2015
2. Theory of Matrices - B S Vatsa, New Age International Publishers, 2010.
3. Matrices - A R Vasista, Krishna Prakashana Mandir, 2014.
4. Differential Calculus - Shanti Narayan, S. Chand & Company, NewDelhi, 1998.
5. Applications of Calculus, Debasish Sengupta, Books and Allied (P) Ltd.,2019.
6. Calculus – Lipman Bers, Holt, Rinehart &Winston, 1969.
7. Calculus - S Narayanan & T. K. Manicavachogam Pillay, S. Viswanathan Pvt. Ltd., vol. I &II, 2009.
8. Schaum's Outline of Calculus - Frank Ayres and Elliott Mendelson, 5th ed. USA: Mc.Graw, 2008.

**Open Elective**  
**(For Students of other than Science Stream)**

<b>MATOE 1.1(B): Business Mathematics-I</b>	
<b>Teaching Hours : 3 Hours/Week</b>	<b>Credits: 3</b>
<b>Totat Teaching Hours: 42 Hours</b>	<b>Max. Marks: 100</b> <b>(S.A.- 60 + I.A. – 40)</b>

**Course Learning Outcomes:** This course will enable the students to:

- Translate the real word problems through appropriate mathematical modeling.
- Explain the concepts and use equations, formulae and mathematical expression and relationship in a variety of context.
- Finding the extreme values of functions.
- Analyze and demonstrate the mathematical skill require in mathematically intensive areas in economics and business.

**Unit-I: Algebra** – Set theory and simple applications of Venn Diagram, relations, functions, indices, logarithms, permutations and combinations. Examples on commercial mathematics.

**14 Hours**

**Unit - II: Matrices** – Definition of a matrix; types of matrices; algebra of matrices. Properties of determinants; calculations of values of determinants upto third order; Adjoint of a matrix, elementary row and column operations; solution of a system of linear equations having unique solution and involving not more than three variables. Examples on commercial mathematics.

**14 Hours**

**Unit - III: Percentage, Ratios and Proportions** – Percentages: Definition, Calculation of percentage, Ratios- Types of Ratios, Duplicate, Triplicate and Sub-Duplicate of ratio, Proportions - Definitions and properties- cross product property and Reciprocal property, United proportions – Continued proportions – Compound proportions, Examples on commercial mathematics.

**14 Hours**

**Reference Books:**

1. Basic Mathematics, Allen R.G.D, Macmillan, NewDelhi, 1962.
2. Mathematics for Economics, Dowling,E.T., Schaum’s Series,McGrawHill,London, 2020.
3. Quantitative Techniques in Management, Vohra, N.D., Tata McGraw Hill, NewDelhi, 2006.
4. Business Mathematics, Soni R.S., Pitamber Publishing House,Delhi, 1996.

## SEMESTER – II

<b>MATDSCT 2.1: Algebra - II and Calculus – II</b>	
<b>Teaching Hours : 4 Hours/Week</b>	<b>Credits: 4</b>
<b>Total Teaching Hours: 56 Hours</b>	<b>Max. Marks: 100</b> <b>(S.A.-60 + I.A. – 40)</b>

**Course Learning Outcomes:** This course will enable the students to

- Recognize the mathematical objects called Groups.
- Link the fundamental concepts of groups and symmetries of geometrical objects.
- Explain the significance of the notions of Cosets, normal subgroups and factor groups.
- Understand the concept of differentiation and fundamental theorems in differentiation and various rules.
- Find the extreme values of functions of two variables.

**Unit-I: Groups-I:** Definition of a group with examples and properties, abelian group, Subgroups, 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  $\phi$  function.

**14 hours**

**Unit-II: Partial Derivatives:** Functions of two or more variables-explicit and implicit functions, partial derivatives. Homogeneous functions- Euler’s theorem, total derivatives, differentiation of implicit and composite functions, Jacobians and standard properties and illustrative examples. Taylor’s and Maclaurin’s series for functions of two variables.

**14 hours**

**Unit-III; integral Calculus I;** Reduction formula for  $\int \sin^n x dx$ ,  $\int \cos^n x dx$ ,  $\int \sin^n x \cos^m x dx$

definite limit, Problems.

**Unit-IV: Integral Calculus II:** Recapitulation of definite integrals and its properties. Line integral: Definition of line integral and basic properties, examples on evaluation of line integrals. Double integral: Definition of Double integrals, evaluation of double integral with constant limits, Applications. Triple integral: Definition of triple integrals and evaluation of triple integral with constant limit.

**28 hours**

**Reference Books:**

1. Topics in Algebra, I N Herstein, Wiley Eastern Ltd., NewDelhi, 2006.
2. Higher algebra, Bernard & Child, Arihant, 2016.
3. Modern Algebra, Sharma and Vasista, Krishna Prakashan Mandir, Meerut, U.P,1960.
4. Differential Calculus, Shanti Narayan, S. Chand & Company, NewDelhi, 1998.
5. Integral Calculus, Shanti Narayan and P K Mittal, S. Chand and Co. Pvt.Ltd., 2015.
6. Schaum's Outline Series, Frank Ayres and Elliott Mendelson, 5th ed. USA: Mc. Graw Hill.,2008.
7. Mathematical Analysis, S C Malik, WileyEastern, 1992.
8. A Course in Abstract Algebra, Vijay K Khanna and S K Bhambri, Vikas Publications, 2018.
9. Textbook of B.Sc. Mathematics, G K Ranganath, S Chand &Company, 2011.

**PRACTICAL**

<b>MATDSCP 2.1: On Algebra -II and Calculus – II</b>	
<b>Practical Hours: 4 Hours/Week</b>	<b>Credits: 2</b>
<b>Total Practical Hours: 56 Hours</b>	<b>Max. Marks: 50</b> <b>(S.A.-25 + I.A. –25)</b>

**Course Learning Outcomes:** This course will enable the students to

- Learn Free and Open Source Software (FOSS) tools for computer programming.
- Solve problem on algebra and calculus by using FOSS software's.
- Acquire knowledge of applications of algebra and calculus through FOSS.

**Practical/Lab Work to be performed in Computer Lab**

**Suggested Software's:** Maxima/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  $\phi$  function for a given finite group.
6. Program to verify the given function is Homomorphism and Isomorphism.
7. Program to verify the Euler's theorem and its extension.
8. Program to find Jacobian.
9. Programs to construct series using Maclaurin's expansion for functions of two variables.
10. Program to evaluate the line integrals with constant and variable limits.
11. Program to evaluate the Double integrals with constant and variable limits.
12. Program to evaluate the Triple integrals with constant and variable limits.

## Open Elective

(For students of Science stream who have not chosen Mathematics as one of the Core subjects)

MATOET 2.1(A): Mathematics – II	
Teaching Hours : 3 Hours/Week	Credits: 3
Total Teaching Hours: 42 Hours	Max. Marks: 100 (S.A.- 60 + I.A. – 40)

**Course Learning Outcomes:** This course will enable the students to

- Recognize the mathematical objects called Groups.
- Link the fundamental concepts of groups and symmetries of geometrical objects.
- Explain the significance of the notions of Cosets, normal subgroups and factor groups.
- Understand the concept of differentiation and fundamental theorems in differentiation and various rules.
- Find the extreme values of functions of two variables.
- To understand the concepts of multiple integrals and their applications.

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

**14 hours**

**Unit-II: Partial Derivatives:** Functions of two or more variables-explicit and implicit functions, partial derivatives. Homogeneous functions- Euler's theorem, total derivatives, differentiation of implicit and composite functions, Jacobians and standard properties and illustrative examples. Taylor's and Maclaurin's series for functions of two variables.

**14 hours**

**Unit-III: Integral Calculus:** Recapitulation of definite integrals and its properties. Line integral: Definition of line integral and basic properties, examples on evaluation of line integrals. Double integral: Definition of Double integrals, Triple integral: triple integral definition and evaluation of triple integral with constant limits.

**14 hours Reference Books:**

1. Topics in Algebra, I N Herstein, 2<sup>nd</sup> Edition, Wiley Eastern Ltd., New Delhi, 2006.
2. Higher algebra, Bernard & Child, Arihant Pub, 2016.
3. Modern Algebra, Sharma and Vasishta, Krishna Prakashan Mandir, Meerut, U.P, 1960.
4. A Course in Abstract Algebra, Vijay K Khanna and S K Bhambri, Vikas Publications, 2018.
5. Differential Calculus, Shanti Narayan, S. Chand & Company, NewDelhi, 1998.
6. Integral Calculus, Shanti Narayan and P K Mittal, S. Chand and Co. Pvt.Ltd., 2015.
7. Schaum's Outline Series, Frank Ayres and Elliott Mendelson, 5th ed. USA:McGraw Hill.,2008.
8. Mathematical Analysis, S.C. Malik, Wiley Eastern, 1992.
9. Text Book of B.Sc. Mathematics, G.K. Ranganath, S.Chand & Company, 2011.

**Open Elective**  
(For Students of other than science stream)

<b>MATOET 2.1(B): Business Mathematics-II</b>	
<b>Teaching Hours : 3 Hours/Week</b>	<b>Credits: 3</b>
<b>Total Teaching Hours: 42 Hours</b>	<b>Max. Marks: 100</b> <b>(S.A.- 60 + I.A. -40)</b>

**Course Learning Outcomes:** This course will enable the students to

- Integrate concept in international business concept with functioning of global trade.
- Evaluate the legal, social and economic environment of business.
- Apply decision-support tools to business decision making.
- Will be able to apply knowledge of business concepts and functions in an integrated manner.

**Unit - I: Mathematical logic:** Propositions, Truth values, Logical connectives, Truth table, Tautology and Contradiction, Logical equivalence, Negations, Converse, Inverse and Contrapositive of condition proposition and examples on commercial mathematics.

**14 hours**

**Unit - II: Commercial Arithmetic:** Interest: Concept of Present value and Future value, Simple interest, Compound interest, Nominal and Effective rate of interest, Examples and Problems Annuity: Ordinary Annuity, Sinking Fund, Annuity due, Present Value and Future Value of Annuity, Equated Monthly Installments (EMI) by Interest of Reducing Balance and Flat Interest methods, Examples and Problems.

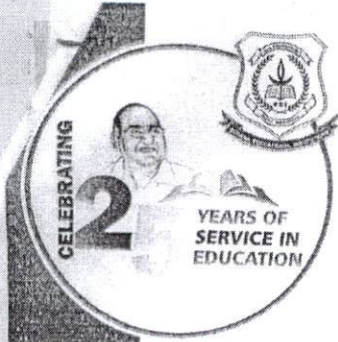
**14 Hours**

**Unit - III: Measures of central Tendency and Dispersion:** Frequency distribution: Raw data, attributes and variables, Classification of data, frequency distribution, cumulative frequency distribution, Histogram and give curves. Requisites of ideal measures of central tendency, Arithmetic Mean, Median and Mode for ungrouped and grouped data. fundamentals of AM,GM,HM and its related Properties and applications. Concept of dispersion, Measures of dispersion: Range, Variance, Standard deviation (SD) for grouped and ungrouped data, combined SD.

**14 Hours**

**Reference Books:**

1. Practical Business Mathematics, S. A. Bari New Literature Publishing Company New Delhi, 1971.
2. Mathematics for Commerce, K. Selvakumar Notion Press Chennai, 2014.
3. Business Mathematics with Applications, Dinesh Khattar & S. R. Arora S. Chand Publishing New Delhi, 2001.
4. Business Mathematics and Statistics, N.G. Das & Dr. J.K. Das McGraw Hill New Delhi, 2017.
5. Fundamentals of Business Mathematics, M. K. Bhowal, Asian Books Pvt. Ltd New Delhi, 2007.
6. Mathematics for Economics and Finance: Methods and Modeling, Martin Anthony and Norman, Biggs Cambridge University Press Cambridge, 2009.
7. Financial Mathematics and its Applications, Ahmed Nazri Wahidudin Ventus Publishing APS Denmark, 2011.
8. Fundamentals of Mathematical Statistics, Gupta S.C. and Kapoor V.K, Sultan Chand and Sons, New Delhi, 2002.
9. Statistical Methods , Gupta S.P.: Sultan Chand and Sons, New Delhi, 2021.
10. Applied Statistics, Mukhopadhyaya Parimal New Central Book Agency Pvt. Ltd. Calcutta, 2018.
11. Fundamentals of Statistics, Goon A.M., Gupta M.K. and Dasgupta, B. World Press Calcutta, 2008.
12. Fundamentals of Applied Statistics, , Gupta S.C. and Kapoor V.K, Sultan Chand and Sons, New Delhi, 2014.



# SURANA COLLEGE

(GDA FOUNDATION ESTD. 1995)

Moulding Character & Careers

Affiliated to Bangalore University  
Re-accredited by NAAC with A+ grade  
Approved by AICTE  
Accredited by IAO & ISO Certified

RAJAT YATRA

## Department of MCA

### Proceedings of Minutes of Meeting of Board of Studies

The first Board of Studies (BoS) meeting was held on 19<sup>th</sup> March 2022 at 03.00 PM in Surana College, Kengeri Campus. The chairman of BoS, Dr. A Srinivas welcomed the members. The list of members is enclosed.

The following agenda was discussed, verified, and approved in the meeting. The highlights are listed below:

**Agenda-1:** Dr. K Balaji, HOD, MCA introduced the department to the dignitaries. The regulations, scheme and evaluation aspects have been presented to the members. The best practices like club activities of the department were presented to the chair.


**Agenda-2:** BoS members discussed and approved to retain the syllabus of Bangalore University for the first and second semesters. Also suggested to have modification in the upcoming semesters while retaining the same structure for the current year. The approved syllabus is enclosed.

**Agenda-3:** List of Board of Examination (BoE) members, examiners, valuers, and paper setters were proposed by the department were scrutinised by the chair. The board approved the list of BoE members enlisted. The approved list is enclosed.

**Agenda-4:** The BoS approved question paper model, the course matrix, and evaluation policy.

**Agenda-5:** The board suggested to have few corporate practices to be added as a part of pre-placement activities and suggested to upgrade the versions of programming languages like C++ in the curriculum. Also suggested to add courses with the essence of banking, finance, insurance, retail, and healthcare as add-on courses.

**Agenda-6:** Approval of proceedings of the meeting.

  
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Surana College  
(AUTONOMOUS)  
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Chairman 19/03/2022

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## DEPARTMENT OF PHYSICS

### Proceedings of the meeting of Board Of studies in Physics

The Board of Studies meeting in Department of physics was held on 22<sup>nd</sup> march 2022 at 11:30 AM, in Room number 208, Surana College, Autonomous, Basavanagudi, Bengaluru 560004. Chairperson Prof Srinivasa S, Department of Physics extended a warm welcome to members of BOS.

The List of BOS members are enclosed.

**The following agenda was discussed, verified, and approved in the meeting:**

**Agenda-1:** BOS members discussed and approved to retain the existing NEP syllabus of BU for I and II semester with the modification syllabus copy is enclosed.

**Agenda-2:** It was suggested that energy sources and Physics for all to be retained as open elective for semester-I.

**Agenda-3:** Presentation and Approval of regulations B.Sc ( Physics) programme.

**Agenda-4:** Presentation and Approval of Syllabus of I and II semester B.Sc ( Physics) based on NEP 2020 framework.

**Agenda-5:** Presentation and Approval of Evaluation Policy.

**Agenda-6:** Approval of BOE/Paper Setters/ Examiners/ Valuers.

**Agenda-7:** Presentation and Approval of Question Paper Model and Matrix.

**Agenda-8:** Approval of Proceedings of meeting.

  
Principal  
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No. 16, South End Road,  
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# **SURANA COLLEGE (AUTONOMOUS)**

## **DEPARTMENT OF PHYSICS**

### **NEP 2020**

### **Syllabus for physics**

#### **Detailed Syllabus for 1 st & 2nd Semesters**

#### **1 st Semester**

Phy-DSCT1: Mechanics and Properties of Matter Course Credits (L+T+P) : 4+0+0

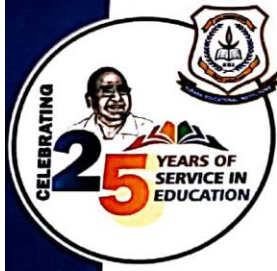
Total Contact Hours: 52 Duration of ESA: 3 hours Course Outcomes (COs):

1. Fixing units, tabulation of observations, analysis of data (graphical/analytical).
2. Accuracy of measurement and sources of errors, importance of significant figures.
3. Knowledge of how g can be determined experimentally and derive satisfaction.
4. Understanding the difference between simple and torsional pendulum and their use in the determination of various physical parameters.
5. Knowledge of how various elastic moduli can be determined.
6. Measuring surface tension and viscosity and appreciate the methods adopted.
7. Hands on experience of different equipments.

#### **Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) Course Outcomes (COs) / Program Outcomes (POs)**

1 2 3 4 5 6 Fixing units, tabulation of observations, analysis of data (graphical/analytical) X  
Accuracy of measurement and sources of errors, importance of significant figures X  
Knowledge of how g can be determined experimentally and derive satisfaction. X  
Understanding the difference between simple and torsional pendulum and their use in the determination of various physical parameters X  
Knowledge of how various elastic moduli can be determined X  
Measuring surface tension and viscosity and appreciate the methods adopted X  
Hands on experience of different equipments. X

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.



RAJAT YATRA

ESTD. 1995  
**SURANA COLLEGE**

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Recognized under 2(f) & 12(B) of UGC  
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#16, Southend road, Bangalore-04  
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BANGALORE UNIVERSITY  
DEPARTMENT OF PHYSICS

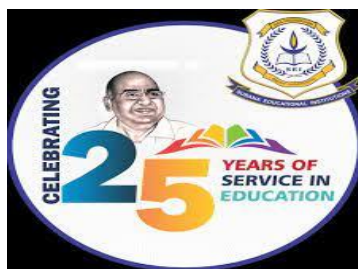
**BOARD OF STUDIES**

22<sup>nd</sup> MARCH 2022

Sl.No	Name of Member	Signature
1.	<b>Dr .Madhavi .K.Y,Professor-University nominee</b> Govt First Grade College, Channapatna, BUB.	
2.	<b>Prof.Ashoka T N (Subject Expert)</b> (GFGC Vijayanagar)	
3.	<b>Prof. Nanjundiah (Subject Expert)</b> Rural college, Kanakapura	
4.	<b>Prof.Srinivasa .S (Chairman)</b> Surana college, Southend road, Bangalore-04	
5.	<b>Sagar.R-Industry Representative</b> Technical Manager, TATA Capitol	
6.	<b>Harshitha.V-Alumni Nominee</b> Software Automation tester, SLK software Ltd	

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**SURANA COLLEGE (AUTONOMOUS)**  
**DEPARTMENT OF PHYSICS**  
**BOARD OF EXAMINERS (TENTATIVE LIST)**

01	Mr.Srinivasa S	Chairman
02	Prof. Narendra. B V	Subject Expert
03	Prof. seetha Vasudevrao	Subject Expert
04	Prof. Lokesh (NMKRV college Autonomous )	Member
05	Prof. Rajeshwari (MES college, mallechwaram)	Member

**Course Content Phy.DSCT1: Mechanics & Properties of Matter**

**Unit – 1 (13 hours of teaching includes 3 hours of activities)**

**Chapter No. 1**

**Units and measurements:** System of units (CGS and SI), measurement of length, mass and time, dimensions of physical quantities, dimensional formulae. Minimum deviation, errors. **4 Hrs**

**Chapter No. 2**

**Momentum and Energy:** Work and energy, Conservation of linear momentum, Conservation of energy with examples, Motion of rockets **4Hrs**

**Chapter No. 3**

**Special Theory of Relativity:**

Constancy of speed of light. Postulates of Special Theory of Relativity. Length contraction. Time dilation. Relativistic addition of velocities. **5Hrs**

**Topics for Self-study**

Variable mass problem & Rocket motion Twin paradox

## **Suggested Activities**

**Activity No. 1** i). Measure diameters of small balls of different size and estimate their volumes.

ii). Measure lengths of nails of different size.

iii). Measure volume of a liquid.

iv). Measure distances and put the result both in CGS and SI units in 2, 3 and 4 significant figures. Mention the precision of the measurement.

v). Estimate standard deviations wherever possible.

**Activity No. 2** Understand conservation of energy in every day examples like i) What happens in solar energy conversion panels ii) Pushing an object on the table iii) Moving car hits a parked car causes parked car to move. In these cases, it is known that energy is conserved. How? Understand and verify if possible.

## **Unit – 2 (13 hours of teaching includes 3 hours of activities)**

**Chapter No. 4.** Laws of Motion: Newton's Laws of motion, Dynamics of single particle and a system of particles, Centre of mass.

**3Hrs**

### **Chapter No. 5.**

Dynamics of Rigid bodies: Rotational motion about an axis, Relation between torque and angular momentum, Rotational energy, Moment of inertia (M.I): M.I of a rectangular lamina and solid cylinders, Flywheel, Theory of compound pendulum and determination of  $g$ .

**6Hrs**

### **Chapter No. 6.**

Gravitation: Law of Gravitation. Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). Kepler's laws (statements). Satellite in a circular orbit.

**4 Hrs**

Topics for self study

Geosynchronous orbits Basic idea of global positioning system (GPS). Suggested Activities

### **Activity No. 3**

Moment of inertia is an abstract concept. It simply gives a measure of rotational inertia of a rigid body and it is proportional to the product of the square of radius,  $r$  of the body and its mass,  $m$ . Refer to different websites to construct and perform simple experiments to verify that M.I.  
Reference : [www.khanacademy.org](http://www.khanacademy.org), [www.pinterest.com](http://www.pinterest.com), [www.serc.cerleton.edu](http://www.serc.cerleton.edu)

#### **Activity No. 4**

Prepare suitable charts and give seminar talks in the class. Reference : Weblink/Youtube/Book

### **Unit – 3**

**(13 hours of teaching includes 3 hours of activities)**

#### **Chapter No. 7**

**Elasticity:** Hooke's law - Stress-strain diagram, elastic moduli-relation between elastic constants, Poisson's Ratio-expression for Poisson's ratio in terms of elastic constants. Work done in stretching and work done in twisting a wire-Twisting couple on a cylinder. Beams, bending of beams, expression for bending moment, theory of single cantilever. Torsional pendulum, expression for time-period of torsional oscillations, determination of rigidity modulus (static and dynamic methods) and moment of inertia, determination of  $q$ ,  $\eta$  and  $\sigma$  by Searle's double bar with necessary theory.

**13Hrs**

#### **Topics for self study**

Time period of oscillations of a spring-mass system with non-negligible mass of the spring.

#### **Suggested Activities**

##### **Activity No. 5**

Arrange a steel spring with its top fixed with a rigid support on a wall and a meter scale along side. Add 100 g load at a time on the bottom of the hanger in steps. This means that while putting each 100g load, we are increasing the stretching force by 1N. Measure the extension for loads up to 500g. Plot a graph of extension versus load. Shape of the graph should be a straight line indicating that the ratio of load to extension is constant. Go for higher loads and find out elastic limit of the material.

**Reference :** Weblink/Youtube/Book

##### **Activity No.6**

Repeat the above experiment with rubber and other materials and find out what happens after exceeding elastic limit. Plot and interpret.

**Reference :** Weblink/Youtube/Book

### **Unit – 4**

#### **Chapter No. 8**

**Surface tension:** Definition of surface tension. Surface energy, relation between surface tension and surface energy, pressure difference across curved surface example, excess pressure inside spherical liquid drop, angle of contact.

**7 Hrs**

#### **Chapter No. 9**

**Topics to be covered:**

**Viscosity:** Streamline flow, turbulent flow, equation of continuity, determination of coefficient of viscosity by Poissulle's method, Stoke's method. Problems **6 Hrs**

**Topics for self study**

Capillarity determination of surface tension by drop weight method.

**Suggested Activities****Activity No.7**

Measure surface tension of water and other common liquids and compare and learn

i) Why water has high ST? think of reasons. ii) Check whether ST is a function of temperature?

You can do it by heating the water to different temperatures and measure ST. iii) Plot ST versus T and learn how it behaves.

Mix some quantity of kerosene or any oil to water and measure ST. Check whether ST for the mixture is more or less than pure water. Think of reasons.

**Activity No. 8**

Collect a set of different liquids and measure their viscosity.

i) Find out whether sticky or non sticky liquids are most viscous. Think of reasons.

ii) Mix non sticky liquid to the sticky liquid in defined quantities and measure viscosity. Find out viscosity is increasing or decreasing with increase of non-sticky liquid concentration.

iii) Do the above experiment by mixing sticky liquid to the non sticky liquid. Find out change in viscosity with increase of concentration of sticky liquid. Think why anyone should know viscosity of a liquid.

**Paper Code: Phy-DSCP1 - Lab I (2 credits, 4 hours per week) List of Experiments to be performed in Lab I**

1. Determination of g using bar pendulum (L versus T and L versus  $T^2$  graphs)
2. Determination of moment of inertia of a Fly Wheel.
3. Determination of rigidity modulus using torsional pendulum
4. Verification of parallel and perpendicular axis theorems.
5. Determine the Young's Modulus a bar by uniform bending method

6. Determination of elastic constants of a wire by Searle's method
7. Young's modulus by Koenig's method
8. Modulus of rigidity of a rod –Static torsion method.
9. Viscosity by Stokes method
10. Radius of capillary tube by mercury pellet method
11. Verification of Hook's law.
12. Determination of surface tension of a liquid and the interfacial tension between two liquids using drop weight method.
13. Critical pressure for stream line flow
14. Determine the Young's Modulus a bar by single cantilever method.
15. Study of motion of a spring and to calculate Spring constant, g and unknown mass.

**Note: A minimum of EIGHT experiments to be carried out**

**Course Content: 2 nd Semester Phy-DSCT2: Electricity and Magnetism Course Credits (L+T+P) : 4+0+0=4 Total Contact Hours: 52 Duration of ESA: 3 hours Course Outcomes (COs):**

1. Demonstrate Gauss law, Coulomb's law for the electric field, and apply it to systems of point charges as well as line, surface, and volume distributions of charges.
2. Explain and differentiate the vector (electric fields, Coulomb's law) and scalar (electric potential, electric potential energy) formalisms of electrostatics.
3. Apply Gauss's law of electrostatics to solve a variety of problems.
4. Describe the magnetic field produced by magnetic dipoles and electric currents.
5. Explain Faraday-Lenz and Maxwell laws to articulate the relationship between electric and magnetic fields.
6. Describe how magnetism is produced and list examples where its effects are observed.

7. Apply Kirchhoff's rules to analyze AC circuits consisting of parallel and/or series combinations of voltage sources and resistors and to describe the graphical relationship of resistance, capacitor and inductor.

8. Apply various network theorems such as Superposition, Thevenin, Norton, Reciprocity, • Maximum Power Transfer, etc. and their applications in electronics, electrical circuit analysis, and electrical machines.

**Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)  
Course Outcomes (COs) / Program Outcomes (POs) 1 2 3 4 5 6**

Demonstrate Gauss law, Coulomb's law for the electric field, and apply it to systems of point, line, surface, and volume distributions of charges. x x

Explain and differentiate the vector (electric fields, Coulomb's law) and scalar (electric potential, electric potential energy) formalisms of electrostatics. x

Apply Gauss's law of electrostatics to solve a variety of problems. x x x

Describe the magnetic field produced by magnetic dipoles and electric currents. x

Explain Faraday-Lenz and Maxwell laws to articulate the relationship between electric and magnetic fields. x Describe how magnetism is produced and list examples where its effects are observed. x x x

Apply Kirchhoff's rules to analyze AC circuits consisting of parallel and/or series combinations of voltage sources and resistors and to describe the graphical relationship of resistance, capacitor and inductor. x x x x

Apply various network theorems such as Superposition, Thevenin, Norton, Reciprocity, • Maximum Power Transfer, etc. and their applications in electronics, electrical circuit analysis, and electrical machines. x x x x

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome

**Course Content Phy-DSCT2:Electricity and Magnetism Unit – 1 (13 hours of teaching includes 3 hours of activities)**

**Chapter No. 1**

Electric charge and field: Coulomb's law, electric field strength, electric field lines, point charge in an electric field and electric dipole, work done by a charge (derivation of the expression for potential energy) **3Hrs**

**Chapter No. 2**

Gauss law: Gauss's law and its applications - electric fields of a (i) spherical charge distribution, (ii) line charge and (iii) an infinite flat sheet of charge.

**3Hrs**

**Chapter No. 3**



Electrostatic potential Electric potential, line integral, gradient of a scalar function, relation between field and potential. Potential due to point charge and distribution of charges C **7Hrs**

### Topics for self study

Concept of Voltage and Current Sources, Kirchhoff's Laws

### Suggested Activities

#### Activity No. 1

- (i) Learn the difference between and DC and AC electricity and their characteristics.
- (ii) Voltage and line frequency standards in different countries.
- (iii) A small project report on production of electricity as a source of energy: Different methods

**Reference :** Weblink/Youtube/Book

#### (iv) Activity No. 2

- (i) Learn to use a multimeter (analog and digital) to measure voltage, current and resistance. Continuity testing of a wire. (ii) Learn about household electrical connection terminals: Live, neutral and ground and voltage between the terminals. Role of earthing and safety measures **Reference :** Weblink/Youtube/Book

## Unit – 2 (13 hours of teaching includes 3 hours of activities)

### Chapter No. 4.

Conductors in electrostatic field: Conductors and insulators, conductors in electric field. Capacitance and capacitors, expression for capacitance in a parallel plate capacitor, parallel plate capacitor with dielectric, Dielectrics: an atomic view. Energy stored in a capacitor, Dielectric and Gauss's law.

**6Hrs**

### Chapter No. 5

DC currents: Electric currents and current density. Electrical conductivity and Ohm's law. Physics of electrical conduction, conduction in metals and semiconductors, circuit elements and circuits: Transient currents in RC, LR and LCR circuits. Force on a moving charge.

**7Hrs**

### Topics for self study

Currents and voltage in combination of R, L and C circuits

**Suggested Activities Activity No. 3** (i) Learn about electrical appliances which work with AC and DC supply. (ii) Learn about types of resistors and their colour codes and types of capacitors (electrolytic and nonelectrolytic)

**Reference :** Weblink/Youtube/Book Activity No. 4 (i) Learn about power transmission: 3-phase electricity, voltage and phase (ii) Visit a nearby electrical power station. Interact with line men, Electrical engineers and managers. Discuss about power loss in transmission. How to reduce it? (iii) Prepare a small project report on street lighting and types of electrical bulbs.

**Reference :** Weblink/Youtube/Book

### **Unit – 3 (13 hours of teaching includes 3 hours of activities)**

#### **Chapter No.6**

Magnetism: Definition of magnetic field, Ampere's law and Biot-Savart law (magnetic force and magnetic flux), Magnetic force on a current carrying conductor, Hall effect in a conductor. Electromagnetic induction, conducting rod moving in a magnetic field, Faraday's laws of induction, Lenz's Law, expression for self-inductance and energy stored in a magnetic field. Mutual inductance.

#### **Chapter No. 7**

**7Hrs**

AC circuits: RMS and average value of AC, Response of series RL, RC, LC, LCR circuits using j-operator method, quality factor, admittance and impedance, power and energy in AC circuits. **6Hrs**

#### **Topics for self study**

Response of parallel RL, RC, LC, LCR circuits using joperator method

**Suggested Activities Activity No. 5** (i) Prepare a small project report on street lighting and types of electrical bulbs. (ii) Learn the measurement of electric current using tangent galvanometer.

**Reference :** Weblink/Youtube/Book Activity No.6 Build a small coil with insulated copper wire. Connect an ammeter micro/milli ammeter. Verify magnetic induction using a powerful bar magnet.  
**Reference :** Weblink/Youtube/Book

### **Unit – 4**

#### **Scalar and vector fields :**

Gradient of a scalar function (use of del operator), Divergence and Curl product rules (explanation with geometrical representation), Line, surface and volume integrals (explanation with examples), Fundamental theorem for divergence and curl (statements only). **3Hrs**

#### **ELECTROMAGNETIC WAVES :**

Equation of Continuity, Displacement Current, Maxwell's equations in differential form (Derivation and physical significance), Derivation of wave equation (for one dimension), Velocity of em waves in free space and isotropic dielectric medium(derivation), Relation between refractive index and permittivity (qualitatively), Transverse nature of Plane em waves, , Poynting Vector, Energy density in electromagnetic field, Momentum and Pressure of em waves (derivation), Electromagnetic waves in a conducting medium – skin effect and skin depth

**10Hrs**

**Paper Code: Phy-DSCP1-Lab II (2 credits / 4 hours per week) List of Experiments to be performed in Lab II**

1. Experiments on tracing of electric and magnetic flux lines for standard configuration.
2. Determination of components of earth's magnetic field using a Ballistic galvanometer.
3. Determination of capacitance of a condenser using B.G.
4. Determination of high resistance by leakage using B.G.
5. Determination of mutual inductance using BG.
6. Charging and discharging of a capacitor (energy dissipated during charging and time constant measurements).
7. Frequency response of LCR Series resonance circuit.
8. Frequency response of LCR Parallel resonance circuit.
9. Impedance of series RC circuits - determination of frequency of AC. 10. Study the i-v characteristics of a series RC and RL Circuit.
11. Determination of self-inductance of a coil.
12. Verification of laws of combination of capacitances and determination of unknown capacitance using de-Sauty bridge.
13. Maxwell's impedance bridge to determine L.
14. Determination of BH using Helmholtz double coil galvanometer and potentiometer.

**Note: A minimum of EIGHT experiments to be performed.**

### **Open Elective Papers Phy-OE1: Energy Sources (Credits:3) 3 hours of teaching per week**

**Unit-I: Non-Renewable energy sources** Introduction: Energy concept-sources in general, its significance & necessity, Classification of energy sources: Primary and Secondary energy, Commercial and Non-commercial energy, Renewable and Non-renewable energy, Conventional and Non-conventional energy, Based on Origin-Examples and limitations. Importance of Non-commercial energy resources (5 hours)

**Conventional energy sources:** Fossil fuels & Nuclear energy- production & extraction, usage rate and limitations. Impact on environment and their issues & challenges. Overview of Indian & world energy scenario with latest statistics- consumption & necessity. Need of eco-friendly & green energy & their related technology. (8 hours)

**13Hrs**

#### **Unit-II: Renewable energy sources Introduction:**

Need of renewable energy, non-conventional energy sources. An overview of developments in Offshore Wind Energy, Tidal Energy, Wave energy systems, Ocean Thermal Energy Conversion, solar energy, biomass, biochemical conversion, biogas generation, geothermal energy tidal energy, Hydroelectricity. (05 hours)

**Solar energy:** Solar Energy-Key features, its importance, Merits & demerits of solar energy, Applications of solar energy. Solar water heater, flat plate collector, solar distillation, solar cooker, solar green houses, solar cell -brief discussion of each. Need and characteristics of photovoltaic (PV)

systems, PV models and equivalent circuits, and sun tracking systems. (8 hours)

**13Hrs**

**Unit-III Wind and Tidal Energy harvesting:** Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines, Power electronic interfaces, and grid interconnection topologies, Ocean Energy Potential against Wind and Solar, Wave Characteristics and Statistics, Wave Energy Devices, Tide characteristics and Statistics, Tide Energy Technologies, Ocean Thermal Energy. (8 hours) Geothermal and hydro energy: Geothermal Resources, Geothermal Technologies (2 hours), Hydropower resources, hydropower technologies, environmental impact of hydro power sources, Carbon captured technologies, cell, batteries, power consumption (3 hour)

**13Hrs**

### **Suggested Activities**

1. Demonstration of on Solar energy, wind energy, etc, using training modules at Labs.
2. Conversion of vibration to voltage using piezoelectric materials.
3. Conversion of thermal energy into voltage using thermoelectric (using thermocouples or heat sensors) modules.
4. Project report on Solar energy scenario in India
5. Project report on Hydro energy scenario in India
6. Project report on wind energy scenario in India
7. Field trip to nearby Hydroelectric stations.
8. Field trip to nearby to wind energy stations.
9. Field trip to nearby to solar energy parks.
10. Videos on solar energy, hydro energy and wind energy.

**Reference Books** 1. Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi

2. Solar energy - M P Agarwal - S Chand and Co. Ltd.

3. Solar energy - Suhas P Sukhative Tata McGraw - Hill Publishing Company Ltd.

4. Godfrey Boyle, "Renewable Energy, Power for a sustainable future", 2004, Oxford University Press, in association with The Open University.

5. Dr. P Jayakumar, Solar Energy: Resource Assessment Handbook, 2009

6. J.Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA).

7. [http://en.wikipedia.org/wiki/Renewable\\_energy](http://en.wikipedia.org/wiki/Renewable_energy)

### **Phy-OE2: Physics for all (Credits:3) 3 hours of teaching per week**

**Unit-I Energy and Power:** Explosions and energy; Energy, heat and its units; Energy table and discussions; Discussion of cost of energy; Measuring energy; Power; Different power sources; Kinetic energy.

**13Hrs**

**Unit-II Gravity, Force and Space:** The force of Gravity; Newton's third law; Weightlessness; Low earth orbit; Geosynchronous satellites; Spy satellites; Medium Earth Orbit satellite; Circular

Acceleration; momentum; Rockets; Airplanes, helicopters and fans; Hot air and helium balloons; angular momentum and torque..

**13Hrs**

**Unit-III Nuclei and radioactivity:** Radioactivity; Elements and isotopes; Radiation and rays; Seeing radiation; The REM – The radiation poisoning; Radiation and cancer; The linear hypothesis; Different types of radiation; The half-life rule; Smoke detectors; measuring age from radioactivity; Environmental radioactivity; Glow of radioactivity; Nuclear fusion.

**13Hrs**

### References Book

This course is extracted from the book titled “Physics and Technology for Future Presidents: An Introduction to the Essential Physics Every World Leader Needs to Know” by Richard A Muller, WW Norton and Company, 2007. (Units 1 to 3 are from chapters 1, 3, 4 respectively).

### Phy-OE3: Atmospheric Science (Credits:3) 3 hours of teaching per week

**Unit-I Atmosphere:** Atmospheric Science (Meteorology) as a multidisciplinary science. Physical and dynamic meteorology, Some terminology, difference between weather and climate, weather and climate variables, composition of the present atmosphere: fixed and variable gases, volume mixing ratio (VMR), sources and sinks of gases in the atmosphere. Green house gases. Structure (layers) of the atmosphere. Temperature variation in the atmosphere, temperature lapse rate, mass, pressure and density variation in the atmosphere. Distribution of winds.

**13Hrs**

Unit-II Climate Science: Overview of meteorological observations, measurement of : temperature, humidity, wind speed and direction and pressure. Surface weather stations, upper air observational network, satellite observation. Overview of clouds and precipitation, aerosol size and concentration, nucleation, droplet growth and condensation (qualitative description). Cloud seeding, lightning and discharge. Formation of trade winds, cyclones. Modelling of the atmosphere: General principles, Overview of General Circulation Models(GCM) for weather forecasting and prediction. Limitations of the models. R and D institutions in India and abroad dedicated to climate Science, NARL, IITM, CSIR Centre for Mathematical Modeling and Computer Simulation, and many more.

**13Hrs**

**Unit-III Global Climate Change:** Green house effect and global warming, Enhancement in concentration of carbon dioxide and other green house gases in the atmosphere, Conventional and non-conventional energy sources and their usage. EL Nino/LA Nino Southern oscillations. Causes for global warming: Deforestation, fossil fuel burning, industrialization. Manifestations of global warming: Sea level rise, melting of glaciers, variation in monsoon patterns, increase in frequency and intensity of cyclones, hurricanes, tornadoes. Geo-engineering as a tool to mitigate global warming, Schemes of geo-engineering.

**13Hrs**

### Suggested Activities

1. Try to find answer to the following questions: (a) Imagine you are going in a aircraft at an altitude greater than 100 km. The air temperature at that altitude will be greater than 200oC. If you put your hands out of the window of the aircraft, you will not feel hot. (b) What would have happened if ozone is not present in the stratosphere.
2. Visit a nearby weather Station and learn about their activities.
3. Design your own rain gauge for rainfall measurement at your place.
4. Learn to determine atmospheric humidity using wet bulb and dry bulb thermometers.
5. Visit the website of Indian Institute of Tropical Meteorology (IITM), and keep track of occurrence and land fall of cyclone prediction.
6. Learn about ozone layer and its depletion and ozone hole.
7. Keep track of melting of glaciers in the Arctic and Atlantic region through data base available over several decades.
8. Watch documentary films on global warming and related issues (produced by amateur film makers and promoted by British Council and BBC).

#### Reference Books

1. Basics of Atmospheric Science – A Chndrashekar, PHI Learning Private Ltd. New Delhi, 2010.
2. Fundamentals of Atmospheric Modelling- Mark Z Jacobson, Cambridge University Press, 2000.

#### Phy-OE4: Sports Science (Credits:3) 3 hours of teaching per week

**Unit-I Measurement:** Physical quantities, Standards and Units, International system of Units, Standards of time, length and mass, Precision and significant figures (4 hours)

**Newton's laws of motion:** Newton's first law. Force, mass. Newton's second law. Newton's third law, Mass and weight. Applications of Newton's laws. (5 hours)

**Projectile motion:** Shooting a falling target, Physics behind Shooting, Javelin throw and Discus throw. (4 hours)

**Topics for self study:** <https://www.real-world-physics-problems.com/physics-of-sports.html>

**13Hrs**

**Unit-II Conservation laws:** Conservation of linear momentum, collisions – elastic and inelastic. Angular momentum. (Physics behind Carom, Billiards, Racing) (4 hours)

**Centre of mass:** Physics behind Cycling, Rock climbing, Skating (5 hours) Gravitation: Origin, Newton's law of gravitation, Archimedes's principle, Buoyancy & Physics behind swimming (4 hours) **Topic for self-study:** Archimedes' Principle: Made EASY | Physics in You tube 13 Unit-III Food and Nutrition: Proteins, Vitamins, Fat, Blood pressure. Problems due to the deficiency of vitamins. (4 hours)

**Energy:** Different forms of Energy, Conservation of mass-energy (3 hours)

Physical exercises: Walking, Jogging and Running, Weight management. (3 hours)

**Suggested Activities**

1. Identify the methods of measurement of time, length and mass from ancient time and build models for them. (Reference : History of measurement - Wikipedia [https://en.wikipedia.org › wiki › History\\_of\\_measurement](https://en.wikipedia.org/wiki/History_of_measurement) )
2. Identify Physics principles behind various Sports activities. <https://www.real-world-physics-problems.com/physics-of-sports.html>
3. List the difficulties experienced in Gymnastics, Cycling and Weight lifting.
4. List the difficulties experienced in swimming.
5. Learn breathing exercises.
6. Write an essay on Physical health v/s Mental health or conduct a debate on Physical health v/s Mental health.

**Text Books**

1. Yakov Perelman. Physics for Entertainment. Createspace Independent Pub, 2010.
2. Yakov Perelman. Physics Everywhere. Prodinova Publishers, 2014.
3. Yakov Perelman. Mechanics for Entertainment. Prodinova Publishers, 2014.
4. Vassilios McInnes Spathopoulos. An Introduction to the Physics of Sports. Createspace Independent Publishing Platform, 2013.
5. Walter Lewin. For the Love of Physics. Taxmann Publications Pvt. Ltd., 2012.
6. Swaminathan M. Handbook of Food and Nutrition. Bangalore Press. 2012.
7. Srilakshmi B. Food Science. New Age International Pub. 2015.

**Internet Resources for Reference: Internet resources**

<https://www.topendsports.com/biomechanics/physics.htm>

<https://www.real-world-physics-problems.com/physics-of-sports.html>

<https://www.healthline.com/>

<https://www.mayoclinic.org/>

<https://www.who.int/news-room/>