Department of Computer Science and Business Systems

Minutes of Board of Studies

The second Board of Studies meeting of Department of Computer Science and Business Systems (CSBS) was held on 27th March 2021 at 10:00 A.M in the Lecture Hall, Department of CSBS, Sri Manakula Vinayagar Engineering College with the Head of the Department in the Chair.

The following members were present for the BoS meeting

Sl.No	Name of the Member with Designation and official Address	Responsibility in the BoS
1	**Dr. G.Shanmugasundaram** Associate Professor and Head, Department of CSBS, SMVEC Puducherry	Chairman
2	**Dr.T. Chithralekha, M.Tech., Ph.D** Professor and Dean , School of Engineering and Technology Pondicherry University, R.V.Nagar, Kalapet, Puducherry	Subject Expert (University Nominee)
3	**Dr. K.Devaki, M.E., Ph.D.,** Professor, Department of Computer Science and Engineering, Rajalakshmi Engineering College, Chennai.	Subject Expert (Academic Council Nominee)
4	**Dr. M.Chinnadurai, M.E., Ph.D.,** Professor, Department of Computer Science and Engineering, Controller of Examination, E.G.S Pillay Engineering College, Nagapattinam, Tamil Nadu	Subject Expert (Academic Council Nominee)
5	**Mr. Asoke Das Sarma** BPO Transformation Lead, Tata Consultancy Services, Kolkata.	Representative from Industry
6	**Dr. P. Victer Paul, M.Tech., Ph.D.,** Assistant Professor, Department of Computer Science and Engineering, Indian Institute of Information Technology, Kottayam - 686635,Kerala.	Postgraduate Alumnus (nominated by the Principal)

7	**Dr. N.S.N. Cailassame, M.B.A,Ph.D.,** Professor and Head, Department of Management Studies, SMVEC.	Internal Member
8	**Dr. C. Punitha Devi, M.Tech, Ph.D** Professor, Department of Information Technology, SMVEC.	Internal Member
9	**Mr.R. Saravanan , M.E., (Ph.D),** Associate Professor, Department of Information Technology, SMVEC.	Internal Member
10	**Mrs.N. Thilagavathi, M.Tech., (Ph.D),** Associate Professor, Department of Information Technology, SMVEC.	Internal Member
11	**Dr.T. Gayatri** Professor and Head, Dept of Mathematics, SMVEC	Internal Member
12	**Dr.T. Jaichitra** Professor and Head, Dept. of English, SMVEC	Internal Member
13	**Dr. T. Jayavardhanan** Professor , Dept. of Physics, SMVEC	Internal Member

Agenda of the Meeting

1) To discuss about the vision and mission of Institution and Department.
2) To discuss and approve Curriculum for I to VIII Semester
3) To discuss Syllabi for III and IV semester for the UG Programme: B.Tech. Degree Computer Science and Business Systems in the AY 2020-21 for the students admitted in the year 2020-21.
4) To Discuss about the student admission, certification and Skill development courses
5) To discuss and approve the panel of examiners
6) To discuss about the Innovative Teaching / Practices Methodology adopted to handle the emerging. / Advanced Technological concept courses.
7) Any other item with the permission of chair

Minutes of the Meeting

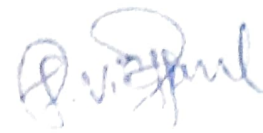
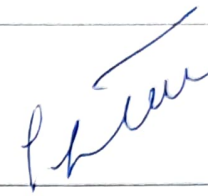
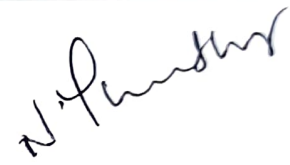
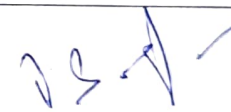
Dr.G.Shanmugasundaram, Chairman, BoS officially announced the opening of the meeting, and welcomed the external, internal and co-opted members and also thanked them for accepting the invite and their presence as member of the Board of Studies and the meeting thereafter deliberated on agenda items that had been approved by the Chairman.

Item:1	Our college Vision, Mission, Department Vision, Mission, PEO and PSO was briefed to the committee members. The members suggested revising the PEO 1 and PSO 2 of department with relevance to business systems. The changes were made as per suggestions (Given in Annexure- I) and it is approved by the BoS members
Item:2	The BoS members recommended the curriculum with following changes from III to VIII semesters and submitted to Academic council for approval. **Skill Development Courses** • Python and R programming is needed for the laboratory courses like computational statistics and Operation Research. Hence the programming languages may be taught as skill development course in earlier semester itself before studying the above said courses. **Certification Courses** • Include java as mandatory certification course since it's not included in curriculum **Elective Courses** • As the programme focus on Business Systems, experts suggested the courses like Data Visualization and Analytics, Business Intelligence, Ecommerce and Payments Systems, Cyber security, Business Process, Robotics Process Automation as part of elective to improve the students' knowledge in that domain. The above corrections are incorporated and the curriculum from semester III to VIII (Given in Annexure- II) are approved by the BoS members
Item:3	The BoS members recommended the following changes to be made in the Syllabi for III and IV Semesters and submitted to Academic council for approval **Semester III** • Include recent processor architecture in Computer Architecture and Organization • Reduce UML content in Object oriented programming theory and Laboratory courses and move it to software design with UML in Semester IV • Revise the Lab exercises for computational statistics laboratory course **Semester IV** • Unit IV and V in Business Communication and Value Science can be changed into life skill based contents. • Some introductory topics can be added in Introduction to innovation , IP Management and Entrepreneurship

	• SQL may be added in Database management systems and contents relevant to advanced database topics may be reduced. • Revise the lab exercises for database management systems laboratory. Proper concentration may be given to SQL and NoSQL. The above corrections are incorporated and the Syllabi (Given in Annexure- II) are approved by the BoS members
Item:4	Admission Status, Certification and skill development courses of current academic year 2020-21 were discussed and BOS members appreciated it
Item:5	Train The Trainer (TTT) model, ICT tools, teaching Pedagogy, Co-Curricular and Extra Curricular activities conducted during this academic year was briefed to members and appreciated it
Item:6	The BoS members recommended and approved the panel of examiners to Academic Council

The meeting was concluded at 12:00 noon with vote of thanks by **Dr. G. Shanmugasundaram**, Chairman, Board of Studies, Department of Computer Science and Business Systems.

Sl.No	Name of the Member with Designation and official Address	Responsibility in the BoS	Signature
1	**Dr. G.Shanmugasundaram** Professor and Head, Department of CSBS, SMVEC. Puducherry	Chairman	
2	**Dr.T. Chithralekha, M.Tech., Ph.D** Professor and Dean , School of Engineering and Technology Pondicherry University, R.V.Nagar, Kalapet, Puducherry	Subject Expert (University Nominee)	
3	**Dr. K.Devaki, M.E., Ph.D.,** Professor, Department of Computer Science and Engineering, Rajalakshmi Engineering College, Chennai.	Subject Expert (Academic Council Nominee)	
4	**Dr. M.Chinnadurai, M.E., Ph.D.,** Professor, Department of Computer Science and Engineering, Controller of Examination, E.G.S Pillay Engineering College, Nagapattinam, Tamil Nadu	Subject Expert (Academic Council Nominee)	
5	**Mr. Asoke Das Sarma** BPO Transformation Lead, Tata Consultancy Services, Kolkata.	Representative from Industry	

6	**Dr. P. Victer Paul, M.Tech., Ph.D.,** Assistant Professor, Department of Computer Science and Engineering, Indian Institute of Information Technology, Kottayam, Kottayam - 686635,Kerala.	Postgraduate Alumnus (nominated by the Principal)	
7	**Dr. N.S.N. Cailassame, M.B.A,Ph.D.,** Professor and Head, Department of Management Studies, SMVEC.	Internal Member	
8	**Dr. C. Punitha Devi, M.Tech, Ph.D** Professor, Department of Information Technology, SMVEC.	Internal Member	
9	**Mr.R. Saravanan , M.E., (Ph.D),** Associate Professor, Department of Information Technology, SMVEC.	Internal Member	
10	**Mrs.N. Thilagavathi, M.Tech., (Ph.D),** Associate Professor, Department of Information Technology, SMVEC.	Internal Member	
11	**Dr.T. Gayatri** Professor and Head, Dept of Mathematics, SMVEC	Internal Member	
12	**Dr.T. Jaichitra** Professor and Head, Dept. of English,SMVEC	Internal Member	
13	**Dr. T. Jayavardhanan** Professor , Dept. of Physics,SMVEC	Internal Member	

Annexure I

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

Existing PEO1

- **PEO1:** To apply computer science and management concepts to solve the real-world problems

Revised PEO1

- **PEO1:** To apply computer science and business concepts to solve the real-world problems

PROGRAM SPECIFIC OUTCOME (PSOs)

Existing PSO2

- **PSO2:**Ability to demonstrate the technical and organizational skills and provide solutions for the societal needs

Revised PSO2

- **PSO2:** Ability to demonstrate the technical and business skills and provide solutions for the societal needs

Annexure II

- The skill development courses such as python and R programming are included in Semester II and III.
- The choice for elective courses is increased and the elective courses suggested by BOS members are also included.

SEMESTER – II											
Sl. No.	**Course Code**	**Course Title**	**Category**	**Periods**			**Credits**	**Max. Marks**		
				L	**T**	**P**		**CAM**	**ESM**	**Total**
Theory										
1	U20HST202	Business Communication & Value Science – II	HS	2	0	0	2	25	75	100
2	U20HST203	Fundamentals of Economics	HS	2	0	0	2	25	75	100
3	U20BST216	Linear Algebra	BS	3	2	0	4	25	75	100
4	U20BST217	Statistical Methods	BS	3	0	0	3	25	75	100
5	U20EST251	Principles of Electronics	ES	2	0	0	2	25	75	100
6	U20CBT201	Data Structures & Algorithms	PC	3	0	0	3	25	75	100
Practical										
7	U20BSP218	Statistical Methods Laboratory	BS	0	0	2	1	50	50	100
8	U20ESP252	Principles of Electronics Laboratory	ES	0	0	2	1	50	50	100
9	U20CBP201	Data Structures & Algorithms Laboratory	PC	0	0	2	1	50	50	100
Employability Enhancement Course										
10	U20CBC2XX	Certification Course - II**	EEC	0	0	4	-	100	-	100
11	U20CBS201	Skill Development Course 1 – Python Programming	EEC	0	0	2	-	100	-	100
Mandatory Course										
12	U20CBM202	Environmental Sciences	MC	2	0	0	-	100	-	100
							19	600	600	1200

SEMESTER – III										
Sl. No.	**Course Code**	**Course Title**	**Category**	**Periods**			**Credits**	**Max. Marks**		
				L	**T**	**P**		**CAM**	**ESM**	**Total**
Theory										
1	U20BST328	Computational Statistics	BS	3	0	0	3	25	75	100
2	U20CBT302	Formal Language and Automata Theory	PC	3	0	0	3	25	75	100
3	U20CBT303	Computer Organization & Architecture	PC	3	0	0	3	25	75	100
4	U20CBT304	Object Oriented Programming	PC	3	0	0	3	25	75	100
5	U20CBT305	Software Engineering	PC	3	0	0	3	25	75	100
Practical										
6	U20BSP329	Computational Statistics Laboratory	BS	0	0	2	1	50	50	100
7	U20CBP302	Object Oriented Programming Laboratory	PC	0	0	2	1	50	50	100
8	U20CBP303	Software Engineering Laboratory	PC	0	0	2	1	50	50	100
Employability Enhancement Course										
9	U20CBC3XX	Certification Course - III**	EEC	0	0	4	-	100	-	100
10	U20CBS302	Skill Development Course 2 –– R Programming	EEC	0	0	2	-	100	-	100
Mandatory Course										
11	U20CBM303	Physical Education	MC	0	0	2	-	100	-	100
							18	575	525	1100

PROFESSIONAL ELECTIVE COURSES (18 CREDITS)

Professional Elective – I (Offered in Semester V)		
Sl. No.	**Course Code**	**Course Title**
1	U20CBE501	Conversational Systems
2	U20CBE502	Cloud, Microservices & Application
3	U20CBE503	Machine Learning
4	U20CBE504	Business Intelligence
5	U20CBE505	Business Process
Professional Elective – II (Offered in Semester VI)		
Sl. No.	**Course Code**	**Course Title**
1	U20CBE606	Robotics and Embedded Systems
2	U20CBE607	Modern Web Applications
3	U20CBE608	Data Mining and Analytics
4	U20CBE609	E- Commerce and E- Payment Systems
5	U20CBE610	Big databases
Professional Elective – III (Offered in Semester VII)		
Sl. No.	**Course Code**	**Course Title**
1	U20CBE711	Cognitive Science & Analytics
2	U20CBE712	Introduction to IoT
3	U20CBE713	Cryptology
4	U20CBE714	Robotic Process Automation
5	U20CBE715	Cyber Security
Professional Elective – IV (Offered in Semester VII)		
Sl. No.	**Course Code**	**Course Title**
1	U20CBE716	Quantum Computation & Quantum Information
2	U20CBE717	Advanced Social, Text and Media Analytics
3	U20CBE718	Mobile Computing

4	U20CBE719	Block chain
5	U20CBE720	Virtual Reality
Professional Elective – V (Offered in Semester VIII)		
Sl. No.	**Course Code**	**Course Title**
1	U20CBE821	Behavioral Economics
2	U20CBE822	Computational Finance & Modeling
3	U20CBE823	Psychology
4	U20CBE824	Data Sciences
5	U20CBE825	Smart Systems
Professional Elective – VI (Offered in Semester VIII)		
Sl. No.	**Course Code**	**Course Title**
1	U20CBE826	Enterprise Systems
2	U20CBE827	Advance Finance
3	U20CBE828	Image Processing and Pattern Recognition
4	U20CBE829	Automation Tools and Technique - Devops
5	U20CBE830	Augmented Reality

PROFESSIONAL ELECTIVE PRACTICAL COURSES (4 CREDITS)

Professional Elective – I (Offered in Semester V)		
Sl. No.	**Course Code**	**Course Title**
1	U20CBEP51	Conversational Systems Laboratory
2	U20CBEP52	Cloud, Microservices & Application Laboratory
3	U20CBEP53	Machine Learning Laboratory
4	U20CBEP54	Business Intelligence
5	U20CBEP55	Business Process Automation
Professional Elective – II (Offered in Semester VI)		
Sl. No.	**Course Code**	**Course Title**
1	U20CBEP61	Robotics and Embedded Systems Laboratory
2	U20CBEP62	Modern Web Applications Laboratory
3	U20CBEP63	Data Mining and Analytics Laboratory
4	U20CBEP64	Robotic Process Automation
5	U20CBEP65	Cyber Security
Professional Elective – IV (Offered in Semester VII)		
Sl. No.	**Course Code**	**Course Title**
1	U20CBEP71	Quantum Computation & Quantum Information Laboratory
2	U20CBEP72	Advanced Social, Text and Media Analytics Laboratory
3	U20CBEP73	Mobile Computing Laboratory
4	U20CBEP74	Block chain
5	U20CBEP75	Virtual Reality
Professional Elective – VI (Offered in Semester VIII)		
Sl. No.	**Course Code**	**Course Title**
1	U20CBEP81	Enterprise Systems Laboratory
2	U20CBEP82	Advance Finance Laboratory
3	U20CBEP83	Image Processing and Pattern Recognition Laboratory
4	U20CBEP84	Automation Tools and Technique - Devops
5	U20CBEP85	Augmented Reality

EMPLOYABILITY ENHANCEMENT COURSES-(B) SKILL DEVELOPMENT COURSES

Sl. No.	Course Code	Course Title
1.	U20CBS201	Skill Development Course 1 : Python Programming
2.	U20CBS302	Skill Development Course 2 : R Programming
3.	U20CBS403	Skill Development Course 3 *
		1) GRAPHIC DESIGN
		2) Exploring GITHUB Platform
		3) APTITUDE – I
4.	U20CBS504	Skill Development Course 4 : Foreign Language/ IELTS -I
5.	U20CBS505	Skill Development Course 5 : Presentation Skills using ICT
6.	U20CBS606	Skill Development Course 6 : Foreign Language/ IELTS - II
7.	U20CBS607	Skill Development Course 7 : Technical Seminar
8.	U20CBS608	Skill Development Course 8 : NPTEL / MOOC - I
9.	U20CBS809	Skill Development Course 9 : NPTEL / MOOC-II

**** Choose any one skill development course in the list for SDC 3***

Annexure III

Revised Syllabus

		L	T	P	C	Hrs
U20CBT303	**COMPUTER ORGANIZATION AND ARCHITECTURE**	**3**	**0**	**0**	**3**	**45**

Course Objectives

- To understand the basic structure and operation of a digital computer
- To learn the fundamentals of organizational and architectural aspects of control unit
- To obtain knowledge on pipelining concepts and parallel processing
- To acquire knowledge about processor and memory design of a digital computer
- To have a broad understanding of various system interfaces and Input output devices

Course Outcomes

After completion of the course, the students will be able to

CO1 - Identify and explain the basic structure of a computer and instruction sets with addressing modes and discuss the design of ALU. **(K2)**

CO2 - Apply fixed and floating-point arithmetic operations **(K2)**

CO3 - Illustrate the concepts of CPU design pipelining and parallel processors **(K2)**

CO4 - Choose the appropriate memory mapping procedure to enhance the performance of the system **(K2)**

CO5 - Describe and identify the standard I/O interfaces and peripheral devices. **(K2)**

UNIT I COMPUTER ORGANIZATION AND DESIGN (9 Hrs)

Functional blocks of a computer, Instruction set architecture of a CPU: Registers -instruction execution cycle- RTL interpretation of instruction- addressing modes- instruction set. Outlining instruction sets of some common CPUs

UNIT II DATA REPRESENTATION AND COMPUTER ARITHMETIC (9 Hrs)

Data representation: Signed number -fixed and floating point number -character representation

Computer arithmetic: Integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift-and-add- Booth multiplier- carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic, IEEE 754 format,

UNIT III PROCESSOR AND CONTROL UNIT (9 Hrs)

Introduction to x86 architecture, CPU control unit design: Hardwired and micro-programmed design approaches - consideration design of a simple hypothetical CPU

Basic concepts of pipelining- throughput and speedup -pipeline hazards

Parallel Processors: Introduction to parallel processors- Concurrent access to memory - cache coherency, introduction to multicore processor, multiprocessor and cluster multiprocessor

UNIT IV MEMORY ORGANIZATION (9 Hrs)

Semiconductor memory technologies- Memory interleaving, concept of hierarchical memory organization: auxiliary memory –Associate memory – Virtual memory -cache memory -cache size vs. block size- mapping functions- replacement algorithms- write policies

UNIT V PERIPHERAL DEVICES AND THEIR CHARACTERISTICS (9 Hrs)

Input-output subsystems- I/O device interface- I/O transfers – program controlled- interrupt driven and DMA - privileged and non-privileged instructions -software interrupts and exceptions - Programs and processes – role of interrupts in process state transitions- I/O device interfaces – SCII, USB

Content beyond Syllabus

Recent Intel processor architectures

Text Books

1. Morris Mano, "Computer System Architecture ", Prentice Hall of India, Third Edition, 2008
2. David A. Patterson and John L. Henessey, “Computer Organisation and Design”, Fifth edition, Morgan Kauffman / Elseveir, 2014
3. Carl Hamacher, Zvonko G. Vranesic, Safwat G. Zaky, Computer Organization, 5th edition, McGraw-Hill, 2014

Reference Books

1. John P.Hayes, Computer Architecture and Organisation, McGraw Hill, 2012.
2. William Stallings, Computer Organization and Architecture, 7th edition, Prentice-Hall of India Pvt. Ltd., 2016.
3. Vincent P. Heuring, Harry F. Jordan, “Computer System Architecture”, 2nd Edition, Pearson Education, 2005.

Web References

1. http://www.inetdaemon.com/tutorials/computers/hardware/cpu/
2. https://inst.eecs.berkeley.edu/~cs152/sp18/
3. http://users.ece.cmu.edu/~jhoe/doku/doku.php?id=18-447_introduction_to_computer_architecture

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	1	1	-	-	-	-	-	-	-	3	2	-
2	3	3	2	1	2	-	-	-	-	-	-	-	3	2	1
3	3	2	2	2	2	-	-	-	-	-	-	-	3	2	2
4	3	2	2	2	-	-	-	-	-	-	-	-	3	1	-
5	3	2	2	2	-	-	-	-	-	-	-	-	3	1	-

Correlation Level: 1-Low, 2-Medium, 3- High

		L	T	P	C	Hrs
U20BSP329	**COMPUTATIONAL STATISTICS LAB**	**0**	**0**	**2**	**1**	**30**

Course Objectives

- To study the concepts of linear regression models
- To develop a sound understanding of correlation
- To analyze the concept of autocorrelation
- To apply principles of multivariate data
- To understand the concept of clustering.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Remember the basic concepts of linear regression. **(K3)**
CO2 - Interpret the results of correlation coefficient. **(K3)**
CO3 - Develop a sound understanding of auto correlation. **(K3)**
CO4 – Analyze the concept of multivariate data. **(K3)**
CO5 – Know the application of clustering. **(K3)**

List of experiments:

1. Program on Regression lines
2. Program on correlation coefficient
3. Program on Autocorrelation
4. Program on Multivariate analysis
5. Program on Factor scores
6. Program on multivariate data
7. Implement k-means, logistic and time series algorithm using Scikit-learn
8. Draw statistical graphics using seaborn
9. Working with hierarchical clustering
10. Working with overlapping clustering

.

Text Books

1. T.W. Anderson, “An Introduction to Multivariate Statistical Analysis”, 2 nd edition, 2003
2. J.D. Jobson ,” Applied Multivariate Data Analysis”, Vol I & II, 2 nd edition ,1991.
3. Magnus Lie Hetland ,”Beginning Python: From Novice to Professional”, 9th. Edition, 2005.

Reference Books

1. D.A. Belsey, E. Kuh and R.E. Welsch, “Regression Diagnostics, Identifying Influential Data and Sources of Collinearety”, New York, 1980.
2. D.C. Montgomery and E.A. Peck, “Introduction to Linear Regression Analysis”,5 th edition , 2012.
3. D.F. Morrison, “Multivariate Statistical Analysis”, 2013.

Web References

1. https://www.edx.org/course/statistical-modeling-and-regression-analysis
2. https://www.cin.ufpe.br/~embat/Python%20for%20Data%20Analysis.pdf
3. https://www.kdnuggets.com/2016/07/statistical-data-analysis-python.html
4. https://people.duke.edu/~ccc14/sta-663/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	1	-	-	-	-	-	-	-	-	2	1	-
2	3	2	1	1	-	-	-	-	-	-	-	-	2	1	1
3	3	2	1	1	-	-	-	-	-	-	-	-	2	1	1
4	3	2	1	1	-	-	-	-	-	-	-	-	2	1	1
5	3	2	1	1	-	-	-	-	-	-	-	-	2	1	1

Correlation Level: 1-Low, 2-Medium, 3- High

U20CBP302	OBJECT ORIENTED PROGRAMMING LABORATORY	L	T	P	C	Hrs
		0	0	2	1	30

Course Objectives

- To introduce the concepts of Basic Object Oriented concepts and Programming Basics.
- To gain insight into the Functions and Array usages using C++.
- To understand in depth about the Classes and Objects.
- To study the Operator overloading and Inheritance concepts.
- To acquaint the Files and Exception Handling concepts.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Implement the Object Oriented concepts in simple applications. **(K3)**

CO2 - Employ the Functions and Arrays in simple programs. **(K3)**

CO3 - Demonstrate simple programs with Classes and Objects. **(K3)**

CO4 - Illustrate Operator overloading and Inheritance concepts. **(K3)**

CO5 - Experiment Files and Exception Handling concepts. **(K3)**

List of Exercises

1. Programs on concept of classes and objects
2. Programs using friend functions
3. Programs using static polymorphism
4. Programs using constructors
5. Programs using inheritance
6. Programs on dynamic polymorphism
7. Programs on exception handling
8. Programs on generic programming using template function & template class
9. Programs on file handling

Reference Books

1. Yashavant Kanetkar, “Let Us C++ “, BPB Publications, 2020.
2. Bjarne Stroustrup, “The C++ Programming Language”, Pearson Education, 3rd Edition, 2009
3. Debasish Jana, “C++ and Object-Oriented Programming Paradigm”, PHI Learning, 2nd Edition,2005
4. Bjarne Stroustrup, “Programming: Principles and Practice Using C++”, Addison Wesley, 2009
5. Bjarne Stroustrup, “The Design and Evolution of C++”, Pearson Education, 2009

Web References

1. https://www.studytonight.com/cpp/cpp-and-oops-concepts.php
2. https://www.tutorialspoint.com/What-are-basic-Object-oriented-programming-concepts
3. https://www.cplusplus.com/doc/tutorial/
4. https://www.w3schools.com/cpp/
5. https://www.javatpoint.com/cpp-tutorial
6. https://www.geeksforgeeks.org/cpp-tutorial/

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COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	1	3	-	-	-	-	-	-	-	2	-	-
2	3	2	1	1	3	-	-	-	-	-	-	-	2	1	1
3	3	2	1	1	3	-	-	-	-	-	-	-	3	2	-
4	3	2	1	1	3	-	-	-	-	-	-	-	3	2	1
5	3	2	1	1	3	-	-	-	-	-	-	-	3	2	1

Correlation Level: 1-Low, 2-Medium, 3- High

U20HST404	BUSINESS COMMUNICATION & VALUE SCIENCE – III	L	T	P	C	Hrs
		2	0	0	2	45

Course Objectives

- To develop technical writing skills
- To Introduce students to Self-analysis techniques like SWOT & TOWS
- To enrich students to the key concepts of Pluralism and cultural spaces
- To imbibe self-motivation and foresee future prospects.
- To inculcate the importance of science in nation building

Course Outcome(s)

By the end of the course, students will be able to,

CO1: Understand, apply & analyze the tools of technical writing **(K2)**
CO2: Apply basic principles of SWOT & life positions **(K3)**
CO3: Identify & respect pluralism in cultural spaces **(K1)**
CO4: Inherent the skill of self- introspection and envision the future **(K2)**
CO5: Learn to apply the role of science in nation building **(K3)**

UNIT I TECHNICAL WRITING SKILLS (9 Hrs)

Technical writing – Introduction and application of Technical writing Identify the best practices on echnical writing. - Technical writing in profession -Theory with YouTube and Dr Bimal Ray's videos on cryptology. - Technical writing in real-life scenarios-Scenario-based Assessment on technical writing - Sell Analytics and Insight to the local tea seller -Explain the concept of Cloud to your 87 year old grandmother-Introduce the concept of friendly robots to a class 3 kid.

UNIT II ANALYSIS OF LIFE POSITION (9 Hrs)

Personal analysis: SWOT analysis - SWOT and Life Positions –Analysis of others' lives – Analysis of one's own life. - TOWS Analysis: How to turn threat into opportunity – VUCA - Volatility, uncertainty, complexity and ambiguity - Application of analysis in real life scenarios – Activity: SWOT analysis of a well-known individual's life – TED talk on bio mimicry – Group activity - Presentation on strengths identified to survive in the VUCA World – Watching videos of motivation & discussion.

UNIT III PLURALISM IN CULTURAL SPACE (9 Hrs)

Identifying Pluralism in cultural spaces - uniqueness and differences - Global, Glocal and Translocational cultures – benefits, differences and implications of multi-culture – Gender awareness - Roles and relations of different genders- Group activity – Exploring cultures and traditions of different states – Performing Indian dance forms – Debate on Global, Glocal and Translocational impacts – cultural misunderstanding – Group discussion on implications of cross cultural communication –Gender awareness campaign: College, Workplace, Family, Friend.

UNIT – IV SELF DRIVEN HUMAN VALUES AND FUTURISM (9 Hrs)

Motivation in real life: Stories - YouTube videos on Maslow's Theory - Explain the idea of motivation with the help of examples - Gender awareness: Differentiate between the roles and relations of different gender - Gender awareness with four different themes: College-Workplace-Family-Friends. Design your college in the year 2090: Groups need to create the college of future with the future teachers, teaching methods, types of students, etc. How will offices/workplaces change in future? -Motivational TED talk videos.

UNIT V ROLE OF SCIENCE IN NATION BUILDING (9 Hrs)

Role of science in nation building – Pre & Post Independent scientific inventions and inventors – development of Information Technology –Discussion on the role of scientists and mathematicians – Presentation on eminent scientists and mathematicians – Quiz on Scientists and inventions – Explaining DNA ,Rings of Saturn ,structure of heart to visually impaired person.

Reference Books

1. Self-Analysis by Ron Hubbard, Bridge Pubns; 2007th edition
2. Managing a Diverse Workforce: Learning Activities, Gary N. Powell, Sage Publication
3. Unity in Diversity: The Indian Experience in Nation-building, M.S. Gore, Rawat Publication
4. Artificial Intelligence, Russell, Pearson Education India
5. Carrie Hutchinson, "Cross Cultural Communication A Guide for International Students" Createspace Independent Pub 1 December 2013.

Web References

1. https://freelance-writing.lovetoknow.com/kinds-technical-writing
2. https://clickhelp.com/clickhelp-technical-writing-blog/11-skills-of-a-good-technical-writer/
3. https://www.hult.edu/blog/benefits-challenges-cultural-diversity-workplace/
4. https://www.investopedia.com/terms/c/cross-culture.asp
5. https://link.springer.com/article/10.1007/s11569-018-0327-8

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	-	-	-	-	-	-	2	-	3	-	1	1	-	-
2	1	-	-	-	-	-	-	2	-	3	-	1	1	-	-
3	1	-	-	-	-	-	-	2	-	3	-	1	1	1	1
4	1	-	-	-	-	-	-	2	-	3	-	1	1	1	1
5	1	-	-	-	-	-	-	2	-	3	-	1	1	1	1

Correlation Level: 1-Low, 2-Medium, 3- High

U20HST405	INTRODUCTION TO INNOVATION, IP MANAGEMENT & ENTREPRENEURSHIP	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To acquaint the students with the knowledge base of Entrepreneurship
- To learn about Innovation and Creativity
- To learn to manage various types of Intellectual Property Rights IPR to protect competitive advantage
- To know about the Building an Innovative Organization
- To enable students to investigate, understand and internalize the process of founding a start-up.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Examine different types' entry strategies of entrepreneurship **(K3)**

CO2 - Demonstrate about Innovation and Creativity **(K2)**

CO3 - Elaborate on various types of Intellectual Property Rights **(K3)**

CO4 -Analyze various entrepreneurial opportunities. **(K3)**

CO5 - Evaluate the process of founding a start-up **(K3)**

UNIT I INNOVATION (9 Hrs)

Innovation: Definition and meaning; Innovation as a core business process, Sources of innovation, Types of Innovation, Challenges in Innovation, Knowledge push vs. need pull innovations. Innovation Vs. Creativity.

UNIT II BUILDING AN INNOVATIVE ORGANIZATION (9 Hrs)

Creating new products and services, Exploiting open innovation and collaboration, Use of innovation for starting a new venture

UNIT III INTELLECTUAL PROPERTY RIGHTS (IPR) (9 Hrs)

Introduction and the economics behind development of IPR: Business Perspective; IPR in India – Genesis and Development; International Context; Concept of IP Management, Use in marketing; Types of Intellectual Property: Patent- Procedure, Licensing and Assignment, Infringement and Penalty, Trademark- Use in marketing, example of trademarks- Domain name, Geographical Indications, Copyright, Industrial Designs.

UNIT IV ENTREPRENEURSHIP (9 Hrs)

Opportunity recognition and entry strategies, Entrepreneurship as a Style of Management, Types of Entrepreneurship, Maintaining Competitive Advantage- Use of IPR to protect Innovation.

UNIT V ENTREPRENEURSHIP- FINANCIAL PLANNING (9 Hrs)

Financial Projections and Valuation, Stages of financing, Debt, Venture Capital and other forms of Financing.

Text Books

1. Joe Tidd, John Bessant. Managing Innovation: Integrating Technological, Market and Organizational Change, Sixth Edition, John Wiley & Sons Limited, 2018

Reference Books

1. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd: Entrepreneurship (Tata McGraw Hill)
2. Arya Kumar: Creating and Leading an Entrepreneurial Organization (Pearson 2012)
3. Vasant Desai: The Dynamics of Entrepreneurial Development and Management (Himalaya Publishing House)
4. Gabe Burton: Entrepreneurship and Small Business Management (Library Press 2017)

Web References

1. www.ediindia.org
2. www.enterweb.org/entrship.htm
3. https://www.theweekendleader.com/more-articles.html

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	1	3	-	-	-	-	-	-	-	1	3	2
2	2	1	-	-	3	-	-	-	-	-	-	-	1	2	1
3	3	2	1	1	3	-	-	-	-	-	-	-	1	3	2
4	3	2	1	1	3	-	-	-	-	-	-	-	1	3	2
5	3	2	1	1	3	-	-	-	-	-	-	-	1	2	1

Correlation Level: 1-Low, 2-Medium, 3- High

U20CBT407	DATABASE MANAGEMENT SYSTEMS	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To understand the various data models, conceptualize E-R diagram and depict using relational model
- To gain knowledge about database languages and frame query using Relational Algebra and SQL
- To understand and design an efficient database schema using the various normal forms
- To impart knowledge on data storage and transaction processing, concurrency control techniques and recovery procedures
- To explore knowledge on database security

Course Outcomes

After completion of the course, the students will be able to

CO1 - Explain the concepts of Database Management System **(K2)**

CO2 - Manipulate and build database queries using Structured and Relational Query Language **(K3)**

CO3 - Use data normalization principles to develop a normalized database for a given application. **(K3)**

CO4 - Illustrate various transactions and recovery techniques **(K2)**

CO5 - Describe the concepts of Database Security **(K2)**

UNIT I INTRODUCTION (9 Hrs)

Introduction: Introduction to Database. Hierarchical, Network and Relational Models.

Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML).

UNIT II DATA MODELS AND DATABASE LANGUAGES (9 Hrs)

Data models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server

UNIT III RELATIONAL-DATABASE DESIGN (9 Hrs)

Relational database design: Domain and data dependency, Armstrong's axioms, Functional Dependencies, Normal forms, Dependency preservation, Lossless design.

Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

UNIT IV DATA STORAGE AND TRANSACTION (9 Hrs)

Storage strategies: Indices, B-trees, Hashing.

Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

UNIT V DATABASE SECURITY (9 Hrs)

Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.

Content Beyond Syllabus

Advanced topics: Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.

Text Books

1. Silberschatz, Korth, Sudarshan, Database System Concepts, 7thEdition – McGraw-Hill Higher Education, International Edition, 2019.
2. Ramez Elmasri, and Shamkant B. Navathe, Fundamentals of Database Systems (7th edition), ,Publisher: Pearson,2016.
3. Raghu Ramakrishnan, —Database Management Systems, Fourth Edition, McGraw-Hill College Publications, 2015.

Reference Books

1. Principles of Database and Knowledge – Base Systems, Vol 1 by J. D. Ullman.
2. Fundamentals of Database Systems. R. Elmasri and S. Navathe.
3. Foundations of Databases. Serge Abiteboul, Richard Hull, Victor Vianu.

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1	-	-	3	-	-	-	-	-	-	-	3	-	-
2	3	2	1	1	3	-	-	-	-	-	-	-	3	2	-
3	3	2	1	1	3	-	-	-	-	-	-	-	3	2	1
4	2	1	-	-	3	-	-	-	-	-	-	-	3	1	1
5	2	1	-	-	3	-	-	-	-	-	-	-	3	1	1

Correlation Level: 1-Low, 2-Medium, 3- High

U20CBP406	DATABASE MANAGEMENT SYSTEMS LABORATORY	L	T	P	C	Hrs
		0	0	2	1	30

Course Objectives

- To understand data definitions and data manipulation commands
- To understand data selection and data projection commands
- To learn the use of nested and join queries
- To understand functions, procedures and procedural extensions of databases
- To understand design and implementation of typical database applications.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Implement relational database systems using SQL statements. **(K3)**

CO2 - Use typical data definitions and manipulation commands in various applications. **(K3)**

CO3 - Demonstrate applications using Nested and Join Queries. **(K3)**

CO4 - Execute various PL/SQL Queries. **(K3)**

CO5 - Build commercial relational database applications. **(K3)**

List of Experiments

Structured Query Language:

1. Conceptual Database design using E-R DIAGRAM
2. Implementation of SQL commands DDL, DML, DCL and TCL
3. Queries to demonstrate implementation of Integrity Constraints
4. Practice of Inbuilt functions
5. Implementation of Join and Nested Queries AND Set operators
6. Implementation of virtual tables using Views

PL/SQL

7. Practice of Procedural extensions (Procedure, Function, Cursors, Triggers)

Application Development

8. Mini Project (Application Development using DB)
9. Mini Project (Application Development using NoSQL)

Reference Books

1. Oracle developer handbook
2. SQL/PL/SQL for Oracle by P.S. Deshpande IIT Madras,Dream tech Press
3. Alan Beaulieu, Mastering SQL Fundamentals, Second Edition, O"Reilly,2009
4. Silberschatz, Korth, Sudarshan, Database System Concepts, 7thEdition – McGraw-Hill Higher Education, International Edition, 2019

Web References

1. www.oracle-developer.net
2. www.oracle.com/DBA

CO-POs/PSOs Mapping

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2	3	2	1	1	3	-	-	-	-	-	-	-	3	2	1
3	3	2	1	1	3	-	-	-	-	-	-	-	3	2	1
4	3	2	1	1	3	-	-	-	-	-	-	-	3	3	1
5	3	2	1	1	3	-	-	-	-	-	-	-	3	3	2

Correlation Level: 1-Low, 2-Medium, 3- High