VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI.

SDS 2022 Scheme

Scheme of Teaching and Examinations and Syllabus
M. Tech in Data Science (SDS)
(Effective from the Academic year 2022-23)

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI
Scheme of Teaching and Examinations – 2022
M. Tech in Data Science (SDS)
Choice Based Credit System (CBCS) and Outcome-Based Education(OBE)

I SEMESTER

Sl. No	Course	Course Code	Course Title	Teaching Hours per Week			Examination				Credits
				Theory	Practical/Seminar	Skill Development Activities (Hours are for Interaction between faculty and students)	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	P	SDA					
1	BSC	22SDS11	Mathematics course stream	03	00	00	03	50	50	100	3
2	IPCC	22SDS12	Fundamentals of Data Sciences	03	02	00	03	50	50	100	4
3	PCC	22SDS13	Advanced Database Management System	03	00	02	03	50	50	100	4
4	PCC	22SDS14	Predictive Analytics	02	00	02	03	50	50	100	3
5	PCC	22SDS15	Fundamentals of Machine Learning	02	00	02	03	50	50	100	3
6	MCC	22RMI16	Research Methodology and IPR	03	00	00	03	50	50	100	3
7	PCCL	22SDSL17	Data Science and Analytics Laboratory	01	02	00	03	50	50	100	2
8	AUD/AEC	22AUD18/ 22AEC27	BOS recommended ONLINE courses	Classes and evaluation procedures are as per the policy of the online course providers.							PP
			TOTAL	**17**	**04**	**06**	**21**	**350**	**350**	**700**	**22**

Note: BSC-Basic Science Courses, PCC: Professional core. IPCC-Integrated Professional Core Courses, MCC- Mandatory Credit Course, AUD/AEC –Audit Course / Ability Enhancement Course(A pass in AUD/AEC is mandatory for the award of the degree)

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Integrated Professional Core Course (IPCC): **Integrated Professional Core Course (IPCC)**: Refers to Professional Theory Core Course Integrated with practical of the same course. The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper.

Audit Courses /Ability Enhancement Courses Suggested by BOS (ONLINE courses): Audit Courses: These are prerequisite courses suggested by the concerned Board of Studies. Ability Enhancement Courses will be suggested by the BoS if prerequisite courses are not required for the programs. **Ability Enhancement Courses**:

- These courses are prescribed to help students to enhance their skills in in fields connected to the field of specialisation as well allied fields that leads to employable skills. Involving in learning such courses are impetus to lifelong learning.
- The courses under this category are online courses published in advance and approved by the concerned Board of Studies.
- Registration to Audit /Ability Enhancement Course shall be done in consultation with the mentor and is compulsory during the concerned semester.
- In case a candidate fails to appear for the proctored examination or fails to pass the selected online course, he/she can register and appear for the same course if offered during the next session or register for a new course offered during that session, in consultation with the mentor.
- The Audit Ability Enhancement Course carries no credit and is not counted for vertical progression. However, a pass in such a course is mandatory for the award of the degree.

Skill development activities: Under Skill development activities in a concerning course, the students should

1. Interact with industry (small, medium, and large).
2. Involve in research/testing/projects to understand their problems and help creative and innovative methods to solve the problem.
3. Involve in case studies and field visits/ fieldwork.
4. Accustom to the use of standards/codes etc., to narrow the gap between academia and industry.
5. Handle advanced instruments to enhance technical talent.
6. Gain confidence in modelling of systems and algorithms for transient and steady-state operations, thermal study, etc.
7. Work on different software/s (tools) to simulate, analyze and authenticate the output to interpret and conclude.

All activities should enhance student's abilities to employment and/or self-employment opportunities, management skills, Statistical analysis, fiscal expertise, etc.

Students and the course instructor/s to involve either individually or in groups to interact together to enhance the learning and application skills of the study they have undertaken. The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.

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II SEMESTER

Sl. No	Course	Course Code	Course Title	Teaching Hours /Week			Examination				Credits
				Theory	Practical/ Seminar	Skill Development Activities(Hours are for Interaction between faculty and students)	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	P	SDA					
1	PCC	22SDS21	Deep Learning	02	00	02	03	50	50	100	3
2	IPCC	22SDS22	Data Visualization	03	02	---	03	50	50	100	4
3	PEC	22SDS23x	Professional Elective 1	02	---	02	03	50	50	100	3
4	PEC	22SDS24x	Professional Elective 2	02	---	02	03	50	50	100	3
5	MPS	22SDS25	Mini Project with Seminar	00	04	02	--	100	--	100	3
6	PCCL	22SDSL26	Deep Learning Laboratory	01	02	00	03	50	50	100	02
7	AUD/ AEC	22AUD27	Suggested ONLINE Courses	Classes and evaluation procedures are as per the policy of the online course providers.							PP
TOTAL				**10**	**08**	**08**	**15**	**350**	**250**	**600**	**18**

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Note: PCC: Professional core courses, PEC: Professional Elective Courses, IPCC-Integrated Professional Core Courses. MPS-Mini Project With Seminar; AUD/AEC; Audit Courses / Ability Enhancement Courses (Mandatory)			
Professional Elective 1		**Professional Elective 2**	
Course Code under 22SDS23X	**Course title**	**Course Code under 22SDS24X**	**Course title**
22SDS231	Managing Big Data	22SDS241	Data Security and Privacy
22SDS232	Natural Language Processing	22SDS242	Time Series Analysis and Forecasting
22SDS233	Soft and Evolutionary Computing	22SDS243	Applied Social Network Analysis
22SDS234	Pattern Recognition	22SDS244	Image and Video Analytics
22SDS235	Health Care Data Analytics	22SDS245	Cloud Computing

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Note:

1 Mini Project with Seminar: This may be hands-on practice**,** survey report, data collection and analysis, coding, mobile app development, field visit and report preparation, modelling of system, simulation, analysing and authenticating, case studies, etc.

CIE marks shall be awarded by a committee comprising of HoD as Chairman, Guide/co-guide, if any, and a senior faculty of the department. Students can present the seminar based on the completed mini-project. Participation in the seminar by all postgraduate students of the program shall be mandatory.

The CIE marks awarded for Mini-Project work and Seminar, shall be based on the evaluation of Mini Project work and Report, Presentation skill and performance in Question and Answer session in the ratio 50:25:25. Mini-Project with Seminar shall be considered as a head of passing and shall be considered for vertical progression as well as for the award of degree. Those, who do not take-up/complete the Mini Project and Seminar shall be declared as fail in that course and have to complete the same during the subsequent semester. There is no SEE for this course.

2. Internship: All the students shall have to undergo a mandatory internship of **06 weeks** during the vacation of II and III semesters. A University examination shall be conducted during III semester and the prescribed internship credit shall be counted in the same semester. The internship shall be considered as a head of passing and shall be considered for vertical progression as well asfor the award of degree. Those, who do not take-up/complete the internship shall be declared as fail in the internship course and have to complete the same during the subsequent University examination after satisfying the internship requirements.

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III SEMESTER

.	o u r	Course		Teaching Hours /Week	Examination	e d

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		Code	Course Title	Theory	Practical/Seminar	Skill Development Activities (Hours are for Interaction between faculty and students)	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	P	SDA					
1	PCC	22SDS31	Business Intelligence and Analytics	03	00	02	03	50	50	100	4
2	PEC	22SDS32X	Professional Elective 3	03	00	00	03	50	50	100	3
3	OEC	22SDS33X	Professional Elective 4	03	00	00	03	50	50	100	3
4	PROJ	22SDS34	Project Work phase -1	00	06	00	--	100	--	100	3
5	SP	22SDS35	Societal Project	00	06	00	--	100	--	100	3
6	INT	22SDSI36	Internship	(06 weeks Internship Completed during the intervening vacation of II and III semesters.)			03	50	50	100	6
TOTAL				**09**	**12**	**03**	**12**	**400**	**200**	**600**	**22**

Note: PCC: Professional core Courses, PEC: Professional Elective Courses. PROJ-Project Work, INT-Internship, OEC Open Elective Courses, SP- Societal Project

Professional Elective 3		**Professional Elective 4**	
Course Code under 22SDS32X	**Course title**	**Course Code under 22SDS33X**	**Course title**
22SDS321	High Performance Computing	22SDS331	Natural Language Processing and Text Mining

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22SDS322	Cyber Security and Cyber Law	22SDS332	Software Project Planning & Management
22SDS323	Cloud Computing for Data Analysis	22SDS333	Financial Data Analytics
22SDS324	Blockchain Technology	22SDS334	Predictive Analysis
22SDS325	Spatial Data Analysis	22SDS335	Semantic Web and Social Network

Note:

1. Project Work Phase-1: The project work shall be carried out individually. However, in case a disciplinary or interdisciplinary project requires more participants, then a group consisting of not more than three shall be permitted.

Students in consultation with the guide/co-guide (if any) in disciplinary project or guides/co-guides (if any) of all departments in case of multidisciplinary projects, shall pursue a literature survey and complete the preliminary requirements of the selected Project work. Each student shall prepare a relevant introductory project document, and present a seminar.

CIE marks shall be awarded by a committee comprising of HoD as Chairman, all Guide/s and co-guide/s (if any) and a senior faculty of the concerned departments. The CIE marks awarded for project work phase -1, shall be based on the evaluation of Project Report, Project Presentation skill, and performance in the Question and Answer session in the ratio of 50:25:25.

2. Societal Project: Students in consultation with the internal guide as well as with external guide (much preferable) shall involve in applying technology toworkout/proposing viable solutions for societal problems.

CIE marks shall be awarded by a committee comprising of HoD as Chairman, Guide/co-guide if any, and a senior faculty of the department. The CIE marks awarded, shall be based on the evaluation of Project Report, Project Presentation skill, and performance in the Question and Answer session in the ratio of 50:25:25.

Those, who have not pursued /completed the Societal Project, shall be declared as fail in the course and have to complete the same during subsequent semester/s after satisfying the Societal Project requirements. There is no SEE (University examination) for this course.

3. Internship: Those, who have not pursued /completed the internship, shall be declared as fail in the internship course and have to complete the same during subsequent University examinations after satisfying the internship requirements. Internship SEE (University examination) shall be as per the University norms.

CIE marks shall be awarded by a committee comprising of HoD as Chairman, Guide/co-guide if any, and a senior faculty of the department. The CIE marks awarded for project work phase -1, shall be based on the evaluation of Project Report, Project

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Presentation skill, and performance in the Question and Answer session in the ratio of 50:25:25.

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IV SEMESTER

Sl. No	Course	Course Code	Course Title	Teaching Hours /Week		Examination				Credits
				Theory	Practical/ Field work	Duration in hours	CIE Marks	SEE Marks Viva voce	Total Marks	
				L	P					
1	Project	22SDS41	Project work phase -2	--	08	03	100	100	200	18
			TOTAL	**--**	**08**	**03**	**100**	**100**	**200**	**18**

Note:

1. Project Work Phase-2:

Students in consultation with the guide/co-guide (if any) in disciplinary project or guides/co-guides (if any) of all departments in case of multidisciplinary projects, shall continue to work of Project Work phase -1to complete the Project work. Each student / batch of students shall prepare project document, and present a seminar.

CIE marks shall be awarded by a committee comprising of HoD as Chairman, all Guide/s and co-guide/s (if any) and a senior faculty of the concerned departments. The CIE marks awarded for project work phase -1, shall be based on the evaluation of Project Report, Project Presentation skill, and performance in the Question and Answer session in the ratio of 50:25:25.

SEE shall be at the end of IV semester. Project work evaluation and Viva-Voce examination (SEE), after satisfying the plagiarism

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check, shall be as per the University norms.

Total Credits 22+18+22+18 =**80**

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