

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI



THREE YEAR UNDERGRADUATE PROGRAMME

B.Sc. Computer Science (112)/Information Technology (123)/Computer Application (Regular) (109)/ Computer Application (Vocational) (110)/Data Analytics (134)/Data Science and Analytics (135)/ Web Designing and Development (138)

Semester - I and II

FACULTY: SCIENCE AND TECHNOLOGY

(Courses effective from Academic Year 2026-27) Under NEP 2020

SYLLABUS

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Sant Gadge Baba Amravati University, Amravati
Faculty of Science and Technology (Science Group)
Board of Studies in Computer Science
(including Computer Application, Information Technology etc.)

Sr. No.	Name	Designation	Address
01	Dr. Swati Sherekar	Chairman	PGTD in Computer Science and Engineering, SGBAU, Amravati
02	Dr. Dineshkumar N. Satange	Member (Faculty Member)	Smt. Narsamma Arts, Commerce and Science College, Kiran Nagar, Amravati. 444606
03	Dr. Mohd. Atique Mohd. Junaid	Member	HoD, PGTD in Computer Science and Engineering, SGBAU, Amravati
04	Dr. Avinash Baburao Kadam	Member	Shri Shivaji Science and Arts College, Chikhali Dist. Buldana
05	Dr. Ajay Purushottam Chendke	Member	Degree College of Physical Education (HVPM), Amravati
06	Dr. Chandrashekhar H. Sawarkar	Member	Smt. Narsamma Arts, Commerce and Science College, Kiran Nagar, Amravati. 444606
07	Dr. Arvind A. Tayade	Member	G.S. Science Arts and Commerce College, Khamgaon Dist. Buldana
08	Prof. Sudeshkumar Chaudhari	Member	RDIK, Mahavidyalaya, Badnera Rly. Amravati.
09	Dr. Narendra M. Jathe	Member	Smt. Narsamma Arts, Commerce and Science College, Kiran Nagar, Amravati. 444606
10	Dr. Homraj Patelpaik	Member	Lokmanya Tilak Mahavidyalaya Wani, Dist. Yavatmal
11	Prof. Sureshkumar Mapari	Member	R. A. College, Washim.

Examination, Evaluation and Assessment

Notes:

- a. The strength of the batch of the Practical for UG Classes shall be 16 with an addition of 10% with the permission of Hon'ble Vice Chancellor. The number of the students required to constitute a batch or calculate the workload shall be in accordance with the relevant Government Resolution in force at the time, applicable to specific time, region, course type, mode of instruction, and other pertinent factors.
- b. 1 Credit shall mean 1 Hour Teaching per Week per Semester (Total 15 Hrs/ Semester), the duration of 1 Teaching Period will be 60 Minutes. For Practical 1 Credit shall mean 2 Hour Teaching per Week per Semester (Total 30 Hrs/ Semester).
- c. For Examination and Evaluation of Theory Courses, 40 % Marks shall be assigned to Internal Examination and 60% Marks shall be assigned to end-semester external university examination.
- d. **Co-curricular Courses:** Health and wellness, Yoga Education, Sports and Fitness, Cultural Activities, NSS/NCC, Fine/Applied/Visual/Performing Arts During Semester I, II, III, IV, V and VI. These courses may be taught by Physical Education Director or may be assigned to Language Teacher by the Principal of HEI based on the expertise of the concerned.
- e. **Value Education Courses** to be selected from the Basket of Courses provided by the University. These courses may be assigned to the Language Teacher by the Principal of HEI based on the expertise of the concerned.
- f. **Generic / Open Elective Courses (GE/OE):** Courses to be selected from the Basket of Courses provided by the University
- g. **Abbreviations:** Department Specific Core: DSC, Department Specific Elective: DSE, FSC: Faculty Specific Core, FSE: Faculty Specific Elective, Indian Knowledge System: IKS, Inter Faculty Specific Core: IFSC, Inter Faculty Specific Elective: IFSE, Theory: Th, Practical/Practicum: Pr, Environment Studies: ES, Pre-requisite Course mandatory if applicable: Prq, Laboratory: Lab (Practical), Generic/ Open Electives: OE; Vocational Skill and Skill Enhancement Courses: VSEC; Vocational Skill Courses: VSC; Skill Enhancement Courses: SEC; Ability Enhancement Courses: AEC; Value Education Courses: VEC; OJT: On Job Training: Internship/ Apprenticeship; Field projects: FP; Community Engagement and Service: CES; Co-curricular Courses: CC; RM: Research Methodology; Research Project: RP; MIL: Modern Indian Language
- h.

Examination and Assessment Process:

- The basic principle of the Credit framework is that Credits are a function of the successful completion of a program of study/ vocational education/ training and assessment. No Credit can be earned by the student unless the student is assessed for the achievement of the desired competencies and outcome of a program.
- Exit options are provided with Certificate, Diploma and Basic Bachelor's degrees to the students at the end of the second, fourth and sixth semesters of a Four Years Multidisciplinary Degree Programme. Students will receive a Bachelor's degree with Honors/ Research on successfully completing of all eight semesters of the UG Program either at a stretch or with opted exits and re-entries.
- For the smooth success of four-year degree programme with multiple entry and exit systems, the examination mode should be based on the combination of innovative trends in formative (informal and formal tests administered during the learning process) and summative (evaluation of students learning at the end of an instructional unit) examination modes in line with the UGC Report on 'Evaluation Reforms in Higher Educational Institutions (2019).

Examination, Evaluation and Assessment Scheme

The total marks for each Course shall be based on Continuous Assessment and Semester End Examination.

Each theory course of Major, Minor, GE/OE, AEC, IKS, VEC as mentioned in **Teaching Learning Scheme** prepared by the Board of Studies shall be evaluated as per the scheme as mentioned in the following table -

Examination, Evaluation and Assessment Scheme

Vertical No.	The Vertical	Mode of Examination, Evaluation & Assessment	Theory				Theory (Total)		Practical				Practical (Total)	
			External		Internal				External		Internal		Max. Marks	Min. Marks
			Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks				
a	Major	External & Internal	30	9	20	6	50	20	25	10	25	10	50	20
b	Minor		30	9	20	6	50	20	25	10	25	10	50	20
c	Generic/ Open Elective		30	9	20	6	50	20	--	--	--	--	--	--
d	VSC	Internal	--	--	--	--	--	--	--	--	50	20	50	20
	SEC	Internal	--	--	--	--	--	--	--	--	50	20	50	20
e	AEC (Eng. & One MIL Composite)	External & Internal	30	9	20	6	50	20	--	--	--	--	--	--
	IKS (Generic)	External & Internal	30	9	20	6	50	20	--	--	--	--	--	--
	VEC	External & Internal	30	9	20	6	50	20	--	--	--	--	--	--
f	FP/CEP	Internal	--	--	--	--	--	--	--	--	50	20	50	20
	Internship/ Apprenticeship		Assessment of these verticals shall be based on various activities/practices. It shall be evaluated by giving maximum marks of 50 per 2 Credit Course with separate activity weightages/levels. A detailed SOP for this assessment process is prescribed for Phase I and Phase II											
	CC													

Continuous Assessment Tests (CAT)

For internal assessment, the Continuous Assessment Tests (CAT) shall be conducted as under-

- i. Three CAT each of 8 / 10 Marks (Theory) as applicable and 10 Marks (Practical).
 - First on completion of 25% Syllabus of the course or on completion of 25 teaching days,
 - Second on completion of 50% Syllabus of the course or on completion of 50 teaching days,
 - Third on completion of 75% Syllabus of the course or on completion of 75 teaching days.
- ii. Each concurrent assessment (CAT-I, II & III) will be mapped to relevant Course Learning Outcome.
- iii. Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations
- iv. Internal assessment shall be carried out by the respective course teacher by choosing variety of assessment tools/methods such as class test, record book, seminar, case study, field work, mini project work, quiz or any innovative method, which may be deemed to be appropriate for assessing the relevant course outcome.

Conduction of the Examination:

As per the scheme of teaching, learning, examination and evaluation, theory/practical examinations of Semester-I, II, III, IV, V, VI, VII and VIII shall be conducted by the University (except for Internal Examinations as applicable) at the end of each semester.

The theory/practical examinations of all the Semesters shall be held as per the following Schedule –

Sr. No.	Name of the Examination	End Sem Examination	Supplementary Examination*
1	Semester-I, III, V and VII	Winter	Summer
2	Semester-II, IV, VI and VIII	Summer	Winter

* The University may evolve mechanism for conducting repeat end semester examination. Such repeat examinations shall have to be conducted within one month of the regular even semester examination and on demand examination.

1. The practical examination of all semesters shall be conducted by the University at the end of each semester. The HEI shall conduct the Practical examination of odd semesters as per the schedule announced by the University. However, the appointment of the External and Internal Examiners shall be done by the Head or Principal of respective HEI to conduct external examination of the odd semester and the same should be communicated to the University before commencement of the practical examination. The University shall conduct the external practical examination of all even semester by appointing external and internal examiners.
2. The examinations specified above shall be held twice in a year at such places and on such dates as may be prescribed by the University.
3. An applicant to an examination specified above, shall pursue a regular course of study in courses prescribed for the examination concerned for not less than one semester in a particular semester in a College/Institute/University department.
4. Provided that the student shall be eligible to appear for examination if -
 - a. He/she complies with the provisions of the Ordinance pertaining to the Examination in general from time to time.
 - b. He/she has prosecuted a regular course of study in a university department/college affiliated to the University.
 - c. He/she has in the opinion of the Principal shown satisfactory progress in his/her studies.
5. The provisions of Ordinance No. 6 and Ordinance No. 9 shall be mutatis-mutandis applicable to every collegiate/non-collegiate student.
6. The fees for each theory examination and practical examination conducted by the university shall be as prescribed by the University, from time to time.

SEMESTER – I

Computer Application (General) (109) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Pract	
					External		Internal		(Total)	
					Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks
Major-T1	109201	Fundamentals of Computer	2	2	30	9	20	6	50	20
Major-P1	109202	Laboratory on Office Automation Tools	2	4	25	10	25	10	50	20
Minor-T	--	--	2	2	30	9	20	6	50	20
Minor-P	--	--	2	4	25	10	25	10	50	20
GOEC-T1	109271	Information Communication Technology	2	2	30	9	20	6	50	20
GOEC-T2	109272	Business Data Processing	2	2	30	9	20	6	50	20
SEC-P3	109281	Laboratory on Information Communication Technology Tools	2	4	-	-	50	20	50	20
AEC-English	--	--	1	1	15	-	-	-	-	-
AEC-MIL	--	--	1	1	15	-	-	-	-	-
IKS-Generic	--	--	2	2	30	9	20	6	50	20
VEC	--	--	2	2	30	9	20	6	50	20
CC	--	Separate SOP will be released	2	4	-	-	50	20	50	20
Total:			22	30						

Computer Application (Vocational) (110) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal		Max. Marks	Min. Marks
					Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major-T1	110201	Fundamentals of Computer	2	2	30	9	20	6	50	20
Major-P1	110202	Laboratory on Office Automation Tools	2	4	25	10	25	10	50	20
Minor-T	--	--	2	2	30	9	20	6	50	20
Minor-P	--	--	2	4	25	10	25	10	50	20
GOEC-T1	110271	Information Communication Technology	2	2	30	9	20	6	50	20
GOEC-T2	110272	Business Data Processing	2	2	30	9	20	6	50	20
SEC-P3	110281	Laboratory on Information Communication Technology Tools	2	4	-	-	50	20	50	20
AEC-English	--	--	1	1	15	-	-	-	-	-
AEC-MIL	--	--	1	1	15	-	-	-	-	-
IKS-Generic	--	--	2	2	30	9	20	6	50	20
VEC	--	--	2	2	30	9	20	6	50	20
CC	--	Separate SOP will be released	2	4	-	-	50	20	50	20
Total:			22	30						

Computer Science (112) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal		Max. Marks	Min. Marks
					Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major-T1	112201	Fundamentals of Computer	2	2	30	9	20	6	50	20
Major-P1	112202	Laboratory on Office Automation Tools	2	4	25	10	25	10	50	20
Minor-T	--	--	2	2	30	9	20	6	50	20
Minor-P	--	--	2	4	25	10	25	10	50	20
GOEC-T1	112271	Information Communication Technology	2	2	30	9	20	6	50	20
GOEC-T2	112272	Business Data Processing	2	2	30	9	20	6	50	20
SEC-P3	110281	Laboratory on Information Communication Technology Tools	2	4	-	-	50	20	50	20
AEC-English	--	--	1	1	15	-	-	-	-	-
AEC-MIL	--	--	1	1	15	-	-	-	-	-
IKS-Generic	--	--	2	2	30	9	20	6	50	20
VEC	--	--	2	2	30	9	20	6	50	20
CC	--	Separate SOP will be released	2	4	-	-	50	20	50	20
Total:			22	30						

Information Technology (123) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal		Max. Marks	Min. Marks
					Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major-T1	123201	Fundamentals of Computer	2	2	30	9	20	6	50	20
Major-P1	123202	Laboratory on Office Automation Tools	2	4	25	10	25	10	50	20
Minor-T	--	--	2	2	30	9	20	6	50	20
Minor-P	--	--	2	4	25	10	25	10	50	20
GOEC-T1	123271	Information Communication Technology	2	2	30	9	20	6	50	20
GOEC-T2	123272	Business Data Processing	2	2	30	9	20	6	50	20
SEC-P3	123281	Laboratory on Information Communication Technology Tools	2	4	-	-	50	20	50	20
AEC-English	--	--	1	1	15	-	-	-	-	-
AEC-MIL	--	--	1	1	15	-	-	-	-	-
IKS-Generic	--	--	2	2	30	9	20	6	50	20
VEC	--	--	2	2	30	9	20	6	50	20
CC	--	Separate SOP will be released	2	4	-	-	50	20	50	20
Total:			22	30						

Data Analytics (134) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal		Max. Marks	Min. Marks
					Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major-T1	134201	Fundamentals of Computer	2	2	30	9	20	6	50	20
Major-P1	134202	Laboratory on Office Automation Tools	2	4	25	10	25	10	50	20
Minor-T	--	--	2	2	30	9	20	6	50	20
Minor-P	--	--	2	4	25	10	25	10	50	20
GOEC-T1	134271	Information Communication Technology	2	2	30	9	20	6	50	20
GOEC-T2	134272	Business Data Processing	2	2	30	9	20	6	50	20
SEC-P3	134281	Laboratory on Information Communication Technology Tools	2	4	-	-	50	20	50	20
AEC-English	--	--	1	1	15	-	-	-	-	-
AEC-MIL	--	--	1	1	15	-	-	-	-	-
IKS-Generic	--	--	2	2	30	9	20	6	50	20
VEC	--	--	2	2	30	9	20	6	50	20
CC	--	Separate SOP will be released	2	4	-	-	50	20	50	20
Total:			22	30						

Data Science and Analytics (135) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal		Max. Marks	Min. Marks
					Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major-T1	135201	Fundamentals of Computer	2	2	30	9	20	6	50	20
Major-P1	135202	Laboratory on Office Automation Tools	2	4	25	10	25	10	50	20
Minor-T	--	--	2	2	30	9	20	6	50	20
Minor-P	--	--	2	4	25	10	25	10	50	20
GOEC-T1	135271	Information Communication Technology	2	2	30	9	20	6	50	20
GOEC-T2	135272	Business Data Processing	2	2	30	9	20	6	50	20
SEC-P3	135281	Laboratory on Information Communication Technology Tools	2	4	-	-	50	20	50	20
AEC-English	--	--	1	1	15	-	-	-	-	-
AEC-MIL	--	--	1	1	15	-	-	-	-	-
IKS-Generic	--	--	2	2	30	9	20	6	50	20
VEC	--	--	2	2	30	9	20	6	50	20
CC	--	Separate SOP will be released	2	4	-	-	50	20	50	20
Total:			22	30						

Web Designing and Development (138) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal		Max. Marks	Min. Marks
					Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major-T1	138201	Fundamentals of Computer	2	2	30	9	20	6	50	20
Major-P1	138202	Laboratory on Office Automation Tools	2	4	25	10	25	10	50	20
Minor-T	--	--	2	2	30	9	20	6	50	20
Minor-P	--	--	2	4	25	10	25	10	50	20
GOEC-T1	138271	Information Communication Technology	2	2	30	9	20	6	50	20
GOEC-T2	138272	Business Data Processing	2	2	30	9	20	6	50	20
SEC-P3	138281	Laboratory on Information Communication Technology Tools	2	4	-	-	50	20	50	20
AEC-English	--	--	1	1	15	-	-	-	-	-
AEC-MIL	--	--	1	1	15	-	-	-	-	-
IKS-Generic	--	--	2	2	30	9	20	6	50	20
VEC	--	--	2	2	30	9	20	6	50	20
CC	--	Separate SOP will be released	2	4	-	-	50	20	50	20
Total:			22	30						

SEMESTER – II

Computer Application (General) (109) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal			
					Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks
Major-T2	109203	Programming with C	2	2	30	9	20	6	50	20
Major-P4	109204	Laboratory on Programming with C	2	4	25	10	25	10	50	20
Minor-T	--	--	2	2	30	9	20	6	50	20
Minor-P	--	--	2	4	25	10	25	10	50	20
GOEC-T3	109273	E Business	2	2	30	9	20	6	50	20
GOEC-T4	109274	Website Design Principles	2	2	30	9	20	6	50	20
VSC-P6	109282	Laboratory on E-Commerce	2	4	-	-	50	20	50	20
SEC-P7	109283	Laboratory on Web Publishing	2	4	-	-	50	20	50	20
AEC-English	--	--	1	1	15	-	-	-	-	-
AEC-MIL	--	--	1	1	15	-	-	-	-	-
VEC	--	--	2	2	30	9	20	6	50	20
CC	--	Separate SOP will be released	2	4	-	-	50	20	50	20
Total:			22	32						

Computer Application (Vocational) (110) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal		Max. Marks	Min. Marks
					Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major-T2	110203	Programming with C	2	2	30	9	20	6	50	20
Major-P4	110204	Laboratory on Programming with C	2	4	25	10	25	10	50	20
Minor-T	--	--	2	2	30	9	20	6	50	20
Minor-P	--	--	2	4	25	10	25	10	50	20
GOEC-T3	110273	E Business	2	2	30	9	20	6	50	20
GOEC-T4	110274	Website Design Principles	2	2	30	9	20	6	50	20
VSC-P6	110282	Laboratory on E-Commerce	2	4	-	-	50	20	50	20
SEC-P7	110283	Laboratory on Web Publishing	2	4	-	-	50	20	50	20
AEC-English	--	--	1	1	15	-	-	-	-	-
AEC-MIL	--	--	1	1	15	-	-	-	-	-
VEC	--	--	2	2	30	9	20	6	50	20
CC	--	Separate SOP will be released	2	4	-	-	50	20	50	20
Total:			22	32						

Computer Science (112) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal		Max. Marks	Min. Marks
					Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major-T2	112203	Programming with C	2	2	30	9	20	6	50	20
Major-P4	112204	Laboratory on Programming with C	2	4	25	10	25	10	50	20
Minor-T	--	--	2	2	30	9	20	6	50	20
Minor-P	--	--	2	4	25	10	25	10	50	20
GOEC-T3	112273	E Business	2	2	30	9	20	6	50	20
GOEC-T4	112274	Website Design Principles	2	2	30	9	20	6	50	20
VSC-P6	112282	Laboratory on E-Commerce	2	4	-	-	50	20	50	20
SEC-P7	112283	Laboratory on Web Publishing	2	4	-	-	50	20	50	20
AEC-English	--	--	1	1	15	-	-	-	-	-
AEC-MIL	--	--	1	1	15	-	-	-	-	-
VEC	--	--	2	2	30	9	20	6	50	20
CC	--	Separate SOP will be released	2	4	-	-	50	20	50	20
Total:			22	32						

Information Technology (123) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal		Max. Marks	Min. Marks
					Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major-T2	123203	Programming with C	2	2	30	9	20	6	50	20
Major-P4	123204	Laboratory on Programming with C	2	4	25	10	25	10	50	20
Minor-T	--	--	2	2	30	9	20	6	50	20
Minor-P	--	--	2	4	25	10	25	10	50	20
GOEC-T3	123273	E Business	2	2	30	9	20	6	50	20
GOEC-T4	123274	Website Design Principles	2	2	30	9	20	6	50	20
VSC-P6	123282	Laboratory on E-Commerce	2	4	-	-	50	20	50	20
SEC-P7	123283	Laboratory on Web Publishing	2	4	-	-	50	20	50	20
AEC-English	--	--	1	1	15	-	-	-	-	-
AEC-MIL	--	--	1	1	15	-	-	-	-	-
VEC	--	--	2	2	30	9	20	6	50	20
CC	--	Separate SOP will be released	2	4	-	-	50	20	50	20
Total:			22	32						

Data Analytics (134) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal		Max. Marks	Min. Marks
					Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major-T2	134203	Programming with C	2	2	30	9	20	6	50	20
Major-P4	134204	Laboratory on Programming with C	2	4	25	10	25	10	50	20
Minor-T	--	--	2	2	30	9	20	6	50	20
Minor-P	--	--	2	4	25	10	25	10	50	20
GOEC-T3	134273	E Business	2	2	30	9	20	6	50	20
GOEC-T4	134274	Website Design Principles	2	2	30	9	20	6	50	20
VSC-P6	134282	Laboratory on E-Commerce	2	4	-	-	50	20	50	20
SEC-P7	134283	Laboratory on Web Publishing	2	4	-	-	50	20	50	20
AEC-English	--	--	1	1	15	-	-	-	-	-
AEC-MIL	--	--	1	1	15	-	-	-	-	-
VEC	--	--	2	2	30	9	20	6	50	20
CC	--	Separate SOP will be released	2	4	-	-	50	20	50	20
Total:			22	32						

Data Science and Analytics (135) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal		Max. Marks	Min. Marks
					Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major-T2	135203	Programming with C	2	2	30	9	20	6	50	20
Major-P4	135204	Laboratory on Programming with C	2	4	25	10	25	10	50	20
Minor-T	--	--	2	2	30	9	20	6	50	20
Minor-P	--	--	2	4	25	10	25	10	50	20
GOEC-T3	135273	E Business	2	2	30	9	20	6	50	20
GOEC-T4	135274	Website Design Principles	2	2	30	9	20	6	50	20
VSC-P6	135282	Laboratory on E-Commerce	2	4	-	-	50	20	50	20
SEC-P7	135283	Laboratory on Web Publishing	2	4	-	-	50	20	50	20
AEC-English	--	--	1	1	15	-	-	-	-	-
AEC-MIL	--	--	1	1	15	-	-	-	-	-
VEC	--	--	2	2	30	9	20	6	50	20
CC	--	Separate SOP will be released	2	4	-	-	50	20	50	20
Total:			22	32						

Web Designing and Development (138) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal		Max. Marks	Min. Marks
					Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major-T2	138203	Programming with C	2	2	30	9	20	6	50	20
Major-P4	138204	Laboratory on Programming with C	2	4	25	10	25	10	50	20
Minor-T	--	--	2	2	30	9	20	6	50	20
Minor-P	--	--	2	4	25	10	25	10	50	20
GOEC-T3	138273	E Business	2	2	30	9	20	6	50	20
GOEC-T4	138274	Website Design Principles	2	2	30	9	20	6	50	20
VSC-P6	138282	Laboratory on E-Commerce	2	4	-	-	50	20	50	20
SEC-P7	138283	Laboratory on Web Publishing	2	4	-	-	50	20	50	20
AEC-English	--	--	1	1	15	-	-	-	-	-
AEC-MIL	--	--	1	1	15	-	-	-	-	-
VEC	--	--	2	2	30	9	20	6	50	20
CC	--	Separate SOP will be released	2	4	-	-	50	20	50	20
Total:			22	32						

SYLLABUS

B.Sc.- I, SEMESTER – I

Computer Science (112)

Information Technology (123)

Computer Application (Regular) (109)

Computer Application (Vocational) (110)

Data Analytics (134)

Data Science and Analytics (135)

Web Designing and Development (138)

Sant Gadge Baba Amravati University, Amravati

FACULTY: Science and Technology

Teaching and Learning Scheme: for the Degree of Bachelor of Science with the Major: Computer Science (112)/Information Technology (123)/Computer Application (Regular) (109)/ Computer Application (Vocational) (110)/Data Analytics (134)/Data Science and Analytics (135)/ Web Designing and Development (138)

(Three Years- Six Semesters Bachelor's Degree Programme)

(Four Years- Eight Semesters Bachelor's Degree Programme (Honors)

(Four Years- Eight Semesters Bachelor's Degree Programme (Honors with Research)

Major/Minor Course: Fundamentals of Computer

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	I	109201/ 110201/ 112201/123201/ 134201/135201/ 138201	Fundamentals of Computer	2	30	2 Hrs	30

Course Objectives:	1. To provide the knowledge of basic of Computer Science 2. To understand importance of memory devices of computer 3. To understand importance of memory devices input output devices of computer 4. To understand the Operating System concepts						
Course Outcomes:	Students will be able to - 1. Define Computer, History of Computer, Uses of Computer and Generations of Computers. 2. Define memories of computers, its types and examples of primary and secondary memories. 3. Introduce about all input-output devices of computer systems. 4. Define operating system, its function and types of operating systems.						
Unit System	Contents				Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies

Unit I	Introduction to Computer, Uses of Computers, History of Computers, Characteristics, Generations of Computers, Block diagram of Computer.	8 Hrs	8 Marks	Use any pedagogical technique suitable for the topic
Unit II	Memories: Primary Memories: RAM, ROM, and its types, Cache Memory, Secondary Storage Devices: Hard Disk, SSD, Pen drives.	7 Hrs	7 Marks	
Unit III	I/O Devices: Input Devices- Keyboard, Mouse, Scanner, Output Devices- Touch Screen, Monitors: VDU, LCD & LED. Printers: Types of Printers, Impact and non-impact printers, Modem.	8 Hrs	8 Marks	
Unit IV	Operating System: Definition, Functions of Operating System, Types: Batch Mode, Multiprogramming, Timesharing, Online Real Time, Distributed O.S. Booting Process.	7 Hrs	7 Marks	
References:	Course Material/Learning Resources Text books: 1) Computer Fundamentals & Networking - P.K.Sinha 2) Fundamentals of Computer - B.Ram 3) Internet Book - Clstenes 4) Information Technology - Alexies & Mathews - Vijay Nikole Reference Books: 1) Fundamentals of Computer - V.Rajaraman 2) Computer Network-Andrew Tennanbaum Weblink to Equivalent MOOC on SWAYAM if relevant: • https://onlinecourses.swayam2.ac.in/cec19_cs06/preview • https://onlinecourses.swayam2.ac.in/nou20_cs03/preview • https://www.classcentral.com/course/swayam-computer-fundamentals-13950 • https://onlinecourses.nptel.ac.in/noc19_cs42/preview • https://onlinecourses.swayam2.ac.in/aic20_sp06/preview • https://onlinecourses.swayam2.ac.in/cec20_cs02/preview			

Assessment Rubric: Major/Minor- Internal for Theory Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. I, SEMESTER – I (NEP)			
Theory	Course Code: 109201/ 110201/ 112201/123201/ 134201/135201/ 138201	Course Title: Fundamentals of Computer	Max Marks: 20
Sr. No.	Assessment Criteria		Marks
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)		10
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)		5
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, CaseStudy, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)		5

Major/Minor Course: Laboratory on Office Automation Tools

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	I	109202/ 110202/ 112202/ 123202/ 134202/135202/ 138202	Laboratory on Office Automation Tools	2	60	4Hrs	50

Course Objectives:	1. Understand the concept of Office Automation Tools. 2. Know the importance of Office Automation. 3. Explain the functions of Office Suits. 4. Define the scope and benefits and limitations of MS-Office.			
Course Outcomes:	On completion of the following syllabus the students will be able to - 1. To design documentation using MS-Word. 2. To design Spread Sheets using MS-Excel. 3. To create the presentation using MS-PowerPoint.			
Contents		Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
	List of Practical: 1. Create a MS-Word document for your own Biodata. 2. Create MS-Word Document Using Cut, Copy, Paste, Find and Replace using Edit Option. 3. Create MS-Word Document for inserting Tables, Pictures, Cliparts, Shapes, Symbols and Word Arts using Insert Option. 4. Create MS-Word Document for Any Newspaper News using Column Option. 5. Create MS-Word Document for Bullets and Numbering Option. 6. Create MS-Word Document using all formatting options. 7. Create MS-Word Document using Change Case Option. 8. Create MS-Word Document for changing Fonts, Color, Size using Formatting Option. 9. Create MS-Word Document to Write and Send Letter using Mail-Merge Option. 10. Create MS-Word Document to prepare Marksheet using table Menu. 11. Create the Excel Spreadsheet for Preparing the Marksheet. 12. Create the Excel Spreadsheet for Preparing the Payment Sheet. 13. Create the Excel Spreadsheet for Preparing the Electric Bill.			Use any pedagogical technique suitable for the topic

	14. Create the Excel Spreadsheet for Preparing the Bar Chart on Marksheet. 15. Create the Excel Spreadsheet for Preparing the Column Chart on Payment Sheet. 16. Create the PowerPoint Presentation on your Seminar topic. 17. Create the PowerPoint Presentation using various designs. 18. Create the PowerPoint Presentation using various Layouts. 19. Create the PowerPoint Presentation using various Transition effects. 20. Create the PowerPoint Presentation using various Animation Effects. 21. Create the PowerPoint Presentation using various Audio and Video effects.			
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Assessment Rubric: External Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. I, SEMESTER – I (NEP)				
Practical	Course Code: 109202/ 110202/ 112202/123202/ 134202/135202/ 138202	Laboratory on Office Automation Tools	Max Marks: 25	Time: 4 Hrs.
Sr. No.	Exercise			Marks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout			10
2.	Submitted Record book (Preferably handwritten)			05
3.	External Viva Voce			10

Assessment Rubric: Internal Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. I, SEMESTER – I (NEP)			
Practical	Course Code: 109202/ 110202/ 112202/123202/ 134202/135202/ 138202	Laboratory on Office Automation Tools	Max Marks: 25
Sr. No.	Assessment Criteria		Marks
1.	Attendance/Regularity in practical's / Students' overall performance		05
2.	Record book Preparation (Preferably handwritten)		10
3.	Internal Viva Voce		10

GOEC Theory1: Information Communication Technology

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	I	109271/ 110271/ 112271/123271/ 134271/135271/ 138271	Information Communication Technology	2	30	2 Hrs	30

Course Outcomes:	Students will be able to - 1. Understand the literature of social networks and their properties. 2. Which network is suitable for whom. 3. Develop skills to use various social networking. 4. Learn some GOI digital initiatives in higher education. 5. Apply skills to use online forums, documents, spreadsheets, presentation for communication, collaboration and research. 6. Get acquainted with internet threats and security mechanisms.				
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies	
Unit I	Introduction to Networking: Introduction, Need of computer communication network, Communication protocol, Types of networks: LAN, MAN, WAN Topology: Ring, Bus, Star, Hybrid, Hierarchical& Mesh.	8 Hrs	8 Marks	Use any pedagogical technique suitable for the topic	
Unit II	Internet: History, Applications of Internet, Types of Internet Connection: wired and wireless. Internet Protocols: TCP/IP, FTP, HTTP, URL, e-mail address, WWW, Web browsers, Search Engines, Introduction to Social Networking: Twitter, LinkedIn, Facebook, Flickr, Skype, YouTube, WhatsApp.	7 Hrs	7 Marks		
Unit III	E-mail: Definition of E-mail, Advantages and disadvantages, User Ids, Login, Passwords, Email Addresses, Domain Names, Mailers, Message Components, message Composition, Mail Managements. G-Suits: Google Drive, Google Documents, Google Spread Sheets, Google Slides and Google Forms.	8 Hrs	8 Marks		
Unit IV	Internet Securities: -mail threats and secure E-mails, Viruses and Antivirus Software, Firewalls, Cryptography, Digital Signatures, Copyright issues.	7 Hrs	7 Marks		

References:	Course Material/Learning Resources Text books: 1) Computer Networks (Fourth Edition) - Andrew S. Tanenbaum (PHI) 2) Information Technology - Alexies & Mathews - Vijay Nikole Reference Books: 1) Fundamentals of the Internet and World Wide Web, 2/e – Raymond Greenlaw and Ellen Hepp, TMH publication. 2) Internet Technology and Web Designs, ISRD group, TMH Publication. 3) Information Technology- The breaking wave, Dennis P. Curtin, Kim Foley, Kunai Sen and Cathleen Mortin, TMH Publication. 4) Computer Network & Internet - Douglas E. Comer (Pearson)			

Assessment Rubric: Internal for GOEC-1- Information Communication Technology

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. I, SEMESTER – I (NEP)			
Theory	Course Code: 109271/ 110271/ 112271/123271/ 134271/135271/ 138271	Information Communication Technology	Max Marks: 20
Sr. No.	Assessment Criteria	Marks	
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)	10	
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)	5	
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, CaseStudy, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)	5	

GOEC Theory2: Business Data Processing

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	I	109272/ 110272/ 112272/123272/ 134272/135272/ 138272	Business Data Processing	2	30	2 Hrs	30

Course Objectives:	1. Student should understand the Data in Business. 2. Student should process the data in Business. 3. Student should present the data in Business in various forms. 4.			
Course Outcomes:	On competition of the following syllabus the students will be able to - 1. Understand the concepts of Data Processing. 2. Student should process the data in Business. 3. Understand type of files required for Data Processing. 4. Interpret data in Business. 5. Able to present data in graphical forms.			
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	Online Processing, Batch Processing, Real-time Processing, Time-Sharing, Multiprogramming Systems, Multiprocessing Systems, Distributed Data Processing	8 Hrs	8 Marks	Use any pedagogical technique suitable for the topic
Unit II	Master File, Transaction File, Intermediate files, Back up files, etc	7 Hrs	7 Marks	
Unit III	Word processing: application of word processing, menus and tool bars, word processor: creating, entering, saving and printing the document, editing and formatting text, mail merge and macros	8 Hrs	8 Marks	
Unit IV	Spreadsheet: application, menus and tool bar, preparing tables, charts, sorting, etc., running statistical applications in Excel and Libra Office Calc, creating formulae in spreadsheets.	7 Hrs	7 Marks	
References:	Text books: 1. V. K. Kapoor, Introduction to Computer Data Processing & System Analysis, Sultan Chand & Sons. 2. Joyce Cox & Joan Lambert, Microsoft Access 2010 Step by Step, Microsoft Press. Reference Books: 1. Foster Provost & Tom Fawcett, Data Science for Business; O'Reilly Media Publishing House			

	2. Bhadka Harsad and Sharma Priyanka, Business Data Processing, LAP Lambert Academic Publishers. 3. S.S. Shrivastava, MS Office, Laxmi Publications. Weblink to Equivalent MOOC on SWAYAM if relevant: Weblink to Equivalent Virtual Lab if relevant:-Nil Any pertinent media (recorded lectures, YouTube, etc.) if relevant: • https://www.youtube.com/watch?v=uvVsyCR4-7c • https://www.youtube.com/watch?v=b3GjKrArLkw
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Assessment Rubric: Internal for GOEC-2- Information Communication Technology

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. I, SEMESTER – I (NEP)			
Theory	Course Code: 109272/ 110272/ 112272/123272/ 134272/135272/ 138272	Business Data Processing	Max Marks: 20
Sr. No.	Assessment Criteria	Marks	
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)	10	
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)	5	
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, CaseStudy, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)	5	

SEC: Laboratory on Information Communication Technology Tools

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	I	109281/ 110281/ 112281/123281/ 134281/135281/ 138281	Laboratory on Information Communication Technology Tools	2	60	4 Hrs	50

Course Objectives:	1. Effectively use ICT tools, software applications and digital resources. 2. Acquire, organize and create his/her own digital resources. 3. Participate in the evaluation and selection of ICT resources. 4. Practice safe, ethical and legal ways of using ICT.						
Course Outcomes:	On completion of the following syllabus the students will be able to - 1. Understand importance and need of incorporating modern ICT tools in education. 2. Use applications of Google for academics, carry out Scholarly writing using ICT tools. 3. Integrate ICT into teaching-learning and its evaluation. 4. Use ICT for making classroom processes more inclusive and to address multiple learning abilities.						
Contents					Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
	List of Practical: 1. Create a Google form using short and long answers. 2. Create a Google form using Multiple Choice and Checkboxes answer. 3. Create a Google form using Drop-down menu answer. 4. Create a quiz using Google form with different kinds of questions. 5. Create a Survey using Google form to collect data about students learning experiences. 6. Create Google Forms to create permission slips for field trips and email them directly to parents.						Use any pedagogical technique suitable for the topic

	7. Create Google Forms to create polls to gather data about student opinions on a variety of topics. 8. Create Google Forms to gather feedback from students on specific lessons and topics, teaching styles, curriculum, and more. 9. Create and edit documents using Google Docs. 10. Create a bulleted list, Customize a bulleted list using Google Docs. 11. Create a numbered list, Change the line and paragraph spacing, Change the text alignment and change the indentation using Google Docs. 12. Create a document using Google docs to insert an image, insert a table, insert a chart, insert page numbers, insert headers and footers, insert a comment and customize your page layout. 13. Create home inventory sheet using Google Sheet. 14. Create health exercise chart using Google Sheet. 15. Create monthly budget using Google Sheet. 16. Create a salary sheet of employees of colleges using Google Sheet. 17. Create a document in Marathi language using Google Translate. 18. Convert the English document into Marathi, Hindi, and Tamil language using Google Translate. 19. Create presentation using Google Slides. 20. Create presentation on Google Forms using Google Slides. 21. Create Class on Google Classroom. 22. Upload the material, links and videos of subject in different topics. 23. Create own website using Google Site. 24. Create college website using Google Site. 25. Create account on YouTube. 26. Create your own channel on YouTube and upload your videos. 27. Create an account on Google Drive and upload your files on it. 28. Upload folder on Google Drive and share the links to your friends. 29. Create your account on Twitter 30. Tweets short post, videos, photos and links to followers. 31. Create account on Instagram. 32. Check out friends and families on Instagram 33. Upload photos, videos and share them with their followers. 34. Create account on LinkedIn. 35. Upload your profile on LinkedIn for business or service.			
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References:	Weblink to Equivalent MOOC on SWAYAM if relevant: https://www.google.com https://mail.google.com https://docs.google.com https://sites.google.com https://forms.google.com https://drive.google.com https://twitter.com/ https://www.youtube.com https://www.instagram.com/ https://in.linkedin.com/ https://en.wikipedia.org/wiki/Google_Docs https://www.youtube.com/user/youtube https://www.google.com/sheets/about/ https://support.google.com/docs/answer/6000292?hl=en&co=GENIE.Platform%3DAndroid https://support.google.com/a/users/answer/9303071?hl=en#create_form https://support.google.com/a/users/answer/9310491?hl=en#sites_create_name https://support.google.com/drive/answer/2424384?hl=en&co=GENIE.Platform%3DAndroid
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Assessment Rubric: Internal Examination Practical Course (SEC)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. I, SEMESTER – I (NEP)			
Practical	Course Code: 109281/ 110281/ 112281/123281/ 134281/135281/ 138281	Laboratory on Information Communication Technology Tools	Max Marks: 50
Sr. No.	Assessment Criteria		Marks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout		20
2.	Record book preparation (Preferably handwritten) / Assignments preparation during semester		10
3.	Attendance in practical session / Students' overall performance		10
4.	Internal Viva Voce		10

SYLLABUS

B.Sc.- I, SEMESTER – II

Computer Science (112)

Information Technology (123)

Computer Application (Regular) (109)

Computer Application (Vocational) (110)

Data Analytics (134)

Data Science and Analytics (135)

Web Designing and Development (138)

Sant Gadge Baba Amravati University, Amravati

FACULTY: Science and Technology

Teaching and Learning Scheme: for the Degree of Bachelor of Science with the Major: Computer Science (112)/Information Technology (123)/Computer Application (Regular) (109)/ Computer Application (Vocational) (110)/Data Analytics (134)/Data Science and Analytics (135)/ Web Designing and Development (138)

**(Three Years- Six Semesters Bachelor's Degree Programme)
(Four Years- Eight Semesters Bachelor's Degree Programme (Honors)
(Four Years- Eight Semesters Bachelor's Degree Programme (Honors with Research)**

Major/Minor Course: Programming with C

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	II	109203/ 110203/ 112203/123203/ 134203/135203/ 138203	Programming with C	2	30	2 Hrs.	30

Course Objectives:	1.To provide students with understanding of code organization and functional hierarchical decomposition with using data types. 2. Programming is about writing the instructions which a computer follows to enable it to store knowledge, process knowledge, and communicate knowledge with the outside world.						
Course Outcomes:	On completion of the following syllabus the students will be able to - 1. Understand the Programming concepts. 2. Understand development of C language. 3. Write Algorithms for the task/problem. 4. Able to design flowcharts of the problem. 5. Able to write Simple C Programs.						
Unit System	Contents				Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies

Unit I	Algorithm, flowcharting, Types of programming languages. History of C language, Advantages, Structure of C program, Character set, Identifiers, Keywords, Constants and Variables, Symbolic constants, Qualifiers, Type conversion. Operators and Expressions	8 Hrs.	8 Marks	Use any pedagogical technique suitable for the topic
Unit II	Formatted I/O: scanf(), printf(), Unformatted I/O : getch(), getchar(), gets(), putchar(), puts(). Control structures: Branching: if, if-else, Conditional operator(? :), nested if, switch. Looping: while, do-while, for statements, comma operator, goto, break, continue, nested loops	7 Hrs.	7 Marks	
Unit III	Arrays - Declaration and initialization of one and two dimensional array. Structure - Definition, declaration, initialization, array of structure, nested structure, union. Pointers - Declaration, initialization, pointers arithmetic	8 Hrs.	8 Marks	
Unit IV	Functions in C: Definition of function, function prototype, categories of function, actual argument, formal argument, function calling: call by value, call by reference, function parameters, local and global variable, functions with array, function recursion. String functions - String functions: strlen(), strcpy(), strcmp() &strcat()	7 Hrs.	7 Marks	
References:	Text books: 1. Programming in C: E Balagurusamy: TMH Publication. Reference Books: 1) ANSI C- Dennis Ritchie 2) Programming in C - V. Rajaraman 3) Programming with C: Venugopal K.R. TMH, Publication. 4) Programming with C: Byson Gottfried , Schaum Series Publication. Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://onlinecourses.swayam2.ac.in/cec19_cs06/preview 2. https://onlinecourses.swayam2.ac.in/nou20_cs03/preview 3. https://www.classcentral.com/course/swayam-computer-fundamentals-13950 4. https://onlinecourses.nptel.ac.in/noc19_cs42/preview 5. https://onlinecourses.swayam2.ac.in/aic20_sp06/preview 6. https://onlinecourses.swayam2.ac.in/cec20_cs02/preview 7. https://www.classcentral.com/course/swayam-introduction-to-programming-in-c-2486 8. https://swayamprabha.gov.in/asset/new_team/images/course_files/R12-Introduction%20to%20Programming%20in%20C%20.pdf Weblink to Equivalent Virtual Lab if relevant: 1. https://www.programiz.com/c-programming/online-compiler/			

	2. https://www.onlinegdb.com/online_c_compiler 3. https://www.tutorialspoint.com/compile_c_online.php Any pertinent media (recorded lectures, YouTube, etc.) if relevant: 1. https://www.youtube.com/watch?v=eEo_aacpwCw 2. https://www.youtube.com/watch?v=OGM2BJ29Syg 3. https://www.youtube.com/playlist?list=PLWPirh4EWFpF_2T13UeEgZWZHc8nHBuXp
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Assessment Rubric: Major/Minor- Internal for Theory Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. I, SEMESTER – II (NEP)			
Theory	Course Code: 109203/ 110203/ 112203/123203/ 134203/135203/ 138203	Course Title: Programming with C	Max Marks: 20
Sr. No.	Assessment Criteria	Marks	
1	Any Two of the Activity(weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)	10	
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)	5	
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, CaseStudy, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)	5	

Major/Minor Course: Laboratory on Programming with C

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	II	109204/ 110204/ 112203/123204/ 134204/135204/ 138204	Laboratory on Programming with C	2	60	4Hrs.	50

Course Objectives:	1. Understand the concept of C programming 2. Know the importance of Looping Statement. 3. To implement decision making structure 4. To develop proficiency in Functions						
Course Outcomes:	On completion of the following syllabus the students will be able to - 1. To design simple C Program. 2. To design program for implementing looping structure. 3. Ability to use function. 4. Skill in structuring code with function.						
Contents					Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
1. Write a program in 'C' to demonstrate Arithmetic Operations. 2. Write a program in 'C' to demonstrate If -Else Statement. 3. Write a program in 'C' to demonstrate Nested If Statement. 4. Write a program in C to demonstrate Switch-case Statement. 5. Write a program in 'C' to demonstrate For Loop Statement. 6. Write a program in 'C' to demonstrate While Loop Statement. 7. Write a program in 'C' demonstrate Do-While Loop Statement. 8. Write a program in 'C' demonstrate Nested Loop. 9. Write a program in 'C' demonstrate One-Dimensional Array. 10. Write a program in 'C' demonstrate Two-Dimensional Array. 11. Write a program in 'C' demonstrate String Functions. 12. Write a program in 'C' demonstrate Structure. 13. Write a program in 'C' demonstrate Pointers. 14. Write a program in 'C' demonstrate Function. 15. Write a program in 'C' demonstrate Function Recursion.							Use any pedagogical technique suitable for the topic

Assessment Rubric: External Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. I, SEMESTER – II (NEP)				
Practical	Course Code: 109204/ 110204/ 112203/123204/ 134204/135204/ 138204	Laboratory on Programming with C	Max Marks: 25	Time: 4 Hrs.
Sr. No.	Exercise			MaxMarks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout			10
2.	Submitted Record book (Preferably handwritten)			05
3.	External Viva Voce			10

Assessment Rubric: Internal Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. I, SEMESTER – II (NEP)			
Practical	Course Code: 109204/ 110204/ 112203/123204/ 134204/135204/ 138204	Laboratory on Programming with C	Max Marks: 25
Sr. No.	Assessment Criteria		Marks
1.	Attendance/Regularity in practical's / Students' overall performance		05
2.	Record book Preparation (Preferably handwritten)		10
3.	Internal Viva Voce		10

GOEC Theory3: E-Business

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	II	109273/ 110273/ 112273/123273/ 134273/135273/ 138273	E-Business	2	30	2 Hrs.	30

Course Objectives:	1. To understand how C++ improves C with object-oriented features 2. Describe the procedural and object-oriented paradigm with concepts of streams, classes, functions, data and objects. 3. To learn the syntax and semantics of the C++ programming language. 4. To learn how to design C++ classes for code reuse. 5. Perform programming on functions, inline functions, constructor and destructor. 6. Perform programming on the concept of function overloading, operator overloading, virtual functions and polymorphism.					
Course Outcomes:	On completion of the following syllabus the students will be able to- 1. Define and identify the fundamental knowledge about object-oriented programming. 2. Declare and describe the concepts of abstraction, encapsulation, inheritance and polymorphism. 3. Implement Object Oriented Programming Concepts in C++. 4. To be able to develop applications in C++. 5. Demonstrate employability skills through the development of programming projects.					
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	In corporation of Pedagogies		
Unit I	Introduction to E-Commerce: Introduction, E-Commerce – Definition, History of Ecommerce, Online Extension of a BAM Model, Transition to E-Commerce in India, E-Commerce v/s Traditional Commerce, E - Commerce v/s E - Business. Electronic Commerce – Cutting Edge Technologies, Strengths, Weakness, Opportunities and Challenges of E-Commerce, Components of E-Business	8 Hrs.	8 Marks	Use any pedagogical technique suitable for the topic		
Unit II	E-Commerce Business models – B2C, B2B, C2B, C2C, B2G, C2G., Brokerage, Advertising, Infomediary, Merchant, Manufacturer (Direct), Affiliate, Community, Subscription, Utility. Ecommerce Business Revenue Models & Types, Impact of E-Commerce on business, Successful Business Models in India.	7 Hrs.	7 Marks			
Unit III	EDI: Electronic Data Interchange (EDI): Meaning & Definition, History & Evolution, Uses, EDI Standards, EDI Working Concept, Implementation difficulties of EDI, Financial EDI, EDI and	8 Hrs.	8 Marks			

	Internet, EDI services			
Unit IV	Hardware and Software for E Business: Web Servers – Browsers – Server Software– Web Authoring Tools Database System - World Wide Web – Domain Name – Hardware requirements, Brief on Shopping Cart, Point of Sale, Wireless Payment Device,	7 Hrs.	7 Marks	

References:	▪ Kalakota Ravi and A. B. Whinston : Frontiers of Electronic Commerce, Addison Wesley ▪ Raydu – E Commerce, HPH ▪ Agarwala K. N. and DeekshaArarwala : Business on the Net – Bridge to the online store front, Macmillan, New Delhi. ▪ Agarwala K.N and Deeksha Ararwala: Business on the Net – Whats and Hows of E-Commerce.
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Assessment Rubric: GOEC Theory-3 - Internal for Theory Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. I, SEMESTER – II (NEP)			
Theory	Course Code: 109273/ 110273/ 112273/123273/ 134273/135273/ 138273	Course Title: E-Business	Max Marks: 20
Sr. No.	Assessment Criteria	Marks	
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)	10	
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)	5	
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, CaseStudy, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)	5	

GOEC Theory4: Website Design Principles

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	II	109274/ 110274/ 112274/123274/ 134274/135274/ 138274	Website Design Principles	2	30	2 Hrs.	30

Course Objectives:	• To have an understanding of the introductory Internet and World Wide Web concepts. • To be able to configure text, color, and page layout with Cascading Style Sheets. • To have an understanding of configuring images & multimedia on web pages. • To have an understanding of some advanced technologies of web. • To develop the skill & knowledge of Web page design using HTML5.				
Course Outcomes:					
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	In corporation of Pedagogies	
Unit I	Internet: History, Application, World Wide Web, Web Standards, Basics in Web Design: Multitier Application Architecture, Client-Side Scripting versus Server-Side Scripting, World Wide Web Consortium (W3C). History of HTML, Introduction to HTML Tags and Attributes	8 Hrs.	8 Marks	Use any pedagogical technique suitable for the topic	
Unit II	HTML5: Features, Editing, First HTML5 Example, Headings, Linking, Images, Lists, Tables, HTML-Iframe. HTML-Form: <input><textarea><button><select><label>	7 Hrs.	7 Marks		
Unit III	CSS: Benefits of CSS, CSS Versions History, CSS Syntax, CSS Properties. Selectors: universal, type, id, class. Inline Styles Embedded Style Sheets, External Style Sheets.	8 Hrs.	8 Marks		
Unit IV	Introduction to scripting: Java Script basics, operators, data types, popup boxes. Control structures: if, If-else, Switch. Looping structures: for, do-while, while.	7 Hrs.	7 Marks		
References:	1. Paul Deitel, Harvey Deitel and Abbey Deitel, “Internet & World Wide Web: How to program”, Fifth Edition Pearson ISBN 978-0-13-215100-9 2. Thomas A. Powell, “HTML & CSS: The Complete Reference”, Fifth Edition, McGraw-Hill, ISBN: 978-0-07-174170-5				

	3. Kogent Learning Solutions Inc, HTML5 Black Book: Covers CSS3, Javascript, XML, Dreamtech Press, New Delhi, 2011 4. Jeffery C. Jackson, “Web Technologies”, A Computer Science Perspective, Pearson Education
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Assessment Rubric: GOEC Theory-4 - Internal for Theory Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. I, SEMESTER – II (NEP)			
Theory	Course Code: 109274/ 110274/ 112274/123274/ 134274/135274/ 138274	Course Title: Website Design Principles	Max Marks: 20
Sr. No.	Assessment Criteria		Marks
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)		10
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)		5
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, CaseStudy, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)		5

VSC: Laboratory on E-Commerce

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	II	109282/ 110282/ 112282/123282/ 134282/135282/ 138282	Laboratory on E-Commerce	2	60	4Hrs.	50

Course Objectives:	1. To provide students with understanding of E-Commerce. 2. Importance of E-Commerce in the current business. 3. How to process E-Commerce and communicate knowledge with the outside world.			
Course Outcomes:	On completion of the following syllabus the students will be able to - 1. Understand the complexity of e-Commerce and its many facts. 2. Explore how e-business and e-commerce fit together. 3. Apply the Knowledge to perform E-Commerce transactions. 4. Identify the impact of e-commerce. 5. Recognize the benefits and limitations of e-commerce			
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
	List of Practical: 1. Visit E-Commerce Website 2. B2B e commerce. Give an example for this. 3. Define B2C e commerce. Give an example for this. 4. Define C2B e commerce. Give an example for this. 5. Define C2C e commerce. Give an example for this. 6. Give any 2 applications of e commerce. 7. Perform digital marketing, Edit Basket of purchase. 8. Visit the e-Commerce site register yourself as client. 9. Visit the e-Commerce site register yourself as client and change the address of client. 10. Illustrate the B2B, B2C with example.			Use any pedagogical technique suitable for the topic

References:	Weblink to Equivalent MOOC on SWAYAM if relevant: • https://www.bigcommerce.com/articles/ecommerce/best-ecommerce-website-design/ • https://www.coursera.org/learn/ecommerce-academy • https://www.coursera.org/learn/foundations-of-digital-marketing-and-e-commerce.
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Assessment Rubric: Internal Examination Practical Course |(VSC)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. I, SEMESTER – II (NEP)			
Practical	Course Code: 109282/ 110282/ 112282/123282/ 134282/135282/ 138282	Laboratory on E-Commerce	Max Marks: 50
Sr. No.	Assessment Criteria		Marks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout		20
2.	Record book preparation (Preferably handwritten) / Assignments preparation during semester		10
3.	Attendance in practical session / Students' overall performance		10
4.	Internal Viva Voce		10

SEC: Laboratory on Web Publishing

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	II	109283/ 110283/ 112283/123283/ 134283/135283/ 138283	Laboratory on Web Publishing	2	60	4Hrs.	50

Course Objectives:	1. Understand the concept of Webpage/site 2. Know the importance of web publishing. 3. Explain the functions of web publishing. 4. Define the scope and benefits and limitations of web publishing.						
Course Outcomes:	On completion of the following syllabus the students will be able to - 1. To design simple web page. 2. To design web page with login id. 3. To create web page/site. 4. To publish the website.						
Contents				Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies	
	List of Practical: 1. Create a web page of your name using various heading tags. 2. Design a web page according to the format given below using heading tag with your name displayed on the top. Creating a web-page using <p> tag 3. Design a web page describing yourself using single and multiline comments. Also use
 tag. 4. Create a html file for displaying a webpage with below mentioned tags. a. Bold b. Italics c. Underline d. Alignment e. Paragraph 5. Create a html file for displaying a webpage with below mentioned tags: a. Text color					Use any pedagogical technique suitable for the topic	

	b. Headings c. HR d. Background color e. Line break 6. Design a web page of your CV with headings as objective, educational qualification, achievements, strengths, hobbies and personal details. a. Insert a horizontal line after every above-mentioned heading b. Set any light color as page background. c. Bold and underline every heading 4. Use heading tag to specify the heading d. Use pre tag for Educational Qualification. 7. Create a html page which shows the following list apply the following parts: a. Put horizontal line after newspaper and magazine. b. Apply heading tag for newspaper and magazine. c. Apply a background color 8. Create a webpage to show the use of lists with type. 9. Design a web page to display the names of Beverages, Dishes and Desserts using unordered lists: 10. Design a web page to display the different courses available in your institute. Show the use of different types of ordered lists.			
References:	Weblink to Equivalent MOOC on SWAYAM if relevant: • https://www.youtube.com/watch?v=8RT4n8KGjFE • http://tinyurl.com/mtjx8pnw • https://www.youtube.com/watch?v=qiR-7fL-I2A • http://tinyurl.com/y84uddwa			

Assessment Rubric: Internal Examination Practical Course |(SEC)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. I, SEMESTER – II (NEP)			
Practical	Course Code: 109283/ 110283/ 112283/123283/ 134283/135283/ 138283	Laboratory on Web Publishing	Max Marks: 50

Sr. No.	Assessment Criteria	Marks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout	20
2.	Record book preparation (Preferably handwritten) / Assignments preparation during semester	10
3.	Attendance in practical session / Students' overall performance	10
4.	Internal Viva Voce	10

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI



THREE YEAR UNDERGRADUATE PROGRAMME

**B.Sc. Computer Science (112)/Information Technology (123)/Computer Application (Regular) (109)/
Computer Application (Vocational) (110)/Data Analytics (134)/Data Science and Analytics (135)/Web
Designing and Development (138)**

Semester - III and IV

FACULTY: SCIENCE AND TECHNOLOGY

(Courses effective from Academic Year 2026-27) Under NEP 2020

SYLLABUS

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Sant Gadge Baba Amravati University, Amravati
Faculty of Science and Technology (Science Group)
Board of Studies in Computer Science
(including Computer Application, Information Technology etc.)

Sr. No.	Name	Designation	Address
01	Dr. Swati Sherekar	Chairman	PGTD in Computer Science and Engineering, SGBAU, Amravati
02	Dr. Dineshkumar N. Satange	Member (Faculty Member)	Smt. Narsamma Arts, Commerce and Science College, Kiran Nagar, Amravati. 444606
03	Dr. Mohd. Atique Mohd. Junaid	Member	HoD, PGTD in Computer Science and Engineering, SGBAU, Amravati
04	Dr. Avinash Baburao Kadam	Member	Shri Shivaji Science and Arts College, Chikhali Dist. Buldana
05	Dr. Ajay Purushottam Chendke	Member	Degree College of Physical Education (HVPM), Amravati
06	Dr. Chandrashekhar H. Sawarkar	Member	Smt. Narsamma Arts, Commerce and Science College, Kiran Nagar, Amravati. 444606
07	Dr. Arvind A. Tayade	Member	G.S. Science Arts and Commerce College, Khamgaon Dist. Buldana
08	Prof. Sudeshkumar Chaudhari	Member	RDIK, Mahavidyalaya, Badnera Rly. Amravati.
09	Dr. Narendra M. Jathe	Member	Smt. Narsamma Arts, Commerce and Science College, Kiran Nagar, Amravati. 444606
10	Dr. Homraj Patelpaik	Member	Lokmanya Tilak Mahavidyalaya Wani, Dist. Yavatmal
11	Prof. Sureshkumar Mapari	Member	R. A. College, Washim.

Notes:

- a. The strength of the batch of the Practical for UG Classes shall be 16 with an addition of 10% with the permission of Hon'ble Vice Chancellor. The number of the students required to constitute a batch or calculate the workload shall be in accordance with the relevant Government Resolution in force at the time, applicable to specific time, region, course type, mode of instruction, and other pertinent factors.
- b. 1 Credit shall mean 1 Hour Teaching per Week per Semester (Total 15 Hrs/ Semester), the duration of 1 Teaching Period will be 60 Minutes. For Practical 1 Credit shall mean 2 Hour Teaching per Week per Semester (Total 30 Hrs/ Semester).
- c. For Examination and Evaluation of Theory Courses, 40 % Marks shall be assigned to Internal Examination and 60% Marks shall be assigned to end-semester external university examination.
- d. **Co-curricular Courses:** Health and wellness, Yoga Education, Sports and Fitness, Cultural Activities, NSS/NCC, Fine/Applied/Visual/Performing Arts During Semester I, II, III, IV, V and VI. These courses may be taught by Physical Education Director or may be assigned to Language Teacher by the Principal of HEI based on the expertise of the concerned.
- e. **Value Education Courses** to be selected from the Basket of Courses provided by the University. These courses may be assigned to the Language Teacher by the Principal of HEI based on the expertise of the concerned.
- f. **Generic / Open Elective Courses (GE/OE):** Courses to be selected from the Basket of Courses provided by the University
- g. **Abbreviations:** Department Specific Core: DSC, Department Specific Elective: DSE, FSC: Faculty Specific Core, FSE: Faculty Specific Elective, Indian Knowledge System: IKS, Inter Faculty Specific Core: IFSC, Inter Faculty Specific Elective: IFSE, Theory: Th, Practical/Practicum: Pr, Environment Studies: ES, Pre-requisite Course mandatory if applicable: Prq, Laboratory: Lab (Practical), Generic/ Open Electives: OE; Vocational Skill and Skill Enhancement Courses: VSEC; Vocational Skill Courses: VSC; Skill Enhancement Courses: SEC; Ability Enhancement Courses: AEC; Value Education Courses: VEC; OJT: On Job Training; Internship/ Apprenticeship; Field projects: FP; Community Engagement and Service: CES; Co-curricular Courses: CC; RM: Research Methodology; Research Project: RP; MIL: Modern Indian Language

Examination, Evaluation and Assessment

Examination and Assessment Process:

- The basic principle of the Credit framework is that Credits are a function of the successful completion of a program of study/ vocational education/ training and assessment. No Credit can be earned by the student unless the student is assessed for the achievement of the desired competencies and outcome of a program.
- Exit options are provided with Certificate, Diploma and Basic Bachelor's degrees to the students at the end of the second, fourth and sixth semesters of a Four Years Multidisciplinary Degree Programme. Students will receive a Bachelor's degree with Honors/ Research on successfully completing of all eight semesters of the UG Program either at a stretch or with opted exits and re-entries.
- For the smooth success of four-year degree programme with multiple entry and exit systems, the examination mode should be based on the combination of innovative trends in formative (informal and formal tests administered during the learning process) and summative (evaluation of students learning at the end of an instructional unit) examination modes in line with the UGC Report on 'Evaluation Reforms in Higher Educational Institutions (2019).

Examination, Evaluation and Assessment Scheme

The total marks for each Course shall be based on Continuous Assessment and Semester End Examination.

Each theory course of Major, Minor, GE/OE, AEC, IKS, VEC as mentioned in **Teaching Learning Scheme** prepared by the Board of Studies shall be evaluated as per the scheme as mentioned in the following table -

Examination, Evaluation and Assessment Scheme

Vertical No.	The Vertical	Mode of Examination, Evaluation & Assessment	Theory				Theory (Total)		Practical				Practical (Total)	
			External		Internal				External		Internal		Max. Marks	Min. Marks
			Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks				
a	Major	External & Internal	30	9	20	6	50	20	25	10	25	10	50	20
b	Minor		30	9	20	6	50	20	25	10	25	10	50	20
c	Generic/ Open Elective		30	9	20	6	50	20	--	--	--	--	--	--
d	VSC	Internal	--	--	--	--	--	--	--	--	50	20	50	20
	SEC	Internal	--	--	--	--	--	--	--	--	50	20	50	20
e	AEC (Eng. & One MIL Composite)	External & Internal	30	9	20	6	50	20	--	--	--	--	--	--
	IKS (Generic)	External & Internal	30	9	20	6	50	20	--	--	--	--	--	--
	VEC	External & Internal	30	9	20	6	50	20	--	--	--	--	--	--
f	FP/CEP	Internal	--	--	--	--	--	--	--	--	50	20	50	20
	Internship/ Apprenticeship		Assessment of these verticals shall be based on various activities/practices. It shall be evaluated by giving maximum marks of 50 per 2 Credit Course with separate activity weightages/levels. A detailed SOP for this assessment process is prescribed for Phase I and Phase II											
	CC													

Continuous Assessment Tests (CAT)

For internal assessment, the Continuous Assessment Tests (CAT) shall be conducted as under-

- i. Three CAT each of 8 / 10 Marks (Theory) as applicable and 10 Marks (Practical).
 - First on completion of 25% Syllabus of the course or on completion of 25 teaching days,
 - Second on completion of 50% Syllabus of the course or on completion of 50 teaching days,
 - Third on completion of 75% Syllabus of the course or on completion of 75 teaching days.
- ii. Each concurrent assessment (CAT-I, II & III) will be mapped to relevant Course Learning Outcome.
- iii. Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations
- iv. Internal assessment shall be carried out by the respective course teacher by choosing variety of assessment tools/methods such as class test, record book, seminar, case study, field work, mini project work, quiz or any innovative method, which may be deemed to be appropriate for assessing the relevant course outcome.

conduction of the Examination:

As per the scheme of teaching, learning, examination and evaluation, theory/practical examinations of Semester-I, II, III, IV, V, VI, VII and VIII shall be conducted by the University (except for Internal Examinations as applicable) at the end of each semester.

The theory/practical examinations of all the Semesters shall be held as per the following Schedule –

Sr. No.	Name of the Examination	End Sem Examination	Supplementary Examination*
1	Semester-I, III, V and VII	Winter	Summer
2	Semester-II, IV, VI and VIII	Summer	Winter

* The University may evolve mechanism for conducting repeat end semester examination. Such repeat examinations shall have to be conducted within one month of the regular even semester examination and on demand examination.

1. The practical examination of all semesters shall be conducted by the University at the end of each semester. The HEI shall conduct the Practical examination of odd semesters as per the schedule announced by the University. However, the appointment of the External and Internal Examiners shall be done by the Head or Principal of respective HEI to conduct external examination of the odd semester and the same should be communicated to the University before commencement of the practical examination. The University shall conduct the external practical examination of all even semester by appointing external and internal examiners.
2. The examinations specified above shall be held twice in a year at such places and on such dates as may be prescribed by the University.
3. An applicant to an examination specified above, shall pursue a regular course of study in courses prescribed for the examination concerned for not less than one semester in a particular semester in a College/Institute/University department.
4. Provided that the student shall be eligible to appear for examination if -
 - a. He/she complies with the provisions of the Ordinance pertaining to the Examination in general from time to time.
 - b. He/she has prosecuted a regular course of study in a university department/college affiliated to the University.
 - c. He/she has in the opinion of the Principal shown satisfactory progress in his/her studies.
5. The provisions of Ordinance No. 6 and Ordinance No. 9 shall be mutatis-mutandis applicable to every collegiate/non-collegiate student.
6. The fees for each theory examination and practical examination conducted by the university shall be as prescribed by the University, from time to time.

SEMESTER – III

Computer Application (General) (109) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practica	
					External		Internal		(Total)	
					Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks
Major-T1	109205	Data Structure (DS)	2	2	30	9	20	6	50	20
Major-T2	109206	Relational Database Management System (RDBMS)	2	2	30	9	20	6	50	20
Major-P	109207	Laboratory on DS and RDBMS	2	4	25	10	25	10	50	20
IKS-T	109208	IKS in Computational Sciences	2	2	30	9	20	6	50	20
Minor-T	109261	Data Structure and RDBMS	2	2	30	9	20	6	50	20
Minor-P	109262	Laboratory on Data Structure and RDBMS	2	4	25	10	25	10	50	20
GOEC-T	109275	E Content Development	2	2	30	9	20	6	50	20
VSC-P	109284	Laboratory on MySQL	2	4	-	-	50	20	50	20
AEC-English	-	-	1	1	15	-	-	-	-	-
AEC-MIL	-	-	1	1	15	-	-	-	-	-
FP/CES	109291	Field Project / Community Engagement Services in Computer Application (General): Phase-I	2	4	-	-	50	20	50	20
CC		Separate SOP will be released	2	4	-	-	50	20	50	20

Computer Application (Vocational) (110) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practica	
					External		Internal		(Total)	
					Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks
Major-T1	110205	Data Structure (DS)	2	2	30	9	20	6	50	20
Major-T2	110206	Relational Database Management System (RDBMS)	2	2	30	9	20	6	50	20
Major-P	110207	Laboratory on DS and RDBMS	2	4	25	10	25	10	50	20
IKS-T	110208	IKS in Computational Sciences	2	2	30	9	20	6	50	20
Minor-T	110261	Data Structure and RDBMS	2	2	30	9	20	6	50	20
Minor-P	110262	Laboratory on Data Structure and RDBMS	2	4	25	10	25	10	50	20
GOEC-T	110275	E Content Development	2	2	30	9	20	6	50	20
VSC-P	110284	Laboratory on MySQL	2	4	-	-	50	20	50	20
AEC-English	-	-	1	1	15	-	-	-	-	-
AEC-MIL	-	-	1	1	15	-	-	-	-	-
FP/CES	110291	Field Project / Community Engagement Services in Computer Application (General): Phase-I	2	4	-	-	50	20	50	20
CC		Separate SOP will be released	2	4	-	-	50	20	50	20

Computer Science (112) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal		Max. Marks	Min. Marks
					Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major-T1	112205	Data Structure (DS)	2	2	30	9	20	6	50	20
Major-T2	112206	Relational Database Management System (RDBMS)	2	2	30	9	20	6	50	20
Major-P	112207	Laboratory on DS and RDBMS	2	4	25	10	25	10	50	20
IKS-T	112208	IKS in Computational Sciences	2	2	30	9	20	6	50	20
Minor-T	112261	Data Structure and RDBMS	2	2	30	9	20	6	50	20
Minor-P	112262	Laboratory on Data Structure and RDBMS	2	4	25	10	25	10	50	20
GOEC-T	112275	E Content Development	2	2	30	9	20	6	50	20
VSC-P	112284	Laboratory on MySQL	2	4	-	-	50	20	50	20
AEC-English	-	-	1	1	15	-	-	-	-	-
AEC-MIL	-	-	1	1	15	-	-	-	-	-
FP/CES	112291	Field Project / Community Engagement Services in Computer Application (General): Phase-I	2	4	-	-	50	20	50	20
CC		Separate SOP will be released	2	4	-	-	50	20	50	20

Information Technology (123) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practica (Total)	
					External		Internal			
					Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks
Major-T1	123205	Data Structure (DS)	2	2	30	9	20	6	50	20
Major-T2	123206	Relational Database Management System (RDBMS)	2	2	30	9	20	6	50	20
Major-P	123207	Laboratory on DS and RDBMS	2	4	25	10	25	10	50	20
IKS-T	123208	IKS in Computational Sciences	2	2	30	9	20	6	50	20
Minor-T	123261	Data Structure and RDBMS	2	2	30	9	20	6	50	20
Minor-P	123262	Laboratory on Data Structure and RDBMS	2	4	25	10	25	10	50	20
GOEC-T	123275	E Content Development	2	2	30	9	20	6	50	20
VSC-P	123284	Laboratory on MySQL	2	4	-	-	50	20	50	20
AEC-English	-	-	1	1	15	-	-	-	-	-
AEC-MIL	-	-	1	1	15	-	-	-	-	-
FP/CES	123291	Field Project / Community Engagement Services in Computer Application (General): Phase-I	2	4	-	-	50	20	50	20
CC		Separate SOP will be released	2	4	-	-	50	20	50	20

Data Analytics (134) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal		Max. Marks	Min. Marks
					Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major-T1	134205	Data Structure (DS)	2	2	30	9	20	6	50	20
Major-T2	134206	Relational Database Management System (RDBMS)	2	2	30	9	20	6	50	20
Major-P	134207	Laboratory on DS and RDBMS	2	4	25	10	25	10	50	20
IKS-T	134208	IKS in Computational Sciences	2	2	30	9	20	6	50	20
Minor-T	134261	Data Structure and RDBMS	2	2	30	9	20	6	50	20
Minor-P	134262	Laboratory on Data Structure and RDBMS	2	4	25	10	25	10	50	20
GOEC-T	134275	E Content Development	2	2	30	9	20	6	50	20
VSC-P	134284	Laboratory on MySQL	2	4	-	-	50	20	50	20
AEC-English	-	-	1	1	15	-	-	-	-	-
AEC-MIL	-	-	1	1	15	-	-	-	-	-
FP/CES	134291	Field Project / Community Engagement Services in Computer Application (General): Phase-I	2	4	-	-	50	20	50	20
CC		Separate SOP will be released	2	4	-	-	50	20	50	20

Data Science and Analytics (135) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal		Max. Marks	Min. Marks
					Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major-T1	135205	Data Structure (DS)	2	2	30	9	20	6	50	20
Major-T2	135206	Relational Database Management System (RDBMS)	2	2	30	9	20	6	50	20
Major-P	135207	Laboratory on DS and RDBMS	2	4	25	10	25	10	50	20
IKS-T	135208	IKS in Computational Sciences	2	2	30	9	20	6	50	20
Minor-T	135261	Data Structure and RDBMS	2	2	30	9	20	6	50	20
Minor-P	135262	Laboratory on Data Structure and RDBMS	2	4	25	10	25	10	50	20
GOEC-T	135275	E Content Development	2	2	30	9	20	6	50	20
VSC-P	135284	Laboratory on MySQL	2	4	-	-	50	20	50	20
AEC-English	-	-	1	1	15	-	-	-	-	-
AEC-MIL	-	-	1	1	15	-	-	-	-	-
FP/CES	135291	Field Project / Community Engagement Services in Computer Application (General): Phase-I	2	4	-	-	50	20	50	20
CC		Separate SOP will be released	2	4	-	-	50	20	50	20

Web Designing and Development (138) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal		Max. Marks	Min. Marks
					Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major-T1	138205	Data Structure (DS)	2	2	30	9	20	6	50	20
Major-T2	138206	Relational Database Management System (RDBMS)	2	2	30	9	20	6	50	20
Major-P	138207	Laboratory on DS and RDBMS	2	4	25	10	25	10	50	20
IKS-T	138208	IKS in Computational Sciences	2	2	30	9	20	6	50	20
Minor-T	138261	Data Structure and RDBMS	2	2	30	9	20	6	50	20
Minor-P	138262	Laboratory on Data Structure and RDBMS	2	4	25	10	25	10	50	20
GOEC-T	138275	E Content Development	2	2	30	9	20	6	50	20
VSC-P	138284	Laboratory on MySQL	2	4	-	-	50	20	50	20
AEC-English	-	-	1	1	15	-	-	-	-	-
AEC-MIL	-	-	1	1	15	-	-	-	-	-
FP/CES	138291	Field Project / Community Engagement Services in Computer Application (General): Phase-I	2	4	-	-	50	20	50	20
CC		Separate SOP will be released	2	4	-	-	50	20	50	20

SEMESTER – IV

Computer Application (General) (109) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal			
					Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks
Major-T1	109209	OOP with C++	2	2	30	9	20	6	50	20
Major-T2	109210	Computer Networks	2	2	30	9	20	6	50	20
Major-T3	109211	Python Programming								
Major-P	109212	Laboratory on C++ and Python Programming	2	4	25	10	25	10	50	20
Minor-T	109263	C++ and Python Programming	2	2	30	9	20	6	50	20
Minor-P	109264	Laboratory on C++ and Python Programming	2	4	25	10	25	10	50	20
GOEC-T	109276	Web Technologies	2	2	30	9	20	6	50	20
VSC-P	109285	Database using Access Laboratory	2	4	-	-	50	20	50	20
AEC English	-	-	1	1	15	-	-	-	-	-
AEC MIL	-	-	1	1	15	-	-	-	-	-
FP/CES	109292	Field Project / Community Engagement Services in Computer Application (General): Phase-II	2	4	-	-	50	20	50	20
CC		Separate SOP will be released	2	4	-	-	50	20	50	20

Computer Application (Vocational) (110) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal		Max. Marks	Min. Marks
					Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major-T1	110209	OOP with C++	2	2	30	9	20	6	50	20
Major-T2	110210	Computer Networks	2	2	30	9	20	6	50	20
Major-T3	110211	Python Programming								
Major-P	110212	Laboratory on C++ and Python Programming	2	4	25	10	25	10	50	20
Minor-T	110263	C++ and Python Programming	2	2	30	9	20	6	50	20
Minor-P	110264	Laboratory on C++ and Python Programming	2	4	25	10	25	10	50	20
GOEC-T	110276	Web Technologies	2	2	30	9	20	6	50	20
VSC-P	110285	Database using Access Laboratory	2	4	-	-	50	20	50	20
AEC English	-	-	1	1	15	-	-	-	-	-
AEC MIL	-	-	1	1	15	-	-	-	-	-
FP/CES	110292	Field Project / Community Engagement Services in Computer Application (General): Phase-II	2	4	-	-	50	20	50	20
CC		Separate SOP will be released	2	4	-	-	50	20	50	20

Computer Science (112) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal		Max. Marks	Min. Marks
					Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major-T1	112209	OOP with C++	2	2	30	9	20	6	50	20
Major-T2	112210	Computer Networks	2	2	30	9	20	6	50	20
Major-T3	112211	Python Programming								
Major-P	112212	Laboratory on C++ and Python Programming	2	4	25	10	25	10	50	20
Minor-T	112263	C++ and Python Programming	2	2	30	9	20	6	50	20
Minor-P	112264	Laboratory on C++ and Python Programming	2	4	25	10	25	10	50	20
GOEC-T	112276	Web Technologies	2	2	30	9	20	6	50	20
VSC-P	112285	Database using Access Laboratory	2	4	-	-	50	20	50	20
AEC English	-	-	1	1	15	-	-	-	-	-
AEC MIL	-	-	1	1	15	-	-	-	-	-
FP/CES	112292	Field Project / Community Engagement Services in Computer Application (General): Phase-II	2	4	-	-	50	20	50	20
CC		Separate SOP will be released	2	4	-	-	50	20	50	20

Information Technology (123) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practica (Total)	
					External		Internal			
					Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks
Major-T1	123209	OOP with C++	2	2	30	9	20	6	50	20
Major-T2	123210	Computer Networks	2	2	30	9	20	6	50	20
Major-T3	123211	Python Programming								
Major-P	123212	Laboratory on C++ and Python Programming	2	4	25	10	25	10	50	20
Minor-T	123263	C++ and Python Programming	2	2	30	9	20	6	50	20
Minor-P	123264	Laboratory on C++ and Python Programming	2	4	25	10	25	10	50	20
GOEC-T	123276	Web Technologies	2	2	30	9	20	6	50	20
VSC-P	123285	Database using Access Laboratory	2	4	-	-	50	20	50	20
AEC English	-	-	1	1	15	-	-	-	-	-
AEC MIL	-	-	1	1	15	-	-	-	-	-
FP/CES	123292	Field Project / Community Engagement Services in Computer Application (General): Phase-II	2	4	-	-	50	20	50	20
CC		Separate SOP will be released	2	4	-	-	50	20	50	20

Data Analytics (134) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal		Max. Marks	Min. Marks
					Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major-T1	134209	OOP with C++	2	2	30	9	20	6	50	20
Major-T2	134210	Computer Networks	2	2	30	9	20	6	50	20
Major-T3	134211	Python Programming								
Major-P	134212	Laboratory on C++ and Python Programming	2	4	25	10	25	10	50	20
Minor-T	134263	C++ and Python Programming	2	2	30	9	20	6	50	20
Minor-P	134264	Laboratory on C++ and Python Programming	2	4	25	10	25	10	50	20
GOEC-T	134276	Web Technologies	2	2	30	9	20	6	50	20
VSC-P	134285	Database using Access Laboratory	2	4	-	-	50	20	50	20
AEC English	-	-	1	1	15	-	-	-	-	-
AEC MIL	-	-	1	1	15	-	-	-	-	-
FP/CES	134292	Field Project / Community Engagement Services in Computer Application (General): Phase-II	2	4	-	-	50	20	50	20
CC		Separate SOP will be released	2	4	-	-	50	20	50	20

Data Science and Analytics (135) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practica (Total)	
					External		Internal			
					Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks
Major-T1	135209	OOP with C++	2	2	30	9	20	6	50	20
Major-T2	135210	Computer Networks	2	2	30	9	20	6	50	20
Major-T3	135211	Python Programming								
Major-P	135212	Laboratory on C++ and Python Programming	2	4	25	10	25	10	50	20
Minor-T	135263	C++ and Python Programming	2	2	30	9	20	6	50	20
Minor-P	135264	Laboratory on C++ and Python Programming	2	4	25	10	25	10	50	20
GOEC-T	135276	Web Technologies	2	2	30	9	20	6	50	20
VSC-P	135285	Database using Access Laboratory	2	4	-	-	50	20	50	20
AEC English	-	-	1	1	15	-	-	-	-	-
AEC MIL	-	-	1	1	15	-	-	-	-	-
FP/CES	135292	Field Project / Community Engagement Services in Computer Application (General): Phase-II	2	4	-	-	50	20	50	20
CC		Separate SOP will be released	2	4	-	-	50	20	50	20

Web Designing and Development (138) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practica (Total)	
					External		Internal			
					Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks
Major-T1	138209	OOP with C++	2	2	30	9	20	6	50	20
Major-T2	138210	Computer Networks	2	2	30	9	20	6	50	20
Major-T3	138211	Python Programming								
Major-P	138212	Laboratory on C++ and Python Programming	2	4	25	10	25	10	50	20
Minor-T	138263	C++ and Python Programming	2	2	30	9	20	6	50	20
Minor-P	138264	Laboratory on C++ and Python Programming	2	4	25	10	25	10	50	20
GOEC-T	138276	Web Technologies	2	2	30	9	20	6	50	20
VSC-P	138285	Database using Access Laboratory	2	4	-	-	50	20	50	20
AEC English	-	-	1	1	15	-	-	-	-	-
AEC MIL	-	-	1	1	15	-	-	-	-	-
FP/CES	138292	Field Project / Community Engagement Services in Computer Application (General): Phase-II	2	4	-	-	50	20	50	20
CC		Separate SOP will be released	2	4	-	-	50	20	50	20

SYLLABUS

B.Sc.- II, SEMESTER – III

B.Sc. Computer Science (112)

Information Technology (123)

Computer Application (Regular) (109)

Computer Application (Vocational) (110)

Data Analytics (134)

Data Science and Analytics (135)

Web Designing and Development (138)

Teaching and Learning Scheme: for the Degree of Bachelor of Science with the Major: Computer Science (112)/Information Technology (123)/Computer Application (Regular) (109)/ Computer Application (Vocational) (110)/Data Analytics (134)/Data Science and Analytics (135)/ Web Designing and Development (138)

(Three Years- Six Semesters Bachelor's Degree Programme)
(Four Years- Eight Semesters Bachelor's Degree Programme (Honors))
(Four Years- Eight Semesters Bachelor's Degree Programme (Honors with Research))

Major Course: Data Structure

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.0	III	109205/ 110205/ 112205/123205/ 134205/135205/138205	Data Structure (DS)	2	30	2.00Hrs.	30 (External) 20 (Internal)

Course Objectives:	1. To provide the knowledge of basic of Data Structure 2. To understand importance of Algorithms 3. To understand importance of different steps of algorithm in Computer Science 4. To understand the Data Structure concepts						
Course Outcomes:	Students will be able to - 1. Learn the basic types for data structure, implementation and application. 2. Know the strength and weakness of different data structures. 3. Use the appropriate data structure in context of solution of given problem. 4. Develop programming skills which require to solve given problem.						
Unit System	Contents				Workload Allotted	Weightage of Marks	Incorporation of Pedagogies

			Allotted	
Unit I	Data structure: Introduction to data structure, Types of data structure: Primitive and Non-primitive, Linear and Non-linear data structure, Data structure operations. Array: Definition and concepts, Memory Representations, Operations: Traversing, Insertion, Deletion.	8 Hrs.	8 Marks	Use any pedagogical technique suitable for the topic
Unit II	Stacks: Definition and concepts, Memory Representations, Operations: Traversing, Insertion, Deletion. Queue: Definition and concepts, Memory Representations, Operations: Traversing, Insertion, Deletion. Types of Queue.	7 Hrs.	7 Marks	
Unit III	Linked List: Definition and concepts, Memory Representations, Types of Linked List, and Operations: Traversing, Insertion, Deletion. Tree: Definition and Terminologies, Memory Representations of Trees, Types of Trees : Binary Trees, Complete Binary Trees, Binary Search Trees, Traversing: Preorder, Inorder, Postorder, Insertion, Deletion.	8 Hrs.	8 Marks	
Unit IV	Searching and Sorting: Definition and concept. Searching Techniques: Linear Search, Binary Search and Indexed Sequential Search. Sorting Techniques: Bubble Sort, Selection Sort, Insertion Sort	7 Hrs.	7 Marks	
References:	Course Material/Learning Resources Text books: 1. Data Structures, Seymour Lipschutz, Schaum's Outlines Series, Tata McGraw-Hill. 2. Text Book of Computer Science (Data Structure and C++): S. D. Pachpande, R.B. Ghayalkar and Athar Iqbal, Dnyanpath Publication. Reference Books: 1. Fundamentals of Data Structures in C, Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed. W. H. Freeman and Company. 2. Data Structure and Algorithms: Aho, Hopcroft, Ulman 3. Introduction to Data Structure: Bhagat Singh, Thomas L Naps Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://onlinecourses.swayam2.ac.in/cec22_cs19/ 2. https://onlinecourses.nptel.ac.in/noc22_cs92/ 3. https://onlinecourses.nptel.ac.in/noc22_cs70/			

Any pertinent media (recorded lectures, YouTube, etc.)if relevant:

1. <https://www.youtube.com/watch?v=RBSGKlAvoiM>
2. <https://www.youtube.com/watch?v=zg9ih6SVACc>

Assessment Rubric: Internal for Theory Course (Major)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. II, SEMESTER – III (NEP)			
Theory	Course Code: 109205/ 110205/ 112205/123205/ 134205/135205/138205	Course Title: Data Structure (DS)	Max Marks: 20
Sr. No.	Assessment Criteria	Marks	
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)	10	
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)	5	
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, CaseStudy, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)	5	

Major Course: Relational Database Management System (RDBMS)

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.0	III	109206/ 110206/ 112206/123206/ 134206/135206/138206	Relational Database Management System (RDBMS)	2	30	2 Hrs.	30

Course Objectives:	1. Discuss Database management systems, databases and its applications 2. Familiarize the students with a good formal foundation on the relational model. 3. Outline the various systematic database design approaches 4. Familiarize with SQL, a basic language of database and enhance the skill to perform the queries by using functions. 5. Explore the Cursor, procedure, function and trigger.					
Course Outcomes:	Students will be able to - 1. Understand the fundamental concepts of Database. 2. Knowledge and ability to implement Normalization. 3. Understand the role and responsibility of Database Administrator, 4. Familiar with SQL, a basic language of database and enhance the skill to perform the queries by using functions. 5. Creation and use of store procedure and functions with the help of PL/SQL. 6. Ability to understand, design and implementation of Cursor, procedure, function and trigger.					
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies		
Unit I	Introduction to Database: Data, Information, Characteristics of Database, Need of database, and Relational Model. Architecture of DBMS, DBA and its Role, Structured Query Language (SQL): Introduction, features, characteristics, advantages, data types, operators, Components of SQL: DDL, DML, DCL and TCL commands, Select statement with Clauses (Order By, Group By, Having, Where)	8 Hrs.	8 Marks	Use any pedagogical technique suitable for the topic		
Unit II	Constraint: Data constraints and its type. Operations on Table with constraints. Views: Need, advantage & types. Index: Need, types and advantages, Joins and	7 Hrs.	7 Marks			

	Union of Tables and its types. In-built Functions: Character Functions, Number Functions, Date Functions, Group Functions, and Conversion Functions, Use of alias, Null, NVL, sub queries.			
Unit III	PL/SQL: Introduction, data types, Block structure of PL/SQL, Exception handling Cursor: Types of Cursor, attributes of Cursor, Life cycle of Cursor	8 Hrs.	8 Marks	
Unit IV	Procedure, Functions, Triggers: Introduction, importance, types advantages & disadvantages. Creation of Procedure, Functions. Backup and Recovery: Introduction, Archive (Transaction) Logs, and Importance of Backups, Database Recovery, and Transaction Control.	7 Hrs.	7 Marks	
References:	Course Material/Learning Resources Text books: 1. SQL, PL/SQL Programming – Ivan Bayross (BPB) 2. SQL A Complete Reference, Alexis Leon, Mathews Leon (Tata McGraw Hill) Reference Books: 1. Database Management System 3rd Ed. by Raghu Ramakrishnan and <i>Johannes Gehrke</i> 2. Oracle PL/SQL Language Pocket Reference, 5E: A Guide to Oracle's PL/SQL Language Fundamentals. by Steven Feuerstein, Bill Pribyl and Chip Dawes (O'REILLY) Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://onlinecourses.swayam2.ac.in/cec19_cs05/preview 2. https://onlinecourses.nptel.ac.in/noc19_cs46/preview 3. https://onlinecourses.nptel.ac.in/noc20_cs60/preview Weblink to Equivalent Virtual Lab if relevant: 1. http://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/index.php Any pertinent media (recorded lectures, YouTube, etc.) if relevant: 1. https://www.youtube.com/watch?v=3EJlovevfcA 2. https://www.youtube.com/watch?v=U2T_LCdO14Y 3. https://www.youtube.com/watch?v=7wj7UEdLI6U			

Assessment Rubric: Internal for Theory Course (Major)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. II, SEMESTER – III (NEP)			
Theory	Course Code:109206/ 110206/ 112206/123206/ 134206/135206	Course Title: Relational Database Management System (RDBMS)	Max Marks: 20
Sr. No.	Assessment Criteria		Marks
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)		10
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)		5
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, CaseStudy, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)		5

Major Practical: Laboratory on DS and RDBMS

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.0	III	109207/ 110207/ 112207/123207/ 134207/135207/138207	Laboratory on DS and RDBMS	2	60	4Hrs.	50

Course Objectives:	1. To develop coding and understanding of database management system 2. To understand how a real world problem can be solved using the concept of DBMS and DS 3. To solve different DS and RDBMS real world problems & to learn its applications.
Course Outcomes:	On completion of the following syllabus the students will be able to - 1. Be able to design and analyze the time and space efficiency of the data structure. 2. Be capable to identify the appropriate data structure for given problem. 3. Have practical knowledge on the applications of data structures 4. Ability to implement linear and non-linear data structure operations using C programs 5. Ability to solve problems implementing appropriate data structures 6. Ability to implement sorting and searching algorithms using relevant data structures

Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
1. Design Program to find sum of N number 2. Design Program to find factorial of N 3. Design Program to find greatest amongst three given number 4. Implementation of traversing technique in array 5. Implementation of insertion technique in array 6. Implementation of deletion technique in array 7. Implementation of PUSH and POP operations on stack. 8. Implementation of insertion and deletion technique in queue 9. Implementation of List data structure using i) array ii) singly linked list. 10. Implementation of recursive technique for finding factorial of an integer. 11. Implement stack using i) array ii) singly linked list 12. Implement Queue using i) array ii) singly linked list 13. Implementation of data insertion in Binary Search trees			Use any pedagogical technique suitable for the topic

14. Implementation of data deletion in Binary Search trees 15. Implementation of search in Binary Search trees 16. Implementation of Linear search 17. Implementation of Binary Search using arrays. 18. Implementation of Bubble sort 19. Implementation of Selection sort 20. Implementation of Insertion sort 21. Illustrate use of DDL commands 22. Illustrate SELECT command by using of possible clauses 23. Illustrate use EXIST, LIKE, IS NULL, IN operators. 24. Illustrate Joins and its types 25. Illustrate queries by using possible inbuilt Character, Number, Date Functions 26. Illustrate queries by using possible Group Functions 27. Write PL/SQL code to create Cursor 28. Write PL/SQL to create Simple Function 29. Write PL/SQL code illustrating loop 30. Write PL/SQL code illustrating conditional controls. 31. Write PL/SQL code to create Triggers 32. Illustrate use of Row Level and Statement level Trigger			
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Assessment Rubric: External Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. II, SEMESTER – III (NEP)				
Practical	Course Code: 109207/ 110207/ 112207/123207/ 134207/135207/138207	Laboratory on DS and RDBMS	Max Marks: 25	Time: 4 Hrs.
Sr. No.	Exercise			Marks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout			10
2.	Submitted Record book (Preferably handwritten)			05
3.	External Viva Voce			10

Assessment Rubric: Internal Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. II, SEMESTER – III (NEP)			
Practical	Course Code: 109207/ 110207/ 112207/123207/ 134207/135207/138207	Laboratory on DS and RDBMS	Max Marks: 25
Sr. No.	Assessment Criteria		Marks
1.	Attendance/Regularity in practical's / Students' overall performance		05
2.	Record book Preparation (Preferably handwritten)		10
3.	Internal Viva Voce		10

IKS –Major Specific: IKS in Computational Sciences

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.0	III	109208/ 110208/ 112208/123208/ 134208/135208/138208	IKS in Computational Sciences	2	30	2 Hrs.	30

Course Objectives:	1. To sensitize the students about context in which they are embedded i.e. Indian Culture and civilization including its Knowledge System and Tradition. 2. Familiarize with the key components of the IKS 3. Know the phonetical foundations in Sanskrit Language. 4. Understand how to measures for time, length and weight were in use in Ancient India. 5. Identify the root of Modern-day binary system.					
Course Outcomes:	Students will be able to - 1. Understanding of the key concepts and principles of the Indian knowledge system. 2. Appreciate the potential Sanskrit offers in Natural Language Processing. 3. Understand how measures, time, length and weight were in use in Ancient India. 4. Understand specific contribution in Arithmetic and Geometry. 5. Demonstrate the aspect of Indian Mathematics.					
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies		
Unit I	Importance of Ancient knowledge, Defining Indian Knowledge System, The IKS Corpus-A Classification Framework, Caturdasa –vidyasthana. History of IKS, Unique Aspects of IKS. Components of a Language, Sanskrit Grammar and Phonetics in Sanskrit.	8 Hrs.	8 Marks	Use any pedagogical technique suitable for the topic		
Unit II	Computational Concept in Astaddhyayi, Role of Sanskrit in Natural Language Processing. IKS in science, engineering and technology - Introduction to ancient Indian mathematics, importance of mathematics in ancient time, great Indian mathematician and their contribution, number system and its significance, concept of algebra, arithmetic and geometry.	7 Hrs.	7 Marks			

Unit III	Number System in India – Historical Evidence, Salient Features of the Indian Numeral. Concept of Zero and its importance, Large Numbers and their Representation, Place value of Numerals, Decimal Number System, Approaches to represent Numbers,	8 Hrs.	8 Marks	
Unit IV	Measurements for Time, Distance and Weight Unique Aspect of Indian Mathematics, Great Mathematicians and their Contributions, Arithmetic- Square of Number, Square Root, Series and Progressions. Value of Pi (π). Algebra, Binary Mathematics. Magic Squares in India.	7 Hrs.	7 Marks	
References :	Course Material/Learning Resources Text books: 1. Introduction to IKS Concept and Application by Prof B Mahadevan, V R Bhat and Nagendra Pavana R N, PHI Publication. References: 1. Nair, Shantha N. Echoes of Ancient Indian Wisdom. New Delhi: Hindology Books, 2008. 2. Banerjea, P. (1916), Public administration in ancient India, Macmillan, London. 3. Kautilya Arthasastra by Dr. R P Kangle, second edition, 1969, reprint in 2000 by Motilal Banarsi Dass Publishers Private Limited, Delhi. 4. L. N.Rangarajan- Kautilya Arthashastra (English), Penguin Books India (P) Ltd, 1992. Web link: 1. https://iksindia.org/ 2. https://iksindia.org/lectures-and-videos.php 3. https://mmc.ugc.ac.in/Home/Indian_Knowledge_System			

Assessment Rubric: Internal for IKS (Major Specific) Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. II, SEMESTER – III (NEP)			
Theory	Course Code: 109208/ 110208/ 112208/123208/ 134208/135208/138208	Course Title: IKS in Computational Sciences	Max Marks: 20
Sr. No.	Assessment Criteria		Marks
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)		10
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)		5
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, CaseStudy, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)		5

Minor Theory: Data Structure and RDBMS

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.0	III	109261/ 110261/ 112261/123261/ 134261/135261/138261	Data Structure and RDBMS	2	30	2 Hrs.	30

Course Objectives:	1. To provide the knowledge of basic of Data Structure 2. To understand importance of Algorithms 3. To understand importance of different steps of algorithm in Computer Science 4. To understand the Data Structure concepts 5. Discuss Database management systems, databases and its applications 6. Familiarize the students with a good formal foundation on the relational model. 7. Outline the various systematic database design approaches 8. Familiarize with SQL, a basic language of database and enhance the skill to perform the queries by using functions.					
Course Outcomes:	Students will be able to - 1. Learn the basic types for data structure, implementation and application. 2. Know the strength and weakness of different data structures. 3. Use the appropriate data structure in context of solution of given problem. 4. Understand the fundamental concepts of Database. 5. Knowledge and ability to implement Normalization. 6. Understand the role and responsibility of Database Administrator, 7. Familiar with SQL, a basic language of database and enhance the skill to perform the queries by using functions.					
Unit System	Contents			Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	Data structure: Introduction to data structure, Types of data structure: Primitive and Non-primitive, Linear and Non-linear data structure, Data structure operations. Array: Definition and concepts, Memory Representations, Operations: Traversing, Insertion,			8 Hrs.	8 Marks	Use any pedagogical

	Deletion.			technique suitable for the topic
Unit II	Stacks: Definition and concepts, Memory Representations, Operations: Traversing, Insertion, Deletion. Queue: Definition and concepts, Memory Representations, Operations: Traversing, Insertion, Deletion. Types of Queue.	7 Hrs.	7 Marks	
Unit III	Introduction to Database: Data, Information, Characteristics of Database, Need of database, and Relational Model. Architecture of DBMS, DBA and its Role, Structured Query Language (SQL): Introduction, features, characteristics, advantages, data types, operators, Components of SQL: DDL, DML, DCL and TCL commands, select statement with clauses (Order By, Group By, Having, Where)	8 Hrs.	8 Marks	
Unit IV	Constraint: Data constraints and its type. Operations on Table with constraints. Snapshot, Views: Need, advantage & types. Index: Need, types and advantages, Joins and Union of Tables and its types. In-built Functions: Character Functions, Number Functions, Date Functions, Group Functions, and Conversion Functions, Use of alias, Null, NVL, sub queries.	7 Hrs.	7 Marks	
References :	Course Material/Learning Resources Text books: 1. Data Structures, Seymour Lipschutz, Schaum's Outlines Series, Tata McGraw-Hill. 2. Text Book of Computer Science (Data Structure and C++): S. D. Pachpande, R. B. Ghayalkar and Athar Iqbal, Dnyanpath Publication. 3. SQL, PL/SQL Programming – Ivan Bayross (BPB) 4. SQL A Complete Reference, Alexis Leon, Mathews Leon (Tata McGraw Hill) Reference Books: 1. Fundamentals of Data Structures in C, Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed. W.H. Freeman and Company. 2. Data Structure and Algorithms: Aho, Hopcroft, Ulman 3. Introduction to Data Structure: Bhagat Singh, Thomas L Naps 4. Database Management System 3rd Ed. by Raghu Ramakrishnan and <i>Johannes Gehrke</i> 5. Oracle PL/SQL Language Pocket Reference, 5E: A Guide to Oracle's Pl/SQL Language Fundamentals. by Steven Feurstein, Bill Pribyl and Chip Dawes (O'REILLY) Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://onlinecourses.swayam2.ac.in/cec22_cs19/ 2. https://onlinecourses.nptel.ac.in/noc22_cs92/ 3. https://onlinecourses.nptel.ac.in/noc22_cs70/			

	4. https://onlinecourses.swayam2.ac.in/cec19_cs05/preview 5. https://onlinecourses.nptel.ac.in/noc19_cs46/preview 6. https://onlinecourses.nptel.ac.in/noc20_cs60/preview Any pertinent media (recorded lectures, YouTube, etc.) if relevant: 1. https://www.youtube.com/watch?v=RBSGKIAvoiM 2. https://www.youtube.com/watch?v=zg9ih6SVACc 3. https://www.youtube.com/watch?v=3EJlovevfcA 4. https://www.youtube.com/watch?v=U2T_LCdO14Y 5. https://www.youtube.com/watch?v=7wj7UEdLI6U
Model Questions:	

Assessment Rubric: Internal for Data Structure and RDBMS (Minor Specific) Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. II, SEMESTER – III (NEP)			
Theory	Course Code: 109261/ 110261/ 112261/123261/ 134261/135261/138261	Course Title: Data Structure and RDBMS	Max Marks: 20
Sr. No.	Assessment Criteria	Marks	
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)	10	
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)	5	
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, CaseStudy, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)	5	

Minor Practical: Laboratory on Data Structure and RDBMS

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.0	III	109262/ 110262/ 112262/123262/ 134262/135262/138262	Laboratory on Data Structure and RDBMS	2	60	4Hrs.	50

Course Objectives:	1. To develop coding and understanding of database management system 2. To understand how a real world problem can be solved using the concept of DBMS and DS 3. To solve different DS and RDBMS real world problems & to learn its applications.			
Course Outcomes:	On completion of the following syllabus the students will be able to - 1. Be able to design and analyze the time and space efficiency of the data structure. 2. Be capable to identify the appropriate data structure for given problem. 3. Have practical knowledge on the applications of data structures 4. Ability to implement linear and non-linear data structure operations using C programs 5. Ability to solve problems implementing appropriate data structures 6. Ability to implement sorting and searching algorithms using relevant data structures			
Contents		Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
	List of Practical: 1. Design Program to find sum of N number 2. Design Program to find factorial of N 3. Design Program to find greatest amongst three given number 4. Implementation of traversing technique in array 5. Implementation of insertion technique in array 6. Implementation of deletion technique in array 7. Implementation of PUSH operations on stack. 8. Implementation of POP operations on stack. 9. Implementation of insertion technique in queue 10. Implementation of deletion technique in queue 11. Illustrate use of DDL commands 12. Illustrate SELECT command by using of possible clauses 13. Illustrate use EXIST, LIKE, IS NULL, IN operators.			Use any pedagogical techniques suitable for the topic

	14. Illustrate Joins and its types 15. Illustrate queries by using possible inbuilt Character, Number, Date Functions 16. Illustrate queries by using possible Group Functions			
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Assessment Rubric: External Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. II, SEMESTER – III (NEP)				
Practical	Course Code: 109262/ 110262/ 112262/123262/ 134262/135262/138262	Laboratory on DS and RDBMS	Max Marks: 25	Time: 4 Hrs.
Sr. No.	Exercise			Marks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout			10
2.	Submitted Record book (Preferably handwritten)			05
3.	External Viva Voce			10

Assessment Rubric: Internal Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. II, SEMESTER – III (NEP)			
Practical	Course Code: 109262/ 110262/ 112262/123262/ 134262/135262/138262	Laboratory on DS and RDBMS	Max Marks: 25
Sr. No.	Assessment Criteria		Marks
1.	Attendance/Regularity in practical's / Students' overall performance		05
2.	Record book Preparation (Preferably handwritten)		10
3.	Internal Viva Voce		10

GOEC Theory 5: E Content Development

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.0	III	109275/ 110275/ 112275/123275/ 134275/135275/138275	E Content Development	2	30	2 Hrs.	30

Course Objectives:	1. Understand the fundamentals of e-content development. 2. Learn about instructional design principles. 3. Explore various multimedia tools for e-content creation. 4. Develop interactive and engaging digital learning materials. 5. Assess the quality and effectiveness of e-content.			
Course Outcomes:	Students will be able to - 1. Developing e-content for specific learning management systems (LMS): Integrating e-content with the features of a particular LMS platform. 2. Understanding the role of technology in e-learning: Exploring emerging trends like gamification, artificial intelligence, and adaptive learning in e-content development. 3. Project management skills: Planning, organizing, and executing e-content development projects within timelines and budget constraints.			
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	Introduction to E-Content Development: Definition, Importance, and Scope of E-Content, Types of E-Content: Text, Audio, Video, Animation, Interactive Modules, Benefits and Challenges in E-Content Development, Role of E-Content in Higher Education and Training. Instructional Design for E-Content: Learning Theories and Pedagogical Models, ADDIE (Analysis, Design, Development, Implementation, Evaluation) Model, Bloom's Taxonomy for Digital Learning, Principles of Effective Instructional Design.	8 Hrs.	8 Marks	Use any pedagogical technique suitable for the topic

Unit II	Tools and Technologies for E-Content Development: Authoring Tools: Articulate Storyline, Adobe Captivate, iSpring, H5P, Video Editing Tools: Camtasia, Adobe Premiere Pro, OpenShot, Audio Editing Tools: Audacity, Adobe Audition, Animation and Infographics: Canva, Powtoon, Vyond, Learning Management Systems (LMS): Moodle, Google Classroom. Multimedia Integration in E-Content: Principles of Multimedia Learning, Creating Engaging Visual Content, Audio Narration and Voiceovers, Interactive Elements: Quizzes, Simulations, and Gamification, Accessibility Considerations in E-Content.	7 Hrs.	7 Marks	
Unit III	E-Content Development Process: Content Planning and Storyboarding, Scripting and Designing Interactive Modules, Content Development and Testing, Publishing and Hosting E-Content (SCORM, HTML5, MP4 Formats).	8 Hrs.	8 Marks	
Unit IV	Evaluation and Quality Assurance in E-Content: Usability Testing and User Feedback, Assessment Strategies for Digital Learning, Standards and Best Practices (SCORM, xAPI, WCAG), Improving Engagement and Retention through Analytics. Emerging Trends in E-Content Development: AI and Machine Learning in E-Learning, Augmented Reality (AR) and Virtual Reality (VR) in Digital Education, Microlearning and Mobile Learning, Cloud-Based Learning Platforms.	7 Hs.	7 Marks	
References :	Course Material/Learning Resources Reference Books: 1. E-Learning and the Science of Instruction – Ruth Colvin Clark & Richard E. Mayer 2. Designing Effective Instruction – Gary R. Morrison, Steven M. Ross, Jerrold E. Kemp, and Howard Kalman 3. E-Content: Technologies and Perspectives for the European Market – P. Belfiore & F. Tiscar 4. Multimedia Learning – Richard E. Mayer 5. The Principles of Beautiful Web Design" – Jason Beaird & James George 6. Digital Media Tools – Nigel Chapman & Jenny Chapman 7. Teaching in a Digital Age – A.W. (Tony) Bates (Available online for free) 8. Learning Management System Technologies and Software Solutions for Online Teaching– Terry Anderson 9. Moodle 4 Administration – Alex Büchner Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://onlinecourses.swayam2.ac.in/cec20_ge31/preview 2. https://onlinecourses.swayam2.ac.in/ntr22_ed05/preview 3. https://onlinecourses.nptel.ac.in/noc19_ge27/preview			

	4. https://onlinecourses.swayam2.ac.in/ntr21_ed50/preview Weblink to Equivalent Virtual Lab if relevant: 1. https://www.vlab.co.in/ 2. https://concord.org/ Any pertinent media (recorded lectures, YouTube, etc.) if relevant: 1. https://www.youtube.com/playlist?list=PLcsj1x9n9h4gk2xxMdNWluAoGj9EPoFAv 2. https://www.youtube.com/playlist?list=PLt_wlo40Ef554qp2xM-vS1e19DQUcStdP
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Assessment Rubric: Internal for E Content Development (GOEC) Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. II, SEMESTER – III (NEP)			
Theory	Course Code:109275/ 110275/ 112275/123275/ 134275/135275/138275	Course Title: E Content Development	Max Marks: 20
Sr. No.	Assessment Criteria	Marks	
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)	10	
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)	5	
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, CaseStudy, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)	5	

VSC: Laboratory on MySQL

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.0	III	109284/ 110284/ 112284/ 123284/ 134284/135284/138284	Laboratory on MySQL	2	60	4Hrs.	50

Course Objectives:	1. Get Familiar with Relational Database and MySQL. 2. Able to Create various Relational Database and Operations over it. 3. Prepare queries by using inbuilt functions.			
Course Outcomes:	On competition of the following syllabus the students will be able to - 1. To design and implement on Relational Database Management System. 2. To design and operate various commands of MySQL. 3. To prepared and execute PL/SQL programs on MySQL			
Contents		Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
	List of Practical: 1. Demonstrate the DDL Commands. (Create, Alter, Drop, Rename) 2. Demonstrate the DML Commands. (Select, Insert, Delete, Update) 3. Demonstrate SELECT commands by using the clauses. (Having, Group By, Where, Order By). 4. Demonstrate the use of Operators. (EXIST, LIKE, IS NULL, IN) 5. Demonstrate the following Joins – (Self, Equi. Outer) 6. Demonstrate the following Character Function. (LOWER, UPPER, INITCAP, CONCAT, LENGTH, SUBSTR, TRIM, REPLACE, LPAD, RPAD) 7. Demonstrate the Numeric Function. (SQUARE ROOT, SINE, MODULUS, CEIL, FLOOR, POWER, ROUND, TRUNCATE, GREATEST, LEAST) 8. Demonstrate the DATE function, (Add month function, Last_day function, Months_between function, Next_function). 9. Demonstrate the Group Function. (COUNT, DISTINCT, MAX, MIN, AVG, SUM) 10. Write PL/SQL code to create Cursor. (IMPLICIT CURSOR, EXPLICIT CURSOR) 11. Write PL/SQL Code to create Simple Function. 12. Write PL/SQL code to demonstrate Loop- a. If Condition Then Statement b. If Condition Then Else Statement			Use any pedagogical technique suitable for the topic

	c. If Condition Elseif Condition Else Statement 13. Write PL/SQL code to demonstrate Conditional Controls 14. Write PL/SQL code to create Trigger. 15. Write PL/SQL code to demonstrate commands on Triggers. (Insert, Update)			
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Assessment Rubric: Internal Examination Practical Course |(VSC)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. II, SEMESTER – III (NEP)			
Practical	Course Code: 109284/ 110284/ 112284/123284/ 134284/135284/138284	Laboratory on MySQL	Max Marks: 50
Sr. No.	Assessment Criteria	Marks	
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout	20	
2.	Record book preparation (Preferably handwritten) / Assignments preparation during semester	10	
3.	Attendance in practical session / Students' overall performance	10	
4.	Internal Viva Voce	10	

**Field Project / Community Engagement Services in Computer Science (112)/Information Technology (123)/
Computer Application (Regular) (109)/ Computer Application (Vocational) (110)/Data Analytics (134)/Data
Science and Analytics (135)/ Web Designing and Development (138): Phase-I**

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.0	III	109291/ 110291/ 112291/123291/ 134291/135291/138291	Field Project / Community Engagement Services in Computer Science (112)/Information Technology (123)/ Computer Application (Regular) (109)/ Computer Application (Vocational) (110)/Data Analytics (134)/Data Science and Analytics (135)/ Web Designing and Development (138): Phase-I	2	60	--	50

Course Objectives:

- To develop a sense of social responsibility among students.
- To foster civic values and the spirit of community service.
- To provide practical experience in addressing societal issues.
- To encourage students to work collaboratively with community members and organizations.
- To enhance critical thinking, problem-solving, and leadership skills through real-world application.
- To help students to initiate developmental activities in the community in coordination with public and government authorities.
- To enable students to apply theoretical/practical Computer Science/Application/Engineering concepts in real-life challenges, enhancing the quality of experiential learning.
- To give exposure to the students about the development of relation between rural communities and Computer Technology
- To study the Computer Technology driven solutions for local problems

Course Outcomes:

Upon successful completion of this course, students will be able to:

- Develop problem-solving and critical thinking abilities by social activities and services to real-world situation.
- Critically evaluate information and conclusions based on the analysis and interpretation of data collected during the project.

- Contribute the knowledge to the social cause by understanding the societal problems and deriving the solution for the same
- Gain valuable experience and skills in a relevant field.
- Gain efficiency in written and oral communication through activity reports, presentations and discussions.
- Work effectively as part of a team to achieve social responsibility.
- Understand the importance of Computer Technology in various rural area problems.
- Build connections with local communities and learn from traditional knowledge.
- Identify Computer Technology related challenges (Lack of Technological Knowledge, non-availability of infrastructure, ICT problem, etc.) and provide the solution/ corrective measure to the concerning authority.

Guidelines/ SoP for FP/CEP

For understanding key principles of CE, forms of CE, operational guidelines and implementation strategy please refer https://www.ugc.gov.in/pdfnews/4187860_Revised-Final-Guidelines.pdf

As per NEP 2020, students of B Sc. II of Semester III need to perform a Field Project (FP) for TWO (2) credits i.e. 50 Marks.

The guidelines regarding the field project are as follows:

1. Students must complete 60 hours of field engagement.
2. Work may be done individually or in groups of up to 4 students, each under a departmental faculty guide.
3. A survey or sample collection methodology must be chosen, with appropriate documentation tools: questionnaires, datasheets, plant specimen formats, etc.
4. Projects can be survey-based, experimental, observational, or intervention-based.
5. **Final report to include:** Title, Introduction, Materials & Methods, Results, Discussion, Conclusion, References.
6. Minimum 6 pages excluding cover page, certificate, acknowledgement, etc.
7. Poster/PPT presentation is mandatory and will be evaluated by an appointed examiner.
8. For a SURVEY based project related questionnaire (15 or more questions) shall be prepared.
9. The departmental coordinator/guide shall check the questions and finalize the questionnaire. The question that may create unnecessary complications should be avoided. The questions should be qualitative as well as quantitative.
10. If the project is related to work that does not involve survey work, then the questionnaire part can be replaced accordingly (e.g. Sample collection/Data collection/ Experimental base etc.).
11. The total project work including preparation of questionnaire to presentation should be evaluated for 2 credits (50 Marks).

**SUGGESTED FORMS OF COMMUNITY-ENGAGED PRACTICE IN COMPUTER SCIENCE (112)/INFORMATION TECHNOLOGY (123)/
COMPUTER APPLICATION (REGULAR) (109)/ COMPUTER APPLICATION (VOCATIONAL) (110)/DATA ANALYTICS (134)/DATA
SCIENCE AND ANALYTICS (135)/ WEB DESIGNING AND DEVELOPMENT (138)**

Community Engagement Services (CES) in Computer Science involve using technology and digital tools to connect, involve, and empower communities. This can encompass various activities, from developing online platforms for community interaction to using data analysis to understand community needs and informed decision-making. CES in Computer Science aims to bridge the digital divide, promote digital literacy, and foster collaboration between communities and organizations.

Here's a more detailed look at CES in Computer Science:

Students have to choose any one of the following as the Community Engagement Services. Programmes may be interdisciplinary, integrating knowledge from various fields such as social sciences, health, education, environmental studies, etc.

1) Teaching

- Basics of Computers, MS Office and internet
- Cyber security and cyber crime
- Applications of statistics in real life
- Introduction to Statistical Software (Excel)
- Online digital services

2) Services

- Digital Banking and Online Payments
- Basic software installation
- E-Governance and Digital Services
- Health Awareness Using Digital Tools
- Online digital services and literacy

3) Data Collection and Survey

- Utilization of government community empowerment schemes.
- IT infrastructure in India
- Cyber and forensic investigation in India, Etc.

Note: Students must have to perform activities from above heads to complete 60 hours of community engagement and services

Key Benefits of CES in Computer Science:

- **Increased Community Participation:**
CES can make it easier for community members to participate in decision-making processes and contribute to their community's development.
- **Improved Communication:**
Online platforms and digital tools can facilitate better communication and information sharing within communities.
- **Enhanced Collaboration:**
CES can foster collaboration between community members, organizations, and local governments.
- **Empowered Communities:**
By providing access to information, resources, and technology, CES can empower communities to address their own needs and shape their future.
- **Greater Social Impact:**
CES can contribute to positive social change by addressing critical community needs and promoting civic engagement.

Assessment Rubric for FP/CEP: Phase -I

**SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
B.Sc. II, SEMESTER – III (NEP)**

FP/CEP	109291/ 110291/ 112291/123291/ 134291/135291/138291	Field Project / Community Engagement Services in Computer Science (112)/Information Technology (123)/ Computer Application (Regular) (109)/ Computer Application (Vocational) (110)/Data Analytics (134)/Data Science and Analytics (135)/ Web Designing and Development (138): Phase-I	Max Marks: 50
Q. No.	Exercise		Marks
1	Field Engagement & Participation (Attendance, hands-on involvement, and community interaction)		15
2	Project Report Quality (Clarity, structure, scientific accuracy, originality, and referencing)		15
3	Data Collection & Analysis (Depth, relevance, and quality of survey/sample collection and its analysis)		10
4	Presentation (Poster or PPT) (Communication of findings, visual clarity, and confidence)		05
5	Social Relevance & Innovation (Creative solutions, awareness campaigns, or community impact beyond data.)		05

SYLLABUS

B.Sc.- II, SEMESTER – IV

B.Sc. Computer Science (112)

Information Technology (123)

Computer Application (Regular) (109)

Computer Application (Vocational) (110)

Data Analytics (134)

Data Science and Analytics (135)

Web Designing and Development (138)

Teaching and Learning Scheme: for the Degree of Bachelor of Science with the Major: Computer Science (112)/Information Technology (123)/Computer Application (Regular) (109)/ Computer Application (Vocational) (110)/Data Analytics (134)/Data Science and Analytics (135)/ Web Designing and Development (138)

(Three Years- Six Semesters Bachelor's Degree Programme)
(Four Years- Eight Semesters Bachelor's Degree Programme (Honors))
(Four Years- Eight Semesters Bachelor's Degree Programme (Honors with Research))

Major Course: OOP with C++

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.0	IV	109209/110209/ 112209/123209/ 134209/135209/ 138209	OOP with C++	2	30	2 Hrs	30

Course Objectives:	1. To understand the concepts of object-oriented paradigm 2. To understand the C++ language features for OOP 3. Apply object-oriented concepts in programming 4. Use object-oriented thinking in problem-solving 5. Able to differentiate structure oriented programming and object oriented programming. 6. Able to understand and apply various object oriented features. 7. Able to know concepts in operator overloading, function overloading & polymorphism.			
Course Outcomes:	1. Understanding of fundamental principles of OOP, including concepts like classes, objects, inheritance, polymorphism, encapsulation 2. Understanding of how to apply OOP concepts effectively within the C++ programming language 3. Design and develop structured, reusable, and modular code by creating well-defined classes and objects to solve complex problems.			
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	OOP Paradigm: Basic Concepts, Features, Advantages, Applications of OOP, Structured Vs OOP, Trending OOP Languages.	8 Hrs	8 Marks	Use any pedagogical

	OOP Concepts- Data Abstraction and Encapsulation: Classes and Objects Introduction, Defining a Class,			technique suitable for the topic
Unit II	Functions: Function Prototype, Inline Function, Default Argument, Function Overloading, Constructors: Types of Constructors: Default, Parameterized and Copy Constructor	7 Hrs	7 Marks	
Unit III	Functions and Objects: Access Specifiers, Memory Allocation for Objects, Objects as Function Arguments, Returning Objects from Functions. Inheritance: Definition, Types of Inheritance: Single, Multiple, Hierarchical, Multilevel, Hybrid, Visibility Modes	8 Hrs	8 Marks	
Unit IV	Polymorphism: Compile Time, Run Time, Virtual Base Classes, Virtual Functions, Pure Virtual Functions, Early Binding and Late Binding. Function Overriding, Operator Overloading, Overloading Unary and Binary Operator, Rules for Overloading.	7 Hrs	7 Marks	
References :	Course Material/Learning Resources Text books: 1. Object oriented programming with C++: E. Balagurusamy Reference Books: 1. The Object-Oriented Thought Process, 5th Edition by Matt Weisfeld 2. An Introduction to Object-Oriented Programming: Timothy Budd 3. The C++ programming language: Bjarne Stroustrup 4. Programming principles and Practice using C++: Bjarne Stroustrup Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://onlinecourses.nptel.ac.in/noc21_cs02/preview 2. https://www.classcentral.com/course/swayam-programming-in-c-6704 3. https://www.coursera.org/learn/cplusplus-crypto-i 4. https://www.mygreatlearning.com/academy/learn-for-free/courses/oops-concepts-in-c 5. https://www.coursera.org/courses?query=object%20oriented%20programming 6. https://www.classcentral.com/course/freecodecamp-object-oriented-programming-oop-in-c-course-104967 7. https://unacademy.com/goal/computer-science/VTQXS/free-platform/object-oriented-programming-in-c/TKNQJ 8. https://www.udemy.com/course/c-programming-oops-concepts/?srsltid=AfmBOopd-ae-k0vN2Q5HR8HWNZKLKxN1jBPrld4RqxQ8vbpg91bFp6L5&couponCode=ST3MT200225A 9. https://www.edx.org/learn/object-oriented-programming/ibm-object-oriented-implementation-using-c			

	Weblink to Equivalent Virtual Lab if relevant: 1. https://www.programiz.com/cpp-programming/online-compiler/ 2. https://www.onlinegdb.com/online_cplusplus_compiler 3. https://onecompiler.com/cpp 4. https://www.codechef.com/cpp-online-compiler
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Assessment Rubric: Internal for Theory Course (Major)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. II, SEMESTER-IV (NEP)			
Theory	Course Code: 109209/110209/ 112209/123209/ 134209/135209/138209	Course Title: OOP with C++	Max Marks: 20
Sr. No.	Assessment Criteria		Marks
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)		10
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)		5
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, CaseStudy, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)		5

Major Course: Computer Networks

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.0	IV	109210/110210/ 112210/123210/ 134210/135210/138210	Computer Networks	2	30	2 Hrs	30

Course Objectives:	1. To provide the knowledge of basic of Computer Network. 2. To understand importance of OSI model in Computer Networking. 3. To understand importance of Network Devices and Network Topology. 4. To understand the concepts of Internet and Email Services.						
Course Outcomes:	Students will be able to - 1. Define Computer Networks, its types and Network Topologies. 2. Define Network Devices and OSI Model. 3. Introduce about data Transmission Media, Switching and Multiplexing. 4. Define Internet and E-mail System						
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies			
Unit I	Introduction to Networking: Introduction, Need of Computer Network, Communication Protocol, Types of Networks: LAN, MAN, WAN Network Topology: Ring, Bus, Star & Mesh.	8 Hrs	8 Marks	Use any pedagogical technique suitable for the topic			
Unit II	Network Devices: Repeater, Hub, Switch, Bridge, Router OSI Reference Model: Introduction, OSI Model, Functions of seven layers of OSI.	7 Hrs	7 Marks				
Unit III	Data Transmission Media: Guided Media (Twisted pair, Coaxial, Fiber Optics) and Wireless media (Radio Waves, Micro Waves, Infrared). Switching: Circuit, Message, Packet. Multiplexing: Frequency Division, Time Division	8 Hrs	8 Marks				
Unit IV	Internet: History, Applications of Internet, Types of Internet Connection: wired and wireless. Internet Protocols: TCP/IP, FTP, HTTP, URL, E-mail Address, WWW, Web Browsers, Search Engines.	7 Hrs	7 Marks				

References:	Course Material/Learning Resources Text books: 1. Computer Networks (Fourth Edition) - Andrew S. Tanenbaum (PHI) 2. Data Communications and Networking, 4th Edition, Behrouz A Forouzan. McGraw-Hill 3. Computer Networking; A Top Down Approach Featuring The Internet, 2nd Edition, Kurose James F., Ross W. Keith PEARSON EDUCATION ASIA Reference Books: 1. Business Data Communication & Networking (fifth edition) – Fitzerland & Dennis. 2. Data and Computer Communication – William Stallings (Pearson) 3. Data Communication and Networking – Behrouz A. Forouzan (McGraw Hill) 4. Computer Network & Internet - Douglas E. Comer (Pearson) Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://onlinecourses.swayam2.ac.in/ntr25_ed44/ 2. https://onlinecourses.nptel.ac.in/noc25_cs02/ 3. https://onlinecourses.nptel.ac.in/noc25_cs15/
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Assessment Rubric: Internal for Theory Course (Major)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. II, SEMESTER-IV (NEP)			
Theory	Course Code: 109210/110210/ 112210/123210/ 134210/135210/138210	Course Title: Computer Networks	Max Marks: 20
Sr. No.	Assessment Criteria	Marks	
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)	10	
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)	5	
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, CaseStudy, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)	5	

Major Course: Python Programming

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.0	IV	109211/110211/ 112211/123211/ 134211/135211/138211	Python Programming	2	30	2 Hrs	30

Course Objectives:	1. To understand the fundamentals of the Python programming language 2. To develop problem-solving skills using Python. 3. To learn modular programming through functions, parameter passing techniques, exception handling, and the use of built-in modules in Python. 4. To perform string manipulation and implement Python programs						
Course Outcomes:	Students will be able to - 1. Describe the core syntax and semantics of Python programming language. 2. Discover the need for working with the strings and functions. 3. Illustrate the process of structuring the data using lists, dictionaries, tuples and sets. 4. Indicate the use of regular expressions and built-in functions						
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies			
Unit I	Introduction: History of Python Programming Language, Thrust area of Python, Installing Anaconda Python Distribution, Installing PyCharm IDE to setup a Python Development Environment, Creating and running your first Python Project. Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity.	8 Hrs	8 Marks	Use any pedagogical technique suitable for the topic			
Unit II	Data Types, Indentation, Comments, Reading Input, Printing Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language. Control Flow Statements: The if, if-else, if-elif-else Decision Control Statement, Nested if Statement, The while Loop, The for Loop, The continue and break Statements.	7 Hrs	7 Marks				
Unit III	Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments	8 Hrs	8 Marks				
Unit IV	Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in	7 Hrs	7 Marks				

	String by Index Number, String Slicing and Joining,			
References :	Course Material/Learning Resources Text books: 1. “Introduction to Python Programming”, 1st Edition, by Gowrishankar S, Veena A Reference Books: 1. “Python Data Science Handbook: Essential Tools for Working with Data”, by Jake VanderPlas, 2. “Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems”, by Aurelien Geron 3. “Core Python Applications Programming”, 3rd Edition, by Wesley J Chun education. Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://onlinecourses.swayam2.ac.in/aic20_sp33/preview 2. https://onlinecourses.nptel.ac.in/noc19_cs40/preview 3. https://www.classcentral.com/course/swayam-python-for-data-science-14266 Weblink to Equivalent Virtual Lab if relevant: 1. https://python-iitk.vlabs.ac.in/ 2. http://vlabs.iitb.ac.in/vlabs-dev/labs/python-basics/index.html 3. https://www.vlab.co.in/broad-area-computer-science-and-engineering Any pertinent media (recorded lectures, YouTube, etc.) if relevant: 1. https://www.youtube.com/watch?v=daefaLgNkw0 2. https://www.youtube.com/watch?v=W8KRzmHUcc 3. https://www.youtube.com/watch?v=gfDE2a7MKjA			

Assessment Rubric: Internal for Theory Course (Major)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. II, SEMESTER-IV (NEP)			
Theory	Course Code:109211/110211/ 112211/123211/ 134211/135211/138211	Course Title: Python Programming	Max Marks: 20
Sr. No.	Assessment Criteria		Marks
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)		10
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)		5
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, CaseStudy, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)		5

Major Practical: Laboratory on OOP with C++

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.0	IV	109212/110212/ 112212/ 123212/ 134212/135212/138212	Laboratory on C++ and Python Programming	2	60	4Hrs	50

Course Objectives:	1. To learn the syntax and semantics of the C++ programming language. 2. To understand the concept of data abstraction and encapsulation. 3. Perform programs on OOPs using C++ 4. Perform programs on functions, constructor and destructor. 5. To learn how to overload functions and operators in C++ 6. Understand and implement concept of Inheritance. 7. To learn how to design C++ classes for code reuse. 8. To implement Python programs with conditionals and loops. 9. Use functions for structuring Python programs. 10. Represent compound data using Python lists, tuples, and dictionaries.						
Course Outcomes:	On completion of the following syllabus the students will be able to - 1. Able to write, compile and debug programs in C++ language. 2. Design programs involving constructors, destructors. 3. Able to use C++ classes and class libraries, arrays and pointers 4. Able to use Python programs with conditionals and loops. 5. Able to use functions for structuring Python programs. 6. Able to compound data using Python lists, tuples, and dictionaries.						
Contents					Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies

	List of Practical: 1. Write a program in C++ to demonstrate Class and Object. 2. Write a program in C++ to demonstrate constructor and destructor. 3. Write a program in C++ to demonstrate Inline function. 4. Write a program in C++ to demonstrate the use of friend function. 5. Write a program in C++ for default argument. 6. Write a program in C++ for unary operator overloading. 7. Write a program in C++ for Binary operator overloading. 8. Write a program in C++ for function overloading. 9. Write a program in C++ for virtual base class. 10. Write a program in C++ to implement single Inheritance. 11. Write a program in C++ to implement multiple Inheritance. 12. Write a program in C++ to implement multilevel Inheritance. 13. Write a program in C++ to implement hybrid Inheritance. 14. Write a program in C++ to implement hierarchical Inheritance. 15. Write a program in C++ for constructor overloading. 16. Write a program in C++ to implement parameterized constructor 17. Write a program in C++ to implement copy constructor 18. Write a program to demonstrate different number data types in python. 19. Write a Python program to perform different arithmetic operations on numbers. 20. Write a Python Program for checking whether the given number is an even number or not. Using a for loop. 21. Write a Python program using a while loop that asks the user for a number, and prints a countdown from that number to zero. 22. Write a Python program to demonstrate if-elif-else statement 23. Write a Python program to demonstrate nested if- else statement 24. Write a program to create, concatenate and print a string and accessing substring from a given string. 25. Write a Python program to check if a substring is present in a given string.			Use any pedagogical technique suitable for the topic
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References:	Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://www.programiz.com/cpp-programming/online-compiler/ 2. https://www.onlinegdb.com/online_cplusplus_compiler 3. https://onecompiler.com/cpp 4. https://www.codechef.com/cpp-online-compiler 5. https://www.w3schools.com/cpp/cpp_compiler.asp 6. https://www.tutorialspoint.com/compile_cpp_online.php 7. https://nextleap.app/online-compiler/cpp-programming 8. https://www.jdoodle.com/online-compiler-cplusplus			
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Assessment Rubric: External Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. II, SEMESTER – III (NEP)				
Practical	Course Code: 109212/ 110212/ 112212/123212/ 134212/135212/138212	Laboratory on C++ and Python Programming	Max Marks: 25	Time: 4 Hrs.
Sr. No.	Exercise			Marks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout			10
2.	Submitted Record book (Preferably handwritten)			05
3.	External Viva Voce			10

Assessment Rubric: Internal Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. II, SEMESTER – III (NEP)			
Practical	Course Code: 109212/ 110212/ 112212/123212/ 134212/135212/138212	Laboratory on C++ and Python Programming	Max Marks: 25
Sr. No.	Assessment Criteria		Marks
1.	Attendance/Regularity in practical's / Students' overall performance		05
2.	Record book Preparation (Preferably handwritten)		10
3.	Internal Viva Voce		10

Minor Course: C++ and Python Programming

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.0	IV	109263/110263/ 112263/123263/ 134263/135263/138263	C++ and Python Programming	2	30	2 Hrs	30

Course Objectives:	After completion of this course student will be able to: 1. To understand the concepts of object-oriented paradigm 2. To understand the C++ language features for OOP 3. Apply object-oriented concepts in programming 4. Use object-oriented thinking in problem-solving 5. Able to differentiate structure oriented programming and object oriented programming. 6. Able to understand and apply various object oriented features. 7. To understand the core syntax and semantics of Python programming language. 8. To understand the working with functions. 9. To understand the concepts of lists, dictionaries				
Course Outcomes:	1. Understanding of fundamental principles of OOP, including concepts like classes, objects, inheritance, polymorphism, encapsulation 2. Understanding of how to apply OOP concepts effectively within the C++ programming language 3. Design and develop structured, reusable, and modular code by creating well-defined classes and objects to solve complex problems. 4. Describe the core syntax and semantics of Python programming language. 5. Discover the need for working with functions. 6. Illustrate the process of structuring the data using lists, dictionaries				
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies	
Unit I	OOP Paradigm: Basic Concepts, Features, Advantages, Applications of OOP, Structured Vs OOP, Trending OOP Languages. OOP Concepts- Data Abstraction and Encapsulation: Classes and Objects, Defining a Class.	8 Hrs	8 Marks	Use any pedagogical technique suitable for the topic	
Unit II	Functions: Function Prototype, Inline Function, Default Argument, Function Overloading,	7 Hrs	7 Marks		

	Constructors: Types of Constructors: Default, Parameterized and Copy Constructor Inheritance: Definition, Types of Inheritance: Single, Multiple, Hierarchical, Multilevel, Hybrid, Visibility Modes			
Unit III	Introduction: History of Python Programming Language, Thrust area of Python Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity. Data Types, Indentation, Comments, Reading Input, Printing Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language.	8 Hrs	8 Marks	
Unit IV	Control Flow Statements: The if, if-else, if-elif-else Decision Control Statement, Nested if Statement, The while Loop, The for Loop, The continue and break Statements. Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters,	7 Hrs	7 Marks	
References :	Course Material/Learning Resources Text books: 1. Object oriented programming with C++: E. Balagurusamy 2. "Introduction to Python Programming", 1st Edition, by Gowrishankar S, Veena A Reference Books: 1. The Object-Oriented Thought Process, 5th Edition by Matt Weisfeld 2. An Introduction to Object-Oriented Programming: Timothy Budd 3. The C++ programming language: Bjarne Stroustrup 4. Programming principles and Practice using C++: Bjarne Stroustrup 5. "Python Data Science Handbook: Essential Tools for Working with Data", by Jake VanderPlas, 6. "Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems", by Aurelien Geron 7. "Core Python Applications Programming", 3rd Edition, by Wesley J Chun 8. "Flask Web Development: Developing Web Applications with Python", 2nd Edition, by Miguel Grinberg, Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://onlinecourses.nptel.ac.in/noc21_cs02/preview 2. https://www.classcentral.com/course/swayam-programming-in-c-6704 3. https://www.coursera.org/learn/cplusplus-crypto-i 4. https://www.mygreatlearning.com/academy/learn-for-free/courses/oops-concepts-in-c 5. https://www.coursera.org/courses?query=object%20oriented%20programming 6. https://www.classcentral.com/course/freecodecamp-object-oriented-programming-oop-in-c-course-104967			

7. <https://unacademy.com/goal/computer-science/VTQXS/free-platform/object-oriented-programming-in-c/TKNQJ>
8. <https://www.udemy.com/course/c-programming-oops-concepts/?srsltid=AfmBOopd-ae-k0vN2Q5HR8HWNZKLKxN1jBPr1d4RqxQ8vbpg91bFp6L5&couponCode=ST3MT200225A>
9. <https://www.edx.org/learn/object-oriented-programming/ibm-object-oriented-implementation-using-c>
10. https://onlinecourses.swayam2.ac.in/aic20_sp33/preview
11. https://onlinecourses.nptel.ac.in/noc19_cs40/preview
12. <https://www.classcentral.com/course/swayam-python-for-data-science-14266>

Weblink to Equivalent Virtual Lab if relevant:

1. <https://www.programiz.com/cpp-programming/online-compiler/>
2. https://www.onlinegdb.com/online_c++_compiler
3. <https://onecompiler.com/cpp>
4. <https://www.codechef.com/cpp-online-compiler>
5. <https://python-iitk.vlabs.ac.in/>
6. <http://vlabs.iitb.ac.in/vlabs-dev/labs/python-basics/index.html>
7. <https://www.vlab.co.in/broad-area-computer-science-and-engineering>

Assessment Rubric: Internal for Theory Course (Minor)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. II, SEMESTER-IV (NEP)			
Theory	Course Code:109263/110263/ 112263/123263/ 134263/135263/138263	Course Title: C++ and Python Programming	Max Marks: 20
Sr. No.	Assessment Criteria		Marks
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)		10
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)		5
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, CaseStudy, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)		5

Minor Practical: Laboratory on C++ and Python Programming

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.0	IV	109264/110264/ 112264/123264/ 134264/135264/138264	Laboratory on C++ and Python Programming	2	60	4Hrs	50

Course Objectives:	1. To learn the syntax and semantics of the C++ programming language. 2. To understand the concept of data abstraction and encapsulation. 3. Perform programs on OOPs using C++ 4. Perform programs on functions, constructor and destructor. 5. To learn how to overload functions and operators in C++ 6. Understand and implement concept of Inheritance. 7. To learn how to design C++ classes for code reuse. 8. To implement Python programs with conditionals and loops. 9. Use functions for structuring Python programs. 10. Represent compound data using Python lists and dictionaries.						
Course Outcomes:	On completion of the following syllabus the students will be able to - 1. Able to write, compile and debug programs in C++ language. 2. Design programs involving constructors, destructors. 3. Able to use C++ classes and class libraries, arrays and pointers 4. Able to use Python programs with conditionals and loops. 5. Able to use functions for structuring Python programs. 6. Able to compound data using Python lists, tuples, and dictionaries.						
Contents				Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies	

	List of Practical: 1. Write a program in C++ to demonstrate Class and Object. 2. Write a program in C++ to demonstrate the Constructor 3. Write a program in C++ to demonstrate Inline function. 4. Write a program in C++ for default argument. 5. Write a program in C++ for function overloading. 6. Write a program in C++ to implement single Inheritance. 7. Write a program in C++ to implement multiple Inheritance. 8. Write a program in C++ to implement multilevel Inheritance. 9. Write a program in C++ to implement hybrid Inheritance. 10. Write a program in C++ to implement hierarchical Inheritance. 11. Write a program to demonstrate different number data types in python. 12. Write a Python program to perform different arithmetic operations on numbers. 13. Write a Python program for checking whether the given number is an even number or not, using a for loop. 14. Write a Python program using a while loop that asks the user for a number, and prints a countdown from that number to zero. 15. Write a Python program to perform different arithmetic operations on numbers. 16. Write a Python Program for checking whether the given number is an even number or not. Using a for loop. 17. Write a Python program using a while loop that asks the user for a number, and prints a countdown from that number to zero. 18. Write a Python program to demonstrate if-elif-else statement 19. Write a Python program to demonstrate nested if- else statement			Use any pedagogical technique suitable for the topic
References:	Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://www.programiz.com/cpp-programming/online-compiler/ 2. https://www.onlinegdb.com/online_cplusplus_compiler 3. https://onecompiler.com/cpp 4. https://www.codechef.com/cpp-online-compiler 5. https://www.w3schools.com/cpp/cpp_compiler.asp 6. https://www.tutorialspoint.com/compile_cpp_online.php 7. https://nextleap.app/online-compiler/cpp-programming 8. https://www.jdoodle.com/online-compiler-cplusplus			

Assessment Rubric: External Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. II, SEMESTER – IV (NEP)				
Practical	Course Code: 109264/110264/ 112264/123264/ 134264/135264/138264	Laboratory on C++ and Python Programming	Max Marks: 25	Time: 4 Hrs.
Sr. No.	Exercise			Marks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout			10
2.	Submitted Record book (Preferably handwritten)			05
3.	External Viva Voce			10

Assessment Rubric: Internal Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. II, SEMESTER – IV (NEP)			
Practical	Course Code: 109264/110264/ 112264/123264/ 134264/135264/138264	Laboratory on C++ and Python Programming	Max Marks: 25
Sr. No.	Assessment Criteria		Marks
1.	Attendance/Regularity in practical's / Students' overall performance		05
2.	Record book Preparation (Preferably handwritten)		10
3.	Internal Viva Voce		10

GOEC Theory 6: Web Technologies

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.0	IV	109276/110276/ 112276/123276/ 134276/135276/138276	Web Technologies	2	30	2 Hrs	30

Course Objectives:	1. To explain different components and technologies of World Wide Web as a platform. 2. To develop the static website using client-side programming like HTML and CSS. 3. To enable students to understand web page site planning, management and maintenance. 4. To explain the concepts of developing advanced HTML pages with the help of frames, scripting language.						
Course Outcomes:	Students will be able to - 1. Understand the fundamentals of Internet and how the web function. 2. Design a static webpage by applying HTML elements. 3. Apply CSS concepts for designing HTML web pages. 4. To acquire knowledge and skills for creation of web site considering client-side programming. 5. Understand need and purpose of Web Hosting						
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies			
Unit I	Basic Terminology of Web and Web Design Principles What is Internet, Brief History of Internet, What is World Wide Web, Client Server Architecture, Web Server Vs Web browser, Webpages, Website, How website works? Types of Websites, Domain Name Server and Uniform Resource locator, Basic principles involved in developing a web site, Five Golden rules of web designing, Web Standards and W3C recommendations	8 Hrs	8 Marks	Use any pedagogical technique suitable for the topic			
Unit II	What is HTML, Features of HTML, Basic structure of an HTML document, Basic Building blocks of HTML, Working with Lists, Tables and Frames, Working with Text and Image Hyperlinks, Images and Multimedia, Working with Forms and Controls.	7 Hrs	7 Marks				
Unit III	Concept of CSS, Need of CSS, Creating Style Sheet -Inline, External, Embedded CSS, CSS Selectors, Types of Selectors, CSS Properties -Position, Float, clear, visibility , CSS Flexbox Layout, CSS Grid Layout, CSS Styling Properties (Background, Text Format, Controlling Fonts), Working with Lists and Tables, Box Model (Border properties, Padding Properties, Margin properties, Display properties)	8 Hrs	8 Marks				

Unit IV	What is Web Hosting? Need of Web Hosting, Types of Hosting packages, Registering Domains, Defining Name Servers, Steps to host the website	7 Hrs	7 Marks	
References :	Course Material/Learning Resources Text books: 1. HTML5 and CSS3- WAN BAYROSS -BPB Publications Reference Books: 1. HTML and CSS, 5th Edition –Thomas A Powell 2. Head First HTML and CSS,2nd Edition-Elisabeth Robson and Eric Freeman –O'Reilly 3. An introduction to Web Design + Programming- Paul S Wang, Sanda S Katila Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://onlinecourses.swayam2.ac.in/cec21_lb01/preview 2. https://onlinecourses.swayam2.ac.in/nou22_cs03/preview			

Assessment Rubric: Internal for Theory Course (GOEC)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. II, SEMESTER-IV (NEP)			
Theory	Course Code: 109276/110276/ 112276/123276/ 134276/135276/138276	Course Title: Web Technologies	Max Marks: 20
Sr. No.	Assessment Criteria	Marks	
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)	10	
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)	5	
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, CaseStudy, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)	5	

VSC: Database using Access Laboratory

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.0	IV	109285/110285/ 112285/123285/ 134285/135285/138285	Database using Access Laboratory	2	60	4 Hrs	50

Course Objectives:	1. To understand the Working on existing database systems 2. To familiarize students with hands-on experience in designing relational databases 3. To familiarize students with hands-on experience in implementing relational databases 4. To familiarize students with hands-on experience in managing relational databases						
Course Outcomes:	On completion of the following syllabus the students will be able to - 1. Understand the fundamentals of relational databases 2. Demonstrate knowledge of designing relational databases 3. Demonstrate knowledge of implementing relational databases 4. Demonstrate knowledge of managing relational databases						
Contents					Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
	List of Practical: 1. Create a table (person) in access with name, phno, email-id and address. insert 10 records. Create a query to display email id, phno and address when user gives name. 2. Field Name Data type Description Class Number Section 3. Prepare a query to display all records and Name should be in ascending order. 4. Create a database named “library.mdb” and perform the following tasks: Create a table named “Book” having following structure: Field name, Field datatype, Description, Book _id Text Primary key. Book identification number Bname Text Book name Wname Text Writer’s name 5. Prepare a query named “senior” to display records including fields name, class, sec, rollno, status, photo and value of “status” field must be senior.						Use any pedagogical technique suitable for the topic

	Prepare a form of above query “senior”. 6. Prepare a query to display only records including book name, writer name and publication name. Save the query as “q_book”. 7. Prepare a query to display all records on the basis of price which is more than Rs. 500. 8. Prepare a form on the basis of table. 9. Prepare a query named “senior” to display records including fields name, class, sec, rollno, status, photo and value of “status” field must be senior. Prepare a report of all the fields of above table.2. 10. Create a table named “student info” having following table structure. Field Name Data type, Description, ClassNumber, Section, Text, Roll no Number, Name Text 40 11. Create a database named “library.mdb” and perform the following tasks: Create a table named “Book” having following structure: Field name Field datatype Description 12. Create a table named “Book” having following structure: Field name Field datatype Description Prepare a form on the basis of table. 13. Create a database named “Nepal Bank” to store information about its staffs and do the following tasks: Create a table named “staffinfo” having following table structure: Field Name, Data Type, Discription 14. Create a form on the basis of “staffinfo” table and save as “entryform”. 15. Create a Student Table in MS-Access with the following features: a. Roll Number b. Student Name c. Class d. Marks in Subject 1, Subject 2, Subject 3 e. Total f. Average g. Result 16. Create “Employee” database and table “Emp”. With following features: Empno, Ename, Designation, Deptno, DOJ, Basic Salary. Calculate DA as 40% of Basic Salary. 17. Create “Employee1” database and table “Emp1” Empno, Ename, Designation, Deptno, DOJ, Basic Salary. List all the Employees who get less than 20000 Salary. 18. Create “Course” database and “Coursedtl” table having following records:- SRollno, Sname, Course Section, Medium, College, Total Fees. Prepare the Report to display all students who are pursuing B.Sc.(Computer)			
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	19. Create a “Stock” database having “Inventory” table:- Display all the Items which has closing stock < 100. 20. Create Business table by using Design Wizard with year own data (at least 6 fields and 10 records)			
References:	Weblink to Equivalent MOOC on SWAYAM if relevant:			

Assessment Rubric: Internal Examination Practical Course |(VSC)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. II, SEMESTER – IV (NEP)			
Practical	Course Code: 109285/110285/ 112285/123285/ 134285/135285/138285	Database using Access Laboratory	Max Marks: 50
Sr. No.	Assessment Criteria		Marks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout		20
2.	Record book preparation (Preferably handwritten) / Assignments preparation during semester		10
3.	Attendance in practical session / Students’ overall performance		10
4.	Internal Viva Voce		10

Field Project / Community Engagement Services in Computer Science (112)/Information Technology (123)/ Computer Application (Regular) (109)/ Computer Application (Vocational) (110)/Data Analytics (134)/Data Science and Analytics (135)/ Web Design and Development (138): Phase-II

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.0	IV	109292/ 110292/ 112292/123292/ 134292/135292/138292	Field Project / Community Engagement Services in Computer Science (112)/Information Technology (123)/ Computer Application (Regular) (109)/ Computer Application (Vocational) (110)/Data Analytics (134)/Data Science and Analytics (135) /Web Design and Development (138): Phase-II	2	60	--	50

Course Objectives:

- To develop a sense of social responsibility among students.
- To foster civic values and the spirit of community service.
- To provide practical experience in addressing societal issues.
- To encourage students to work collaboratively with community members and organizations.
- To enhance critical thinking, problem-solving, and leadership skills through real-world application.
- To help students to initiate developmental activities in the community in coordination with public and government authorities.
- To enable students to apply theoretical/practical Computer Science/Application/Engineering concepts in real-life challenges, enhancing the quality of experiential learning.
- To give exposure to the students about the development of relation between rural communities and Computer Technology
- To study the Computer Technology driven solutions for local problems

Course Outcomes:

Upon successful completion of this course, students will be able to:

- Develop problem-solving and critical thinking abilities by social activities and services to real-world situation.

- Critically evaluate information and conclusions based on the analysis and interpretation of data collected during the project.
- Contribute the knowledge to the social cause by understanding the societal problems and deriving the solution for the same
- Gain valuable experience and skills in a relevant field.
- Gain efficiency in written and oral communication through activity reports, presentations and discussions.
- Work effectively as part of a team to achieve social responsibility.
- Understand the importance of Computer Technology in various rural area problems.
- Build connections with local communities and learn from traditional knowledge.
- Identify Computer Technology related challenges (Lack of Technological Knowledge, non-availability of infrastructure, ICT problem, etc.) and provide the solution/ corrective measure to the concerning authority.

Guidelines/ SoP for FP/CEP

For understanding key principles of CE, forms of CE, operational guidelines and implementation strategy please refer https://www.ugc.gov.in/pdfnews/4187860_Revised-Final-Guidelines.pdf

As per NEP 2020, students of B Sc. II of Semester IV need to perform a Field Project (FP) for TWO (2) credits i.e. 50 Marks.

The guidelines regarding the field project are as follows:

1. Students must complete 60 hours of field engagement.
2. Work may be done individually or in groups of up to 4 students, each under a departmental faculty guide.
3. A survey or sample collection methodology must be chosen, with appropriate documentation tools: questionnaires, datasheets, plant specimen formats, etc.
4. Projects can be survey-based, experimental, observational, or intervention-based.
5. **Final report to include:** Title, Introduction, Materials & Methods, Results, Discussion, Conclusion, References.
6. Minimum 6 pages excluding cover page, certificate, acknowledgement, etc.
7. Poster/PPT presentation is mandatory and will be evaluated by an appointed examiner.
8. For a SURVEY based project related questionnaire (15 or more questions) shall be prepared.
9. The departmental coordinator/guide shall check the questions and finalize the questionnaire. The question that may create unnecessary complications should be avoided. The questions should be qualitative as well as quantitative.
10. If the project is related to work that does not involve survey work, then the questionnaire part can be replaced accordingly (e.g. Sample collection/Data collection/ Experimental base etc.).

11. The total project work including preparation of questionnaire to presentation should be evaluated for 2 credits (50 Marks).

**SUGGESTED FORMS OF COMMUNITY-ENGAGED PRACTICE IN COMPUTER SCIENCE (112)/ INFORMATION TECHNOLOGY (123)/
COMPUTER APPLICATION (REGULAR) (109)/ COMPUTER APPLICATION (VOCATIONAL) (110)/DATA ANALYTICS (134)/DATA
SCIENCE AND ANALYTICS (135)**

Community Engagement Services (CES) in Computer Science involve using technology and digital tools to connect, involve, and empower communities. This can encompass various activities, from developing online platforms for community interaction to using data analysis to understand community needs and informed decision-making. CES in Computer Science aims to bridge the digital divide, promote digital literacy, and foster collaboration between communities and organizations.

Here's a more detailed look at CES in Computer Science:

Students have to choose any one of the following as the Community Engagement Services. Programmes may be interdisciplinary, integrating knowledge from various fields such as social sciences, health, education, environmental studies, etc.

1) Teaching

- Basics of Computers, MS Office and internet
- Cyber security and cyber crime
- Applications of statistics in real life
- Introduction to Statistical Software (Excel)
- Online digital services

2) Services

- Digital Banking and Online Payments
- Basic software installation
- E-Governance and Digital Services
- Health Awareness Using Digital Tools
- Online digital services and literacy

3) Data Collection and Survey

- Utilization of government community empowerment schemes.
- IT infrastructure in India

- Cyber and forensic investigation in India, Etc.

Note: Students must have to perform activities from above heads to complete 60 hours of community engagement and services

Key Benefits of CES in Computer Science:

- **Increased Community Participation:**

CES can make it easier for community members to participate in decision-making processes and contribute to their community's development.

- **Improved Communication:**

Online platforms and digital tools can facilitate better communication and information sharing within communities.

- **Enhanced Collaboration:**

CES can foster collaboration between community members, organizations, and local governments.

- **Empowered Communities:**

By providing access to information, resources, and technology, CES can empower communities to address their own needs and shape their future.

- **Greater Social Impact:**

CES can contribute to positive social change by addressing critical community needs and promoting civic engagement.

Assessment Rubric for FP/CEP: Phase -II

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI B.Sc. II, SEMESTER – IV (NEP)			
FP/CEP	Course Code: 109292/ 110292/ 112292/123292/ 134292/135292/138292	Field Project / Community Engagement Services in Computer Science (112)/Information Technology (123)/ Computer Application (Regular) (109)/ Computer Application (Vocational) (110)/Data Analytics (134)/Data Science and Analytics (135) /Web Design and Development (138) : Phase-II	Max Marks: 50
Q. No.	Exercise		Marks
1	Field Engagement & Participation (Attendance, hands-on involvement, and community interaction)		15
2	Project Report Quality (Clarity, structure, scientific accuracy, originality, and referencing)		15
3	Data Collection & Analysis (Depth, relevance, and quality of survey/sample collection and its analysis)		10
4	Presentation (Poster or PPT) (Communication of findings, visual clarity, and confidence)		05
5	Social Relevance & Innovation (Creative solutions, awareness campaigns, or community impact beyond data.)		05

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI



THREE YEAR UNDERGRADUATE PROGRAMME

**B.Sc. Computer Application (General (109)/Vocational (110))
Semester - V and VI**

**FACULTY: SCIENCE AND TECHNOLOGY
(Courses effective from Academic Year 2026-27) Under NEP 2020**

SYLLABUS

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Sant Gadge Baba Amravati University, Amravati
Faculty of Science and Technology (Science Group)
Board of Studies in Computer Science
(Including Computer Application, Information Technology etc.)

Sr. No.	Name	Designation	Address
01	Dr. Swati Sherekar	Chairman	PGTD in Computer Science and Engineering, SGBAU, Amravati
02	Dr. Dineshkumar N. Satange	Member (Faculty Member)	Smt. Narsamma Arts, Commerce and Science College, Kiran Nagar, Amravati. 444606
03	Dr. Mohd. Atique Mohd. Junaaid	Member	HoD, PGTD in Computer Science and Engineering, SGBAU, Amravati
04	Dr. Avinash Baburao Kadam	Member	Shri Shivaji Science and Arts College, Chikhali Dist. Buldana
05	Dr. Ajay Purushottam Chendke	Member	Degree College of Physical Education (HVPM), Amravati
06	Dr. Chandrashekhar H. Sawarkar	Member	Smt. Narsamma Arts, Commerce and Science College, Kiran Nagar, Amravati. 444606
07	Dr. Arvind A. Tayade	Member	G.S. Science Arts and Commerce College, Khamgaon Dist. Buldana
08	Prof. Sudeshkumar Chaudhari	Member	RDIK, Mahavidyalaya, Badnera Rly. Amravati.
09	Dr. Narendra M. Jathe	Member	Smt. Narsamma Arts, Commerce and Science College, Kiran Nagar, Amravati. 444606
10	Dr. HomrajPatelpaik	Member	Lokmanya Tilak Mahavidyalaya Wani, Dist. Yavatmal
11	Prof. Sureshkumar Mapari	Member	Rajasthan Aryan Arts, Shri Mithulal Kacholia Commerce and Shri SatyanarayanjiRamkrishnaji Rathi Science College, Washim

Subcommittee appointed for drafting syllabus of B. Sc. III Sem V and VI (NEP) in B.Sc. Computer Application (General (109)/Vocational (110))

Sr. No.	Name	Designation	Address
01	Dr. Arvind Tayade	Chairman	G.S. Science Arts and Commerce College, Khamgaon Dist. Buldana
02	Prof. Ather Iqbal	Member	Vidya Bharati Mahavidyalaya, Amravati
03	Yogesh Hushare	Member	Shri Shivaji Science College, Amravati
04	Dr. Anil Dudhe	Member	Phulsing Naik Mahavidyalaya, Pusad,
05	Dr. Nitin Suradkar	Member	Shankarlal Khandelwal Arts, Science And Commerce College, Akola
06	Prof. Gopal Gawali	Member	Rajasthan Aryan Arts, Shri Mithulal Kacholia Commerce and Shri SatyanarayanjiRamkrishnaji Rathi Science College, Washim

Scheme- Examination, Evaluation and Assessment

Notes:

- a. The strength of the batch of the Practical for UG Classes shall be 16 with an addition of 10% with the permission of Hon'ble Vice Chancellor. The number of the students required to constitute a batch or calculate the workload shall be in accordance with the relevant Government Resolution in force at the time, applicable to specific time, region, course type, mode of instruction, and other pertinent factors.
- b. 1 Credit shall mean 1 Hour Teaching per Week per Semester (Total 15 Hrs/ Semester), the duration of 1 Teaching Period will be 60 Minutes. For Practical 1 Credit shall mean 2 Hour Teaching per Week per Semester (Total 30 Hrs/ Semester).
- c. For Examination and Evaluation of Theory Courses, 40 % Marks shall be assigned to Internal Examination and 60% Marks shall be assigned to end-semester external university examination.
- d. **Co-curricular Courses:** Health and wellness, Yoga Education, Sports and Fitness, Cultural Activities, NSS/NCC, Fine/Applied/Visual/Performing Arts During Semester I, II, III, IV, V and VI. These courses may be taught by Physical Education Director or may be assigned to Language Teacher by the Principal of HEI based on the expertise of the concerned.
- e. **Value Education Courses** to be selected from the Basket of Courses provided by the University. These courses may be assigned to the Language Teacher by the Principal of HEI based on the expertise of the concerned.
- f. **Generic / Open Elective Courses (GE/OE):** Courses to be selected from the Basket of Courses provided by the University
- g. **Abbreviations:** Department Specific Core: DSC, Department Specific Elective: DSE, FSC: Faculty Specific Core, FSE: Faculty Specific Elective, Indian Knowledge System: IKS, Inter Faculty Specific Core: IFSC, Inter Faculty Specific Elective: IFSE, Theory: Th, Practical/Practicum: Pr, Environment Studies: ES, Pre-requisite Course mandatory if applicable: Prq, Laboratory: Lab (Practical), Generic/ Open Electives: OE; Vocational Skill and Skill Enhancement Courses: VSEC; Vocational Skill Courses: VSC; Skill Enhancement Courses: SEC; Ability Enhancement Courses: AEC; Value Education Courses: VEC; OJT: On Job Training: Internship/ Apprenticeship; Field projects: FP; Community Engagement and Service: CES; Co-curricular Courses: CC; RM: Research Methodology; Research Project: RP; MIL: Modern Indian Language

Examination and Assessment Process:

- The basic principle of the Credit framework is that Credits are a function of the successful completion of a program of study/ vocational education/ training and assessment. No Credit can be earned by the student unless the student is assessed for the achievement of the desired competencies and outcome of a program.
- Exit options are provided with Certificate, Diploma and Basic Bachelor's degrees to the students at the end of the second, fourth and sixth semesters of a Four Years Multidisciplinary Degree Programme. Students will receive a Bachelor's degree with Honors/ Research on successfully completing of all eight semesters of the UG Program either at a stretch or with opted exits and re-entries.
- For the smooth success of four-year degree programme with multiple entry and exit systems, the examination mode should be based on the combination of innovative trends in formative (informal and formal tests administered during the learning process) and summative (evaluation of students learning at the end of an instructional unit) examination modes in line with the UGC Report on 'Evaluation Reforms in Higher Educational Institutions (2019).

Examination, Evaluation and Assessment Scheme

The total marks for each Course shall be based on Continuous Assessment and Semester End Examination.

Each theory course of Major, Minor, GE/OE, AEC, IKS, VEC as mentioned in **Teaching Learning Scheme** prepared by the Board of Studies shall be evaluated as per the scheme as mentioned in the following table -

Examination, Evaluation and Assessment Scheme

Vertical No.	The Vertical	Mode of Examination, Evaluation & Assessment	Theory				Theory (Total)		Practical				Practical (Total)	
			External		Internal				External		Internal		Max. Marks	Min. Marks
			Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks				
a	Major	External & Internal	30	9	20	6	50	20	25	10	25	10	50	20
b	Minor		30	9	20	6	50	20	25	10	25	10	50	20
c	Generic/ Open Elective		30	9	20	6	50	20	--	--	--	--	--	--
d	VSC	Internal	--	--	--	--	--	--	--	--	50	20	50	20
	SEC	Internal	--	--	--	--	--	--	--	--	50	20	50	20
e	AEC (Eng. & One MIL Composite)	External & Internal	30	9	20	6	50	20	--	--	--	--	--	--
	IKS (Generic)	External & Internal	30	9	20	6	50	20	--	--	--	--	--	--
	VEC	External & Internal	30	9	20	6	50	20	--	--	--	--	--	--
f	FP/CEP	Internal	--	--	--	--	--	--	--	--	50	20	50	20
	Internship/ Apprenticeship		Assessment of these verticals shall be based on various activities/practices. It shall be evaluated by giving maximum marks of 50 per 2 Credit Course with separate activity weightages/levels. A detailed SOP for this assessment process is prescribed for Phase I and Phase II											
	CC													

Continuous Assessment Tests (CAT)

For internal assessment, the Continuous Assessment Tests (CAT) shall be conducted as under-

- i. Three CAT each of 8 / 10 Marks (Theory) as applicable and 10 Marks (Practical).
 - First on completion of 25% Syllabus of the course or on completion of 25 teaching days,
 - Second on completion of 50% Syllabus of the course or on completion of 50 teaching days,
 - Third on completion of 75% Syllabus of the course or on completion of 75 teaching days.
- ii. Each concurrent assessment (CAT-I, II & III) will be mapped to relevant Course Learning Outcome.
- iii. Total Performance in CAT (i.e. 40 %) shall be based on the best two out of three in CAT examinations
- iv. Internal assessment shall be carried out by the respective course teacher by choosing variety of assessment tools/methods such as class test, record book, seminar, case study, field work, mini project work, quiz or any innovative method, which may be deemed to be appropriate for assessing the relevant course outcome.

Conduction of the Examination:

As per the scheme of teaching, learning, examination and evaluation, theory/practical examinations of Semester-I, II, III, IV, V, VI, VII and VIII shall be conducted by the University (except for Internal Examinations as applicable) at the end of each semester.

The theory/practical examinations of all the Semesters shall be held as per the following Schedule –

Sr. No.	Name of the Examination	End Sem Examination	Supplementary Examination*
1	Semester-I, III, V and VII	Winter	Summer
2	Semester-II, IV, VI and VIII	Summer	Winter

* The University may evolve mechanism for conducting repeat end semester examination. Such repeat examinations shall have to be conducted within one month of the regular even semester examination and on demand examination.

1. The practical examination of all semesters shall be conducted by the University at the end of each semester. The HEI shall conduct the Practical examination of odd semesters as per the schedule announced by the University. However, the appointment of the External and Internal Examiners shall be done by the Head or Principal of respective HEI to conduct external examination of the odd semester and the same should be communicated to the University before commencement of the practical examination. The University shall conduct the external practical examination of all even semester by appointing external and internal examiners.

2. The examinations specified above shall be held twice in a year at such places and on such dates as may be prescribed by the University.
3. An applicant to an examination specified above, shall pursue a regular course of study in courses prescribed for the examination concerned for not less than one semester in a particular semester in a College/Institute/University department.
4. Provided that the student shall be eligible to appear for examination if -
 - a. He/she complies with the provisions of the Ordinance pertaining to the Examination in general from time to time.
 - b. He/she has prosecuted a regular course of study in a university department/college affiliated to the University.
 - c. He/she has in the opinion of the Principal shown satisfactory progress in his/her studies.
5. The provisions of Ordinance No. 6 and Ordinance No. 9 shall be mutatis-mutandis applicable to every collegiate/non-collegiate student.
6. The fees for each theory examination and practical examination conducted by the university shall be as prescribed by the University, from time to time.

SEMESTER – V

Computer Application (General (109)/Vocational (110)) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/Practical (Total)	
					External		Internal		Max. Marks	Min. Marks
					Max. Marks	Min. Marks	Max. Marks	Min. Marks		
Major-T7	109213/110213	Digital Communication Technologies	2	2	30	9	20	6	50	20
Major-T8	109214/110214	Scripting Language	2	2	30	9	20	6	50	20
Major-T9	109215/110215	User Interface Design	2	2	30	9	20	6	50	20
Major-Lab/Practical-15	109216/110216	Laboratory on Scripting Language	2	4	25	10	25	10	50	20
Major-Elective T1	109217/110217	M-Commerce	2	2	30	9	20	6	50	20
Major-Elective T1	109218/110218	Cryptography	2	2	30	9	20	6	50	20
Major-Elective Lab/Practical-17	109219/110219	Laboratory on M-Commerce	2	4	25	10	25	10	50	20
Major-Elective Lab/Practical-17	109220/110220	Laboratory on Cryptography	2	4	25	10	25	10	50	20
Minor-T5	109265/110265	Digital Image Processing	2	2	30	9	20	6	50	20
Minor-P18	109266/110266	Laboratory on Digital Image Processing	2	4	25	10	25	10	50	20
VSC-P19	109286/110286	Laboratory on PHP Programming	2	4	-	-	50	20	50	20
SEC-P	109287/110287	Laboratory on User Interface Design	2	4	-	-	50	20	50	20
Project	109293/110293	Project in Computer Application (General/Vocational)	2	4	-	-	50	20	50	20
*Special Theory	--	Foundation of Artificial Intelligence	2	2						

*Implementation of the Course of “Foundation of Artificial Intelligence” for the U.G. Programmes Under all the faculties. As per Extra-Ordinary Notification No. 241/2025 of SGBAU, dated 24/12/2025. Students will earn grade from written examination marks conducted by the concerning college.

SEMESTER – VI

Computer Application (General (109)/Vocational (110)) Credits, Workload, Examination, Evaluation and Assessment Scheme

The Vertical	Course Code	Course Title	Credits	Workload	Theory/Practical				Theory/ Practical (Total)	
					External		Internal			
					Max. Marks	Min. Marks	Max. Marks	Min. Marks	Max. Marks	Min. Marks
Major-T10	109221/110221	Programming with LISP	2	2	30	9	20	6	50	20
Major-T11	109222/110222	Cyber Law and Ethics	2	2	30	9	20	6	50	20
Major-T	109223/110223	IoT Applications	2	2	30	9	20	6	50	20
Major-Lab/Practical-20	109224/110224	Laboratory on Programming with LISP and IoT Applications	2	4	25	10	25	10	50	20
Major-Elective T12	109225/110225	Artificial Intelligence	2	2	30	9	20	6	50	20
Major-Elective T2	109226/110226	Computer Animation	2	2	30	9	20	6	50	20
Major-Elective Lab/Practical-22	109227/110227	Laboratory on Artificial Intelligence	2	4	25	10	25	10	50	20
Major-Elective Lab/Practical-22	109228/110228	Laboratory on Computer Animation	2	4	25	10	25	10	50	20
Minor-T6	109267/110267	Advance Python Programming	2	2	30	9	20	6	50	20
Minor-P23	109268/110268	Laboratory on Advance Python Programming	2	4	25	10	25	10	50	20
VSC-P24	109288/110288	Laboratory on R Programming	2	4	-	-	50	20	50	20
Internship / Apprenticeship	112294/110294	Internship / Apprenticeship in Computer Application (General (109)/Vocational (110))	4	8	-	-	50	20	50	20

SYLLABUS
B.Sc.- III, SEMESTER – V
Computer Application
(General (109)/
Vocational (110))

Major Course: Digital Communication Technologies

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	109213/110213	Digital Communication Technologies	2	30	2 Hrs	30

Course Objectives:	1. Understand the basic concepts and elements of digital communication systems. 2. Explain information theory, channel characteristics, and source coding techniques. 3. Analyse sampling, quantization, PCM, and digital modulation techniques. 4. Understand multiplexing and multiple access methods used in communication systems. 5. Describe spread spectrum modulation techniques and their applications in modern communication systems.						
Course Outcomes:	CO1 Explain the fundamentals of digital communication systems, communication channels, and information theory. CO2 Apply sampling, quantization, PCM, and digital modulation techniques in communication systems. CO3 Differentiate various shift keying and M-ary encoding techniques used in digital communication. CO4 Analyse multiplexing and multiple access techniques such as TDM, FDM, CDM, TDMA, FDMA, and CDMA. CO5 Explain spread spectrum modulation techniques, PN sequences, DSSS, and FHSS applications.						
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies			
Unit I	Introduction to Digital Communication	8 Hrs	8 Marks	Use any			

	Introduction to Digital Communication: Elements of digital communication system with its block diagram: Source, Channel, Transmitter, Receiver. Advantages & disadvantages of digital communication. Communication Channel Characteristics: Bit rate, Baud rate, Bandwidth, Repeater distance, Applications. Information Theory: Concept of entropy & information rate, Channel capacity, Hartley’s law, Shannon–Hartley theorem, Source coding, Huffman coding.			pedagogical technique suitable for the topic
Unit II	<u>Pulse Code Modulation Technique</u> Sampling & Quantization: Sampling process, Types of sampling, Nyquist sampling theorem (only statement), Aliasing effect, Quantization process, Quantization error/noise Digital Modulation: Concept of digital modulation, Types of digital modulation techniques, Advantages, Coherent and non-coherent detection Shift Keying Techniques: Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), Differential Phase Shift Keying (DPSK), Quadrature Phase Shift Keying (QPSK) M-ary Encoding; M-ary FSK, M-ary PSK.	7 Hrs	7 Marks	
Unit III	<u>Multiplexing and Multiple Access Techniques</u> Multiplexing Methods: Need and methods of multiplexing, Time Division Multiplexing (TDM), Frequency Division Multiplexing (FDM), Code Division Multiplexing (CDM) Block diagram & comparison Multiple Access Techniques: Time Division Multiple Access (TDMA), Frequency Division Multiple Access (FDMA), Code Division Multiple Access (CDMA).	8 Hrs	8 Marks	
Unit IV	<u>Spread Spectrum Modulation</u> Introduction to Spread Spectrum (SS) modulation, Advantages over fixed frequency, Applications of SS modulation, Block diagram of spread spectrum modulation system Pseudo Noise (PN) Sequence: Definitions, Generation, Maximum length sequence Types of SS Modulation: Direct Sequence Spread Spectrum (DSSS), Frequency Hopped Spread Spectrum (FHSS).	7 Hrs	7 Marks	
References:	Course Material/Learning Resources Text books: 1. “Digital Communication System” by Siman Haykin 2. “Digital Communication System” by B. P. Lathi Reference Books: 1. Digital Communications by John G. Proakis, Masoud Salehi 5th Edition 2. Electronic Communication Systems by George Kennedy, Bernard Davis 4th or 5th Edition Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://onlinecourses.nptel.ac.in/noc25_eeXX/preview?utm_source=chatgpt.com			

	2. https://www.getyoureducation.net/course/modern-digital-communication-techniques?utm_source=chatgpt.com 3. https://www.classcentral.com/course/swayam-analog-and-digital-communications-i-hinglish-502941?utm_source=chatgpt.com Weblink to Equivalent Virtual Lab if relevant: 1. https://www.vlab.co.in/ba-nptel-labs-electronics-and-communications?utm_source=chatgpt.com 2. https://ece.iiitk.ac.in/course/ec303-communication-lab-i?utm_source=chatgpt.com
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Assessment Rubric: Internal for Theory Course (Major)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. III, SEMESTER – V (NEP)			
Theory	Course Code: 109213/110213	Course Title: Digital Communication Technologies	Max Marks: 20
Sr. No.	Assessment Criteria		Marks
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)		10
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)		5
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, Case Study, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)		5

Major Course: Scripting Language

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	109214 / 110214	Scripting Language	2	30	2 Hrs	30

Course Objectives:	1. To understand the fundamentals of JavaScript programming including syntax, variables, operators, and decision-making statements. 2. To develop problem-solving skills using looping constructs and array operations in JavaScript. 3. To learn the use of functions, built-in objects, and JSON for modular programming and data handling. 4. To create interactive web applications using JavaScript objects, DOM manipulation, event handling, and AJAX concepts.					
Course Outcomes:	CO1: Understand the fundamentals of JavaScript, scripting concepts, data types, operators, and decision-making statements for developing basic web programs. CO2: Apply looping constructs and array operations to solve computational and data manipulation problems effectively. CO3: Develop modular programs using functions, built-in objects, recursion, and JSON for data representation and processing. CO4: Create interactive web applications using JavaScript objects, DOM manipulation, event handling, form validation, and AJAX concepts					
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies		
Unit I	Introduction to JavaScript: Introduction to Scripting Languages, Features and Applications of JavaScript, Embedding JavaScript in HTML, Variables, Constants and Data Types, Operators in JavaScript, Input and Output Statements, Comments, Decision Making Statements: if, if-else, nested if, switch statement	8 Hrs	8 Marks	Use any pedagogical technique suitable for the topic		
Unit II	Loops and Arrays: Loops: Introduction to Loops, Loop statements: for loop, while loop, do-while loop, Nested loops, break and continue statements, Arrays: Introduction to Arrays: Creating Arrays, Accessing Array Elements, Array Traversal using Loops, One-dimensional Arrays, Two-dimensional Arrays, Array functions: push(), pop(), shift(), unshift(), sort(), reverse(), splice(), slice()	7 Hrs	7 Marks			
Unit III	Functions & JSON Function definition & its need, Types of functions: User-defined functions & Built in	8 Hrs	8 Marks			

	functions, Function parameters and return values, Scope of Variables, String Handling Functions, Date and Math Objects, Recursive Functions, Introduction to JSON, Features and advantages of JSON, Importance of JSON in web applications, Creating JSON objects, JSON arrays, Accessing JSON data			
Unit IV	Objects, Events and DOM JavaScript Objects, Creating and using objects: Document Object Model (DOM), Accessing HTML Elements using JavaScript, Event Handling: onclick, onload, onchange, onsubmit, Form Validation using JavaScript, Browser Objects: window, document, navigator.	7 Hrs	7 Marks	
References:	Text Books: 1. Head First JavaScript Programming – Eric Freeman & Elisabeth Robson 2. JavaScript: The Definitive Guide – David Flanagan			
	Reference Books: 1. JavaScript: The Good Parts — Douglas Crockford 2. JavaScript and jQuery: Interactive Front-End Web Development-- Jon Duckett			
	Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://onlinecourses.swayam2.ac.in/e-learning/preview/ntr25_ed64 2. https://onlinecourses.swayam2.ac.in/e-learning/preview/imb26_mg155 3. https://www.classcentral.com/course/swayam-web-technologies-473712 4. https://onlinecourses.swayam2.ac.in/e-learning/preview/ntr25_ed64			

Assessment Rubric: Internal for Theory Course (Major)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. III, SEMESTER – V (NEP)			
Theory	Course Code: 109214/110214	Course Title: Scripting Language	Max Marks: 20
Sr. No.	Assessment Criteria		Marks
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)		10
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)		5
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, Case Study, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)		5

Major Course: User Interface Design

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	109215 / 110215	User Interface Design	2	30	2 Hrs	30

Course Objectives:	1. To learn fundamentals of User Interface (UI) Design. 2. To understand design principles for creating effective interfaces. 3. To learn basics of wireframes and prototypes for web and mobile applications. 4. Understand usability, accessibility, and responsive design concepts.				
Course Outcomes:	1. Understand the fundamental concepts of User Interface (UI) Design and (HCI) 2. Apply visual design principles such as color, typography etc. 3. Analyze user requirements and create user-centered designs using wireframes. 4. Use modern UI/UX design tools such as Figma, Adobe XD, and Sketch for designing interactive interfaces				
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies	
Unit I	Fundamental of UI Design: Definition, Importance of good design, Brief History: Command-Line Interface (CLI), Graphical User Interface (GUI), Key Principles of UI Design, Types of Interfaces: Web Interface, Mobile (iOS/Android), Touch based Interface, Voice User Interface (VUI).	8 Hrs	8 Marks	Use any pedagogical technique suitable for the topic	
Unit II	UI Design Process : Human-Computer Interaction (HCI) Basics, Characteristics of Good HCI, Applications of HCI, UI Process Phases: Requirement Analysis, User Research, Information Architecture, Wireframing, Visual Design, Prototyping, Usability Testing, Implementation and Development.	7 Hrs	7 Marks		
Unit III	Visual Design for Interfaces: Visual Design Fundamentals: Definition, Principles of Visual Design, Color Theory in UI Design, Typography in UI Design, Layout and Composition, Icons and Imagery.	8 Hrs	8 Marks		
Unit IV	Usability and Accessibility: Usability Principles, Heuristic Evaluation, Accessibility Standards, User Testing Methods Tools: Figma, Adobe XD, Sketch (Basic component creation, Auto-layout, Constraints)	7 Hrs	7 Marks		

References:	Course Material/Learning Resources Text books: 1. The Design of Everyday Things by Don Norman 2. The Essential Guide to User Interface Design by Wilbert O. Galitz Reference Books: 1. Designing Interfaces: Patterns for Effective Interaction Design by Jenifer Tidwell 2. The Design of Everyday Things by Don Norman Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_ar05
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Assessment Rubric: **Internal for Theory Course (Major)**

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. III, SEMESTER – V (NEP)			
Theory	Course Code: 109215 / 110215	Course Title: User Interface Design	Max Marks: 20
Sr. No.	Assessment Criteria		Marks
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)		10
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)		5
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, Case Study, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)		5

Major Course: Laboratory on Scripting Language

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	109216 / 110216	Laboratory on Scripting Language	2	30	2 Hrs	30

Course Objectives:	1. To understand the fundamentals of JavaScript programming including syntax, variables, operators, and decision-making statements. 2. To develop problem-solving skills using looping constructs and array operations in JavaScript. 3. To learn the use of functions, built-in objects, and JSON for modular programming and data handling. 4. To create interactive web applications using JavaScript objects, DOM manipulation, event handling, and AJAX concepts.						
Course Outcomes (COs)	1. Develop JavaScript programs using variables, operators, decision-making statements, loops, and arrays to solve basic computational problems. 2. Apply JavaScript functions, string handling methods, Date and Math objects, and JSON concepts for data processing and program development. 3. Create and manipulate arrays, JSON objects, and JSON arrays using appropriate JavaScript methods and techniques. Design interactive web pages using DOM manipulation, event handling, and form validation techniques in JavaScript.						
Content					Workload allotted	Weightage of Marks Allotted	Incorporation of pedagogies
1. Write a program to demonstrate input and output statements. 2. Write a program to find whether a number is even or odd using if-else. 3. Write a program to find the largest of three numbers using nested if. 4. Write a program to display day name using switch statement. 5. Write a program to calculate simple interest using variables and constants. 6. Write a program to calculate factorial using while loop. 7. Write a program to generate Fibonacci series using do-while loop. 8. Write a program to demonstrate nested loops using pattern printing. 9. Write a program to create and display one-dimensional array elements. 10. Write a program to perform array traversal using loops. 11. Write a program to demonstrate array functions: push(), pop(), shift(), unshift(), sort(), reverse(). 12. Write a program to create user-defined functions for arithmetic operations. 13. Write a program using String handling functions. 14. Write a program using Date and Math objects.							Use any pedagogical technique suitable for the topic

15. Write a program to create and access JSON objects.			
16. Write a program to create JSON arrays and display data.			
17. Write a program to access HTML elements using DOM methods.			
18. Write a program demonstrating onclick event.			
19. Write a program demonstrating on change event.			
20. Write a program demonstrating on submit form validation.			

Assessment Rubric: External Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. III, SEMESTER – V (NEP)				
Practical	Course Code:109216 / 110216	Laboratory on Scripting Language	Max Marks: 25	Time: 4 Hrs.
Sr. No.	Exercise			Marks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout			10
2.	Submitted Record book (Preferably handwritten)			05
3.	External Viva Voce			10

Assessment Rubric: Internal Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. III, SEMESTER – V (NEP)			
Practical	Course Code:109216 / 110216	Laboratory on Scripting Language	Max Marks: 25
Sr. No.	Assessment Criteria		Marks
1.	Attendance/Regularity in practical's / Students' overall performance		05
2.	Record book Preparation (Preferably handwritten)		10
3.	Internal Viva Voce		10

Major Course (Elective-1): M-Commerce

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	109217/ 110217	M-Commerce	2	30	2 Hrs	30

Course Objectives:	1. To understand the Foundations of E-Commerce and M-Commerce Concepts 2. To develop M-Commerce Technology and Infrastructure Software and Hardware. 3. To learn the use of Mobile Payment Systems and Fin-Tech Instruments. 4. To create Mobile Marketing and Applications.				
Course Outcomes:	CO1: Understand the fundamentals of E-Commerce and M-Commerce Concepts.CO2: To develop M-Commerce Technology and Infrastructure Software and Hardware. CO3: To learn the use of Mobile Payment Systems and Fin-Tech Instruments like E Banking and Security. CO4: To create Mobile Marketing and Applications like channel, Services and Customer Behavior.				
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies	
Unit I	Foundations of E-Commerce and M-Commerce Concepts: Digital commerce evolution, traditional vs. electronic commerce, and the transition from e-commerce to m-commerce. Framework: M-Commerce definition, scope, player types, and life cycle. Economics: Business models, revenue frameworks, value chains, and functional information models. Factors: Driving forces, strategic benefits, device constraints, and market limitations of wireless business.	8 Hrs	8 Marks	Use any pedagogical technique suitable for the topic	
Unit II	M-Commerce Technology and Infrastructure Hardware: Mobile clients, screen layout optimization, and handheld user interfaces. Software: Mobile operating systems (iOS, Android), micro-browsers, and page description languages. Networks: Wireless wide area network (WWAN) technologies, including 3G, 4G, 5G, LTE, and Wi-Fi networks.	7 Hrs	7 Marks		

	Data Routing: System architecture, base station servers, and real-time database access in mobile environments.		
Unit III	Mobile Payment Systems and Fin-Tech Instruments: Credit/debit cards, smart cards, internet banking, and cryptocurrencies. Infrastructure: Unified Payment Interface (UPI), mobile wallets, BHIM, Aadhar Enabled Payment Services (AePS), and IMPS. E-Banking: Mobile banking portals, microfinance tech platforms, and payment gateways. Security: Encryption protocols, biometric authentication, fraud indicators, and tokenization techniques.	8 Hrs	8 Marks
Unit IV	Mobile Marketing and Applications Strategies: Location-based marketing, context-aware advertising, and data-driven mobile analytics. Channels: App-based marketing, SMS/MMS campaigns, push notifications, and QR-code systems. Services: Mobile ticketing, entertainment apps, information services, and real-time location tracking (GPS/Triangulation). Consumer Behavior: Mobile shopping patterns, user experience design (UX), and brand-building over handheld systems.	7 Hrs	7 Marks
References:	Text Books: 1. Mobile Commerce - Karabi Bandyopadhyay Mobile Commerce: Technology, Theory and Applications - Brian Mennecke and Troy J. Strade		
	Reference Books: 1. Mobile Commerce: Technology, Theory, and Applications by Brian E. Mennecke and Troy J. Strader 2. Mobile Commerce: Opportunities, Applications, and Technologies of Wireless Business by Paul May 3. Global Mobile Commerce: Strategies, Implementation and Case Studies by Wayne W. Huang		

Assessment Rubric: Internal for Theory Course (Major Elective-1)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. III, SEMESTER – V (NEP)			
Theory	Course Code: 109217/110217	Course Title: M-Commerce	Max Marks: 20
Sr. No.	Assessment Criteria		Marks
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)		10
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)		5
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, Case Study, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)		5

Major Course (Elective-1): Cryptography

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	109218 / 110218	Cryptography	2	30	2 Hrs.	30

Course Objectives:	1. To introduce the basic concepts of cryptography and information security. 2. To understand simple encryption and decryption techniques. 3. To study modern cryptographic methods and their applications. 4. To develop awareness about cybersecurity and secure communication.						
Course Outcomes:	Students will be able to – 1. Understand basic concepts of cryptography and security. 2. Apply simple encryption and decryption techniques. 3. Identify real-world applications of cryptography. 4. Understand secure communication methods used in modern systems.						
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies			
Unit I	Introduction to Cryptography: Introduction to Information Security, Need and Importance of Cryptography, Goals of Cryptography: Confidentiality, Integrity, Authentication, Non-Repudiation. Terminologies: Plaintext, Ciphertext, Encryption, Decryption, Key. Types of Cryptography: Symmetric Key, Asymmetric Key. Applications of Cryptography in Daily Life: ATM, Online Banking, WhatsApp, E-Commerce, Digital Payments	8 Hrs.	8 Marks	Use any pedagogical technique suitable for the topic			
Unit II	Classical Encryption Techniques: Caesar Cipher, Monoalphabetic Cipher, Playfair Cipher, Rail Fence Technique, Transposition Cipher, Simple Steganography Concepts, Advantages and Limitations of Classical Ciphers. Application Oriented Examples: Secret message encoding, Password hiding techniques, Basic text encryption activities.	7 Hrs.	7 Marks				
Unit III	Modern Cryptography: Introduction to Modern Cryptography, Symmetric Encryption: DES (Introduction only), AES (Basic Concept). Asymmetric Encryption: RSA Algorithm (Basic Working),	8 Hrs.	8 Marks				

	Hashing Concepts, Digital Signature, Public Key Infrastructure (PKI), Secure Communication over Internet. Applications: Secure email, Online transactions, Digital certificates, OTP and authentication systems.		
Unit IV	Cryptography Applications and Cyber Security: Cryptography in Cyber Security, Password Security and Best Practices, Encryption in Mobile Applications, Cryptography in Cloud Computing, Blockchain and Cryptocurrency Basics, Ethical Issues in Cryptography, Future Trends in Cryptography. Small Practical Applications: File encryption and decryption demonstration, Password strength analysis, Simple encryption tools, Secure communication examples.	7 Hrs.	7 Marks
References:	Course Material/Learning Resources Text books: 1. Network Security Essentials by William Stallings 2. Introduction to Modern Cryptography Jonathan Katz Reference Books: 1. Cryptography and Network Security: Principles and Practice. By William Stallings, Pearson Education. 2. Cryptography Made Simple by Nigel Smart 3. Understanding Cryptography: A Textbook for Students and Practitioners” by Christof Paar and Jan Pelzl, Springer. Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://onlinecourses.swayam2.ac.in/e-learning/preview/nou26_ma04 2. https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_cs57 3. https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_cs18 Any pertinent media (recorded lectures, YouTube, etc.) if relevant: https://www.youtube.com/channel/UC1usFRN4LCMcfIV7UjHNuQg		

Assessment Rubric: Internal for Theory Course (Major Elective-1)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. III, SEMESTER – V (NEP)			
Theory	Course Code: 109218/110218	Course Title: Cryptography	Max Marks: 20
Sr. No.	Assessment Criteria		Marks
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)		10
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)		5
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, Case Study, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)		5

Major Course (Elective-1 Laboratory): Laboratory on M Commerce

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	109219 / 110219	Laboratory on M Commerce	2	60	4Hrs.	50

Course Objectives:	1. To introduces the basic concepts and terminology of M Commerce. 2. To understand and implement QR Code, UPI Payment and Mobile Payment. 3. To develop awareness about Ticket Booking and Mobile Shopping. 4. To study practical applications of healthcare Services using mobile applications.						
Course Outcomes:	On competition of the following syllabus the students will be able to - 1. Students will be able to understand the fundamental concepts, terminology, and importance of Mobile Commerce 2. Know about QR Code, UPI Payment and Digital Wallet. 3. NFC-based payment systems. 4. Emerging trends in mobile commerce technologies..						
Contents					Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
1. Study of popular mobile commerce applications. 2. Creating and scanning QR codes. 3. Demonstration of digital wallet applications. 4. Study of UPI payment system. 5. Comparison of mobile commerce and e-commerce platforms. 6. Security settings analysis in mobile payment applications. 7. Study of mobile banking applications. 8. Case study on mobile marketing applications. 9. Analysis of mobile commerce security threats. 10. Mini project based on mobile commerce applications. 11. Study of mobile ticket booking applications. 12. Demonstration of online food delivery applications and payment process. 13. Study of authentication methods used in mobile commerce applications. 14. Create and test QR code for product information sharing.							Use any pedagogical technique suitable for the topic

15. Study of NFC-based payment systems.			
16. Analysis of security features in digital wallet applications.			
17. Study of mobile commerce applications used in healthcare services.			
18. Case study on social media marketing through mobile applications.			
19. Survey and comparison of popular mobile payment platforms.			
20. presentation on emerging trends in mobile commerce technologies.			

Assessment Rubric: External Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. III, SEMESTER – V (NEP)				
Practical	Course Code: 109219/110219	Laboratory on M Commerce	Max Marks: 25	Time: 4 Hrs.
Sr. No.	Exercise			Marks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout			10
2.	Submitted Record book (Preferably handwritten)			05
3.	External Viva Voce			10

Assessment Rubric: Internal Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. III, SEMESTER – V (NEP)			
Practical	Course Code: 109219/110219	Laboratory on M Commerce	Max Marks: 25
Sr. No.	Assessment Criteria		Marks
1.	Attendance/Regularity in practical's / Students' overall performance		05
2.	Record book Preparation (Preferably handwritten)		10
3.	Internal Viva Voce		10

Major Course (Elective-1 Laboratory): Laboratory on Cryptography

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	109220 / 110220	Laboratory on Cryptography	2	60	4Hrs.	50

Course Objectives:	1. To introduces the basic concepts and terminology of cryptography and secure communication. 2. To understand and implement classical encryption and decryption techniques. 3. To develop awareness about modern security mechanisms such as hashing, OTP, and digital signatures. 4. To study practical applications of cryptography in secure communication and cybersecurity.						
Course Outcomes:	On completion of the following syllabus the students will be able to - 1. Students will be able to understand the fundamental concepts, terminology, and importance of cryptography in information security. 2. Program Arduino boards using Arduino IDE. 3. Interface sensors and actuators with Arduino. 4. Develop basic IoT applications and projects.						
Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies				
1. Study of basic cryptography terminology and concepts. 2. Write a program to implement Caesar Cipher encryption. 3. Write a program to implement Caesar Cipher decryption. 4. Encrypt and decrypt text using Monoalphabetic Cipher. 5. Write a program for Rail Fence Cipher technique. 6. Perform simple text encryption using Transposition Cipher. 7. Write a program to convert plaintext into ciphertext. 8. Write a program to convert ciphertext into plaintext. 9. Demonstrate secret message encoding using simple substitution method. 10. Study and demonstration of password protection techniques. 11. Create and test strong passwords using online password tools. 12. Study of OTP-based authentication system. 13. Demonstration of hashing using simple online tools.			Use any pedagogical technique suitable for the topic				

14. Study of digital signatures and certificates.			
15. Encrypt and decrypt a text file using basic encryption software.			
16. Study of secure websites using HTTPS protocol.			
17. Compare secure and insecure communication methods.			
18. Study of encryption used in mobile applications like WhatsApp and banking apps.			
19. Perform basic steganography using text or image hiding tools.			
20. Mini activity based on secure communication and message protection.			

Assessment Rubric: External Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. III, SEMESTER – V (NEP)				
Practical	Course Code:109220/110220	Laboratory on Cryptography	Max Marks: 25	Time: 4 Hrs.
Sr. No.	Exercise			Marks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout			10
2.	Submitted Record book (Preferably handwritten)			05
3.	External Viva Voce			10

Assessment Rubric: Internal Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. III, SEMESTER – V (NEP)			
Practical	Course Code:109220/110220	Laboratory on Cryptography	Max Marks: 25
Sr. No.	Assessment Criteria		Marks
1.	Attendance/Regularity in practical's / Students' overall performance		05
2.	Record book Preparation (Preferably handwritten)		10
3.	Internal Viva Voce		10

Minor Course: Digital Image Processing

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	109265 / 110265	Digital Image Processing	2	30	2 Hrs	30

Course Objectives:	1. To understand the basics of digital images and image processing. 2. To perform simple image editing and enhancement operations. 3. To learn practical applications of image processing using ImageJ. 4. To develop basic skills in image analysis.				
Course Outcomes:	After completion of the course, students will be able to: 1. Understand basic concepts of digital images. 2. Perform image enhancement operations using ImageJ. 3. Apply simple image processing techniques. 4. Use ImageJ for basic image analysis applications.				
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies	
Unit I	Introduction to Digital Images: Introduction to Digital Image Processing, Applications of Image Processing, Digital Image and Pixel Concept, Gray Scale and Color Images, Image Resolution, Image File Formats: BMP, JPEG, PNG. Introduction to Image Processing Software/Tool (e.g. ImageJ), Opening, Saving and Viewing Images in ImageJ	8 Hrs	8 Marks	Use any pedagogical technique suitable for the topic	
Unit II	Basic Image Enhancement using image processing tools: Need of Image Enhancement, Concept of Image Brightness and Brightness Adjustment, Concept of Image Contrast and Contrast Adjustment, Concept of Image Negative, Histogram of Image, Histogram Equalization, Image Thresholding	7 Hrs	7 Marks		
Unit III	Image Filtering and Simple Processing using Image Processing Tools: Introduction to Image Noise, Noise Removal, Smoothing Filter, Sharpening Filter, Edge Detection, Image Cropping, Image Resizing, Image Rotation	8 Hrs	8 Marks		
Unit IV	Image Analysis and Applications: Introduction to Image Measurement, Region of Interest (ROI), Area and Perimeter	7 Hrs	7 Marks		

	Measurement, Distance Measurement, Object Counting, Particle Analysis, Applications in Medical and Industrial Images		
References :	Course Material/Learning Resources Text books: Digital Image Processing, Authors: Rafael C. Gonzalez, Richard E. Woods, Edition: 4th Edition, Publisher: Pearson Education Fundamentals of Digital Image Processing Author: Anil K. Jain, Edition: 1st Edition, Publisher: PHI Learning Reference Books: Digital Image Processing, Author: S. Sridhar, Edition: 2nd Edition, Publisher: Oxford University Press Image Processing, Analysis and Machine Vision Authors: Milan Sonka, Vaclav Hlavac, Roger Boyle, Edition: 4th Edition, Publisher: Cengage Learning Digital Image Processing and Analysis, Authors: Bhabatosh Chanda, Dwijesh Dutta Majumder, Edition: 2nd Edition Publisher: PHI Learning Weblink to Equivalent MOOC on SWAYAM if relevant: Digital Image Processing, by Prof. Prabir Kumar Biswas, IIT Kharagpur https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_ee126 Weblink to Equivalent Virtual Lab if relevant: - ImageJ official website: Digital Image Processing https://imagej.net/ij/?utm_source=chatgpt.com		

Assessment Rubric: Internal for Theory Course (Minor)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. III, SEMESTER – V (NEP)			
Theory	Course Code: 109265/110265	Course Title: Digital Image Processing	Max Marks: 20
Sr. No.	Assessment Criteria		Marks
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)		10
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)		5
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, Case Study, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)		5

Minor Course: Laboratory on Digital Image Processing

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	109266 / 110266	Laboratory on Digital Image Processing	2	60	4Hrs	50

Course Objectives:	1. To introduce students to the fundamentals of digital image processing using software's/tools. 2. To develop practical skills in image acquisition, enhancement, transformation, and analysis techniques. 3. To enable students to perform operations such as filtering, segmentation, histogram processing, and edge detection. 4. To provide hands-on experience in image measurement, object analysis, and manipulation for real-world applications. 5. To familiarize students with image processing applications in medical, industrial, and scientific domains.						
Course Outcomes:	After successful completion of this practical course, students will be able to: 1. Use image processing software's/tools for basic and advanced image processing operations. 2. Analyze image properties such as pixels, resolution, brightness, and contrast. 3. Apply image enhancement techniques including filtering, histogram equalization, and sharpening. 4. Perform image transformation and segmentation operations effectively. 5. Measure, analyze, and interpret objects and regions in digital images for practical applications.						
Contents					Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
1. Study of image processing tools interface and basic tools. 2. Opening, viewing, and saving different image formats (BMP, JPEG, PNG). 3. Experiment to identify pixels and image resolution properties. 4. Conversion of color image into grayscale image. 5. Adjusting image brightness using ImageJ tools. 6. Adjusting image contrast for image enhancement. 7. Creating image negative from a given image. 8. Plotting and analyzing histogram of an image. 9. Performing histogram equalization on low-contrast images. 10. Applying thresholding techniques for image segmentation. 11. Adding noise to an image and observing its effects. 12. Removing noise using smoothing filters. 13. Applying sharpening filters for image enhancement.							Use any pedagogical technique suitable for the topic

14. Performing edge detection using available filters. 15. Cropping a selected region from an image. 16. Resizing an image using scaling operations. 17. Rotating images at different angles. 18. Measuring area and perimeter of objects in an image. 19. Distance measurement between two points using ROI tools. 20. Object counting and particle analysis in medical or industrial images.				
References:	Weblink to Equivalent MOOC on SWAYAM if relevant: Virtual Lab: 1. https://cse19-iiith.vlabs.ac.in/ 2. https://imagej.net/tutorials/ 3. https://imagej.net/docs/ 4. https://imagej.net/tutorials/segmentation-in-fiji			

Suggested Statement for Syllabus

“Theory and practical’s shall be conducted using ImageJ or equivalent open-source image processing software.”

Assessment Rubric: External Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. III, SEMESTER – V (NEP)				
Practical	Course Code:109266/110266	Laboratory on Digital Image Processing	Max Marks: 25	Time: 4 Hrs.
Sr. No.	Exercise			Marks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout			10
2.	Submitted Record book (Preferably handwritten)			05
3.	External Viva Voce			10

Assessment Rubric: Internal Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. III, SEMESTER – V (NEP)			
Practical	Course Code:109266/110266	Laboratory on Digital Image Processing	Max Marks: 25
Sr. No.	Assessment Criteria		Marks
1.	Attendance/Regularity in practical's / Students' overall performance		05
2.	Record book Preparation (Preferably handwritten)		10
3.	Internal Viva Voce		10

VSC: Laboratory on PHP Programming

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	109286 / 110286	Laboratory on PHP Programming	2	60	4Hrs	50

Course Objectives:	1. To introduce the fundamentals of PHP programming and server-side scripting concepts. 2. To develop programming skills using variables, operators, control statements, functions, arrays, and strings in PHP. 3. To provide hands-on experience in handling forms, files, cookies, and sessions in web applications. 4. To enable students to connect PHP applications with MySQL databases and perform database operations. 5. To develop practical skills for designing dynamic and interactive web applications using PHP.						
Course Outcomes:	After successful completion of this practical course, students will be able to: 1. Develop basic PHP programs using syntax, variables, operators, and control structures. 2. Create and manage functions, arrays, strings, and file handling operations in PHP. 3. Design interactive web forms and implement validation techniques. 4. Implement session and cookie management for web-based applications. 5. Develop database-driven PHP applications with MySQL connectivity.						
Contents					Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
1. Write a PHP program to display “Hello World” and demonstrate the basic structure of a PHP script. 2. Write a PHP program to demonstrate the use of variables, constants, and different data types. 3. Write a PHP program to perform arithmetic, relational, and logical operations using operators. 4. Write a PHP program to find the largest of three numbers using decision-making statements. 5. Write a PHP program to generate the multiplication table of a given number using loops. 6. Write a PHP program to demonstrate the use of user-defined functions with arguments and return values. 7. Write a PHP program to perform various string operations using built-in string functions. 8. Write a PHP program to create and manipulate indexed and associative arrays. 9. Write a PHP program to sort an array in ascending and descending order. 10. Write a PHP program to accept user input through an HTML form using GET and POST methods. 11. Write a PHP program to validate a registration form containing fields like name, email, and mobile number.							Use any pedagogical technique suitable for the topic

12. Write a PHP program to create, read, write, and append data to a text file. 13. Write a PHP program to demonstrate the use of cookies in PHP. 14. Write a PHP program to create and manage sessions for user login/logout functionality. 15. Write a PHP program to display current date and time using PHP date and time functions. 16. Write a PHP program to establish connectivity between PHP and MySQL database. 17. Write a PHP program to insert records into a MySQL database table using PHP. 18. Write a PHP program to display records from a MySQL database table in tabular format. 19. Write a PHP program to update and delete records from a MySQL database table. 20. Write a PHP program to upload an image or document file to the server using PHP.				
References:	Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://onecompiler.com/php/3wdebrepb 2. https://onlinecourses.swayam2.ac.in/e-learning/preview/aic20_sp32 3. https://www.w3schools.com/php/ 4. https://php.org/			

Assessment Rubric: Internal Examination Practical Course (VSC)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. III, SEMESTER – V (NEP)			
Practical	Course Code: 109286/110286	Laboratory on PHP Programming	Max Marks: 50
Sr. No.	Assessment Criteria		Marks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout		20
2.	Record book preparation (Preferably handwritten) / Assignments preparation during semester		10
3.	Attendance in practical session / Students' overall performance		10
4.	Internal Viva Voce		10

SEC: Laboratory on User Interface Design

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.0	V	109287 / 110287	Laboratory on User Interface Design	2	60	4 Hrs	50

Course Objectives:	1. To learn fundamentals of User Interface (UI) Design. 2. To understand design principles for creating effective interfaces. 3. To learn basics of wireframes and prototypes for web and mobile applications. 4. Understand usability, accessibility, and responsive design concepts.						
Course Outcomes:	1. Understand the fundamental concepts of User Interface (UI) Design and (HCI) 2. Apply visual design principles such as color, typography etc. 3. Analyze user requirements and create user-centered designs using wireframes. 4. Use modern UI/UX design tools such as Figma, Adobe XD, and Sketch for designing interactive interfaces						
Contents:					Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
1. Demonstration to Create a simple design workspace. 2. Demonstration to Create layers and frames 3. Demonstration to Apply color theory and contrast principles 4. Demonstration to Create different color schemes for a website or mobile app 5. Demonstration to Design a page using different font styles and size 6. Demonstration to Create heading and subheading. 7. Demonstration to Create paragraph hierarchy 8. Demonstration to Create a simple webpage layout 9. Demonstration to Use alignment, spacing, and grid concepts 10. Demonstration to Design low-fidelity wireframes for: Login Page 11. Demonstration to Design low-fidelity wireframes for: Registration Form 12. Demonstration to Design a basic mobile app screen 13. Demonstration to Design different types of buttons							Use any pedagogical technique suitable for the topic
Demonstration to Create menu bars and navigation systems							
Suggested Software for Practical's							

• Figma • Adobe XD • Canva • Sketch			
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Assessment Rubric: Internal Examination Practical Course [(SEC)]

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. III, SEMESTER – V (NEP)			
Practical	Course Code: 109287/110287	Laboratory on User Interface Design	Max Marks: 50
Sr. No.	Assessment Criteria		Marks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout		20
2.	Record book preparation (Preferably handwritten) / Assignments preparation during semester		10
3.	Attendance in practical session / Students' overall performance		10
4.	Internal Viva Voce		10

Project in Computer Application Regular (109)/ Vocational (110)

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	V	109293/110293	Project in Computer Application Regular (109)/ Vocational (110)	2	--	--	--
Course Objectives: 1. To understand the research project development process. 2. To motivate students to undertake research projects and pursue innovations. 3. To cultivate a research and innovation mindset in students. 4. To create awareness about Design Thinking and innovative research idea generation.							
Course Outcomes: Upon successful completion of the course, students will be able to: 1. Develop new research ideas and innovations. 2. Create innovative solutions for identified problems. 3. Use research tools effectively. 4. Develop feasible solutions aligned with Sustainable Development Goals (SDGs).							
Guidelines: 1. The Project must be research or Application based and focus on innovation and problem-solving. 2. The research work needs to be carried out collaboratively and the topic shall be in area of Computer Science or an interdisciplinary in nature. 3. Single or at the most group of Four student will engage in Research Project. 4. Student or group of students responsible for regularly reporting the progress of their research project to their guide (Project In-charge). 5. The synopsis must be submitted within the timeframe provided by the guide (Project In-charge)/Department. 6. Students must submit the Title and Synopsis (5-8 pages) in the prescribed format provided by guide (Project In-charge)/Department. 7. Plagiarism is strictly prohibited. Projects found to contain plagiarism will be rejected. 8. The single or at the most group of four students will conduct the project. 9. Students must submit One copy of their final project report for examination to the department. 10. All students must adhere to the given schedule for submissions and presentations. 11. Students should ensure that their research work is aligned with ethical research practices. 12. The project report and synopsis should strictly follow the provided format for consistency. 13. Students are encouraged to seek funding or support from relevant bodies and publish their research where applicable.							
Formats of the Proposal/Synopsis and Report							
Synopsis Format:							

1. Title Page
2. Certificate
3. Acknowledgement
4. Index/Table of Contents
5. Abstract
6. Introduction
7. Motivation
8. Aims and Objectives
9. Literature Review
10. Methodology
11. Proposed System/Model
12. Applications
13. References

Research Project Report Format:

1. Title Page
2. Certificate
3. Acknowledgement
4. Index/Table of Contents
5. Abstract
6. Introduction
7. Literature Review
8. Methodology
9. Proposed System/Model
10. Implementation
11. Results and Discussion
12. Conclusion and Future Scope
13. References

Assessment Rubric/Internal evaluation for the Project:**SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
B.Sc. III, SEMESTER – V (NEP)**

Project	Course Code: 109293/110293	Project in Computer Application Regular (109)/ Vocational (110)	Max Marks: 50
Sr. No.	Exercise		Marks
1	Innovativeness of Topic, Synopsis Preparation, Submission and Presentation etc.		10
2	Regular Attendance in Laboratory, Progress / objective achievements in proposed plan of research (Clarity, structure, scientific accuracy, originality, and referencing)		10
3	Project Report Quality Assessment/Submission/Evaluation (Clarity, structure, scientific accuracy, originality, and referencing Depth, relevance, etc.)		20
4	Viva-Voce/Presentation (PPT) (Visual clarity, and confidence, Findings etc.)		10



SANT GADGE BABA AMRAVATI UNIVERSITY GAZETTE

Official Publication of Sant Gadge Baba Amravati University

PART- TWO

(Extra-Ordinary)

Wednesday, the 24th December, 2025

(NOTIFICATION)

No. 241/2025

Date: 24/12/2025

Subject: Implementation of the Course of “Foundation of Artificial Intelligence” for the U.G. Programmes Under all the faculties.

It is notified for general information of all the concerned that the authorities of the University have accepted to implement the syllabus of the course “Foundation of Artificial Intelligence” to be implemented from semester V of III Year of all the Under graduate programmes in all the Faculties of the University as per NEP-2020 guidelines from the Academic Session 2026-2027 onwards which is published herewith vide Annexure- “A”

Sd/-
(Dr. Avinash Asanare) Registrar,
Sant Gadge Baba Amravati University

Annexture-A

Name of Course – “Foundation of Artificial Intelligence”

Introduction:

The National Education Policy (NEP) 2020 emphasizes the integration of Artificial Intelligence (AI) across all undergraduate levels and disciplines to foster digital literacy and problem-solving skills. ‘It can enhance the employability of the youth and prepare professionals in cutting-edge areas.’(pg. 46, R.D Kulkarni Report)

The Foundations of Artificial Intelligence course offers an overview of the key concepts, structures, applications, and ethical aspects of AI. It helps learners understand how intelligent

systems work and shape modern life. The course covers AI's definition, evolution, types, and practical uses, along with its basic architectures like rule-based systems, machine learning, and neural networks. Learners will explore AI's role in education, healthcare, and commerce while reflecting on ethical and social concerns such as privacy, bias, and automation. In line with NEP 2020, it fosters digital literacy and responsible AI awareness for all disciplines.

A) Objective

- i) Introduce all undergraduate students of all the faculties to the basic concepts, uses, and importance of AI.
- ii) Enable learners to understand AI's principles, applications, limitations, and effectively use AI tools.
- iii) Encourage students to recognize AI's role in enhancing life and engage with its social and ethical implications.

B) Outcomes

- i) Understand the fundamental concepts, types, and evolution of Artificial Intelligence.
- ii) Apply basic AI techniques and tools to real-world problems across different domains.
- iii) Evaluate the social, ethical, and professional implications of AI in everyday life.
- iv)

C) Implementation of Syllabus, Scheme of Examination and Teaching.

- 1) Curriculum, Teaching and Examination Scheme Given in Appendix A
- 2) This course given in Appendix A shall be compulsory course in **fifth semester** of all undergraduate programs of all faculties in Sant Gadge Baba Amravati University, Amravati. Medium of instruction, paper setting and writing of Answer paper shall be in English, Marathi and Hindi.
- 3) Question paper shall be set and valued by the College/ Department.
- 4) Duration of external examination shall be of 2 hours and paper shall be of 30 marks.
- 5) Internal 20 marks shall be distributed, 5 to attendance, 15 marks to assignment/class test/viva voce/presentation.
- 6) Distribution of 30 external marks shall be based on 4 units, 15 marks to short and 15 marks to long answer type questions.
- 7) It shall be obligatory on part of the college/department to conduct examination on prescribed date by the university and submit the candidate wise information as follows on university portal on due date after valuation answer books.
 - Grade A -- mark secured 30 to 50
 - Grade B -- 25 to 29
 - Grade C -- 20 to 24
 - FAIL 19 and below
- 8) The final Grade shall be determined by the combined performance in internal and external assessments. A student must secure a minimum of 30% in the internal assessment, 30% in the external assessment, and at least 40% overall to pass. Failure to meet any of these criteria will result in a grade of "Fail."
- 9) In case of failure, student need to appeared in backlog examination by paying prescribed fees.
- 10) Valuated answer book shall be kept in college custody for one academic year and random verification may be done by the University if required.

- 11) Result of final year of respective degree shall not be declared of an examination unless secured any of the grades out of A to C in Foundation of Artificial intelligence.
- 12) Grade secured by an examinee in examination of said course shall be shown on fifth and last semester marksheet.
- 13) The candidates shall have to pay Rs 150 /- in 5th semester to the college to meet out the expenses by the college on teaching of course, question paper setting and printing, paper valuation, providing answer sheet, and filling grade on University portal. In case of failure student need to pay Rs 20 /- for conduction of examination. There shall not have any facility of revaluation of answer book.
- 14) For teaching of the subject person having PG degree in any faculty with second class shall be considered eligible, provided priority shall be given to Ph.D., NET, SET, regular teacher.

15) Format of question paper

Distribution of 30 external marks shall be based on 4 units, 15 marks to short and 15 marks to long answer type questions with internal choice.

1a) Long or short answer questions based on unit number 1 having 8 marks

Or

1b) Long or short answer questions based on unit number 1 having 8 marks 2a) Long or short answer questions based on unit number 2 having 7 marks

Or

2b) Long or short answer questions based on unit number 2 having 7 marks 3a) Long or short answer questions based on unit number 3 having 8 marks

Or

3b) Long or short answer questions based on unit number 3 having 7 marks 4a) Long or short answer questions based on unit number 4 having 8 marks

Or

4b) Long or short answer questions based on unit number 4 having 8 marks

Program:				Semester:	V	
Course:	Foundation of Artificial Intelligence			Code:		
Teaching Scheme				Evaluation Scheme		
Level	Lecture	Hours	Credit	Internal	External	Total
5.5	2	2	2	20	30	50
Methods of Internal Assessment: 15 Marks to Class Tests, /Assignments/ Viva voce/ Presentation & 5 Marks to Attendance						
Course Objectives: To introduce AI concepts in a simple, real-life way with focus on understanding applications, ethics, and future opportunities.						
Course Outcomes: After completion of the course, the students will be able to:						

CO	Course Outcomes	BT Level
CO-1	Explain the basic concepts, history, and types of AI with real-life examples.	L1 – Knowledge, L2 – Understanding
CO-2	Describe AI structures and architectures using simple real-world analogies.	L2 – Understanding, L3 – Application
CO-3	Identify and analyze applications of AI in the area of arts, commerce, humanities, and daily life.	L3 – Application, L4 – Analysis
CO-4	Evaluate ethical, social issues and predict future opportunities of AI in their own fields.	L4 – Analysis, L5 – Evaluation

Unit 1: Introduction to Artificial Intelligence (8 Hours)

Definition of AI: What is Intelligence? Natural vs. Artificial, Simple definition of AI; History & Evolution of AI: From early computers to modern AI; Types of AI: Narrow AI vs. General AI vs. Super AI; AI in Everyday Life: Google Maps, E-commerce suggestions, Chatbots, Social Media feeds; Key Components: Data, Algorithms, Computing Power

Unit 2: AI Structures, Architectures & Techniques (7 Hours)

Basic Structure of an AI System; AI Architectures (Simplified): Rule Based System, Machine Learning, Neural Networks; Key Concepts: Knowledge Representation (using symbols, facts), Search & Problem Solving (maze example, finding shortest route), Natural Language Understanding (Google Translate, chatbots)

Unit 3: Applications of AI in Society (7 Hours)

AI in Different Fields: Education (Personalized learning apps, plagiarism checkers), Healthcare (Disease prediction, medical chatbots), Commerce (Fraud detection in banking, stock market predictions, customer support), Daily Life (Smart home devices, language translation, travel assistants); AI & Decision Making: Hiring, Loan Approval, Court Decisions; Advantages of AI, Limitations of AI

Unit 4: Ethical, Social & Future Aspects of AI (8 Hours)

Ethical Concerns in AI: Privacy issues (CCTV, online data), Bias & Fairness (AI preferring certain groups), Job Displacement (automation replacing humans); Responsible AI: Transparency, Accountability, Human oversight; Future Trends in AI: Self-driving cars, AI in governance, creative industries; AI and You (Career Perspective): Opportunities in Digital Marketing, Content Creation, Business Analytics, HR Tech, Creative Industries (non-programming roles)

Textbook:

Melanie Mitchell – *Artificial Intelligence: A Guide for Thinking Humans* Reference Books:

1. Boden, Margaret A., *Artificial Intelligence: A Very Short Introduction*
2. Elaine Rich – *Artificial Intelligence* (3rd Edition)
3. Godbole, Achyut, *Artificial Intelligence* Bookganga Publication.
4. Stuart Russell – *Human Compatible* (2019)

SYLLABUS
B.Sc.- III, SEMESTER – VI
Computer Application
(General (109)/
Vocational (110))

Sant Gadge Baba Amravati University, Amravati
FACULTY: Science and Technology
Teaching and Learning Scheme: for the Degree of Bachelor of Science with the
Major: Computer Application (Regular) (109)/ Computer Application (Vocational) (110)
[Three Years- Six Semesters Bachelor's Degree Programme]
[Four Years- Eight Semesters Bachelor's Degree Programme (Honors)]
[(Four Years- Eight Semesters Bachelor's Degree Programme (Honors with Research))]

Major Course: Programming with LISP

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	109221 / 110221	Programming with LISP	2	30	2 Hrs	30

Course Objectives:	1. Understand the basic concepts, structure, syntax, and features of the LISP programming language. 2. Develop programs using list processing techniques, control structures, and built-in functions in LISP. 3. Apply user-defined functions, recursion, and string handling techniques for problem solving in LISP. 4. Demonstrate file handling operations and understand the role of LISP in Artificial Intelligence applications.					
Course Outcomes:	After completion of the course, students will be able to: 1. Explain fundamental concepts of LISP including atoms, lists, symbols, expressions, and operators. 2. Perform list manipulation and implement decision-making and control structures in LISP programs. 3. Design and execute recursive and user-defined functions for solving computational problems. 4. Implement basic file handling operations and identify applications of LISP in Artificial Intelligence and real-world systems.					
Unit	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies		
Unit-I	Introduction to LISP: Introduction to LISP, History and Features of LISP, Applications of LISP, Structure of LISP Program, Atoms and Lists, Symbols and Expressions, Variables and Constants, Data Types in LISP, Operators in LISP, Input and Output Functions, Comments	8 Hrs	8 Marks	Use any pedagogical technique suitable for the topic		
Unit-II	List Processing and Control Structures:	7 Hrs	7 Marks			

	Introduction to Lists, List Creation and Manipulation, CAR, CDR, CONS Functions, APPEND and LIST Functions, Nested Lists, Conditional Statements IF, COND, Looping Concepts, Sequence of Execution, Basic Error Handling			
Unit-III	Functions in LISP: Basic Built-in Functions, User-Defined Functions, Function Arguments and Return Values, Lambda Functions, Local and Global Variables, Recursive Functions, Mathematical Programs using Recursion, String Handling Functions	8 Hrs	8 Marks	
Unit-IV	File Handling and Applications of LISP: Introduction to File Handling, Reading Data from File, Writing Data to File, File Operations, Introduction to Artificial Intelligence using LISP, Simple AI-based Examples, Advantages and Limitations of LISP, Real-world Applications of LISP	7 Hrs	7 Marks	
References:	Course Material/Learning Resources: Text books: 1. Programming in ANSI Common Lisp, by Author: Paul Graham Publisher: Prentice Hall 2. Artificial Intelligence Programming with LISP, by Authors: Eugene Charniak, Christopher K. Riesbeck, Donald P. McDermott Reference Books: 1. Common Lisp: A Gentle Introduction to Symbolic Computation, by Author: David S. Touretzky Publisher: Benjamin/Cummings Publishing Company 2. Practical Common Lisp, Author: Peter Seibel, Publisher: Apress 3. LISP, Authors: Patrick Henry Winston and Berthold Klaus Paul Horn Publisher: MIT Press Weblink to Equivalent Virtual Lab if relevant: 1. https://www.tutorialspoint.com/lisp/index.htm 2. https://ocw.mit.edu/courses/6-001-structure-and-interpretation-of-computer-programs-spring-2005/video_galleries/video-lectures/			

Assessment Rubric: Internal for Theory Course (Major)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. III, SEMESTER – VI (NEP)			
Theory	Course Code: 109221 / 110221	Course Title: Programming with LISP	Max Marks: 20
Sr. No.	Assessment Criteria		Marks
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)		10
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)		5
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, Case Study, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)		5

Major Course: Cyber Law and Ethics

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	109222 / 110222	Cyber Law and Ethics	2	30	2 Hrs	30

Course Objectives:	1. To understand cyber laws and legal issues in information technology. 2. To study Cyber Crimes and their prevention. 3. To understand IPR concepts, software piracy, domain name disputes and issues related to data protection and privacy. 4. To understand legal and regulatory aspects of e-commerce, electronic contracts, digital payments, social media regulations, and real world case studies related to cyber ethics and cybercrime.				
Course Outcomes:	CO1: Understand the fundamentals of cyber law, cyber jurisprudence, Information Technology Act 2000, digital signatures, and ethical practices in Information Technology. CO2: Identify various cyber crimes, cyber security threats, and safe internet practices while understanding the role of cyber security agencies and legal remedies. CO3: Explain Intellectual Property Rights, data privacy issues, software piracy, social media ethics, and ethical hacking concepts in the digital environment. CO4: Analyze legal and ethical issues related to e-commerce, electronic contracts, social media regulations, digital payments, and cyber defamation through case studies.				
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies	
Unit I	Introduction to Cyber Law and Cyber Ethics: Introduction to Cyber Law, Need and Importance of Cyber Law, Cyber Jurisprudence, Jurisprudence and law, Cyber Space Web space, Web hosting and web development agreement, Legal and technological implication of domain names, Information Technology Act 2000 and Amendments, Digital Signature and Electronic Records, Cyber Ethics and Professional Ethics, Ethical Issues in Information Technology	8 Hrs.	8 Marks	Use any pedagogical technique suitable for the topic	
Unit II	Cyber Crimes and Security: Cyber Crime and Offences, Types of Cyber Crimes: Hacking, Phishing, Identity Theft, Cyber Stalking, Online Fraud, Malware and Viruses. Cyber Crime Appellate Tribunal, Penalties and Adjudication, Cyber Security Fundamentals, Password Security and Safe Internet Practices, Role of Cyber Cells and CERT-In	7 Hrs.	7 Marks		

Unit III	Intellectual Property Rights and Privacy: Introduction to Intellectual Property Rights (IPR), Copyright, Patent, Trademark, Software Piracy, domain name and copyright disputes, Data Protection and Privacy, Right to Information and Privacy Issues, Social Media Ethics, Ethical Hacking Concepts	8 Hrs.	8 Marks	
Unit IV	E-Commerce, Social Media and Legal Issues: Legal Issues in E-Commerce, Electronic Contracts, IT Rules and regulations for Social Media, Digital Payments and Legal Concerns, Cyber Defamation, Case Studies on Cyber Ethics and Cyber Crime	7 Hrs.	7 Marks	
	Text books: 1. Cyber Law and Information Technology – Dr. Jatindra Kumar Das & Dr. Nandan Kamath 2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives– Nina Godbole & Sunit Belapure 3. Intellectual Property Rights– Neeraj Pandey 4. E-Commerce: Strategy, Technologies and Applications – David Whiteley Reference Books: 1. Cyber Ethics by Richard A. Spinello, Publisher: Jones & Bartlett Learning 2. Social Media in India: Regulatory Needs, Issues and Challenges by Francis P. Barclay, Boobalajrishnan N, Publisher SAGE Publications 3. The Information Technology Act 2000, S.R. Bhansali, University Book House Pvt Ltd, Jaipur (2003) 4. Cyber Law: Intellectual Property & E-Commerce, Security by Kumar K, domiant Publisher. Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://onlinecourses.swayam2.ac.in/cec24_cs20/preview 2. https://onlinecourses.nptel.ac.in/noc25_cs52/preview 3. https://onlinecourses.swayam2.ac.in/cec21_cs08/preview 4. https://onlinecourses.nptel.ac.in/noc25_cs31/preview 5. https://onlinecourses.nptel.ac.in/noc25_cs54/preview 6. https://onlinecourses.swayam2.ac.in/cec24_cm10/preview			

	7. https://onlinecourses.nptel.ac.in/noc25_mg63/preview Weblink to Equivalent Virtual Lab if relevant: 1. https://www.vlab.co.in/broad-area-computer-science-and-engineering 2. https://nptel.ac.in/courses/106105217 3. https://www.vlab.co.in/participating-institutes 4. https://onlinecourses.swayam2.ac.in/ugc24_hs11/preview 5. https://onlinecourses.swayam2.ac.in/cec24_cm05/preview			
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Assessment Rubric: **Internal for Theory Course (Major)**

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. III, SEMESTER – VI (NEP)			
Theory	Course Code: 109222/110222	Course Title: Cyber Law and Ethics	Max Marks: 20
Sr. No.	Assessment Criteria	Marks	
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)	10	
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)	5	
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, Case Study, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)	5	

Major Course: IoT Applications

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	109223 /110223	IoT Applications	2	30	2 Hrs.	30

Course Objectives:	1. To introduce the fundamentals and architecture of Internet of Things (IoT). 2. To understand sensors, actuators, and IoT communication technologies. 3. To develop practical knowledge of Arduino hardware and programming. 4. To create simple IoT-based applications using Arduino.						
Course Outcomes:	Students will be able to – * Understand IoT concepts and architecture. * Program Arduino boards using Arduino IDE. * Interface sensors and actuators with Arduino. * Develop basic IoT applications and projects.						
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies			
Unit I	Introduction to IoT and Fundamentals: Introduction to Internet of Things (IoT), Evolution and Need of IoT, Characteristics and Advantages of IoT, Components of IoT System, IoT Architecture and Working, Sensors and Actuators, Communication Technologies in IoT: Wi-Fi, Bluetooth, ZigBee, RFID. Applications of IoT in: Smart Home, Healthcare, Agriculture, Industry, Smart City. Challenges and Security Issues in IoT, Future Scope of IoT.	8 Hrs.	8 Marks	Use any pedagogical technique suitable for the topic			
Unit II	Introduction to Arduino: Introduction to Arduino, Features and Types of Arduino Boards, Arduino UNO Architecture, Pin Configuration and Components, Installation of Arduino IDE, Writing and Uploading First Arduino Program, Structure of Arduino Program, Variables, Data Types, and Operators, Input and Output Functions, Serial Communication in Arduino	7 Hrs.	7 Marks				
Unit III	Arduino Programming and Interfacing: Control Statements in Arduino: if-else, switch, loops. Functions in Arduino, Arrays and Strings, Interfacing LEDs and Buzzers, Interfacing Sensors: Temperature Sensor, LDR Sensor, Ultrasonic Sensor. Interfacing LCD Display, PWM and Analog Signals Motor Control using Arduino.	8 Hrs.	8 Marks				

Unit IV	IoT Applications using Arduino: Introduction to Arduino-based IoT Projects, Interfacing Arduino with Wi-Fi/Bluetooth Modules, Data Transmission using IoT Modules, Smart Home Automation System, IoT-based Weather Monitoring System, IoT-based Smart Agriculture System, IoT-based Security and Alert System, Cloud and Mobile App Connectivity Basics, Mini Project Development using Arduino.	7 Hrs.	7 Marks	
References :	Course Material/Learning Resources Text books: 1. Internet of Things: A Hands-On Approach by Arshdeep Bahga and Vijay Madisetti 2. Getting Started with Arduino by Massimo Banzi 3. Internet of Things by Samuel Greengard Reference Books: 1. Designing the Internet of Things by Adrian McEwen and Hakim Cassimally 2. Arduino Cookbook by Michael Margolis, O'Reilly Media 3. Learning Internet of Things by Peter Waher Packt Publishing Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_cs37 2. https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_cs38 3. https://onlinecourses.swayam2.ac.in/e-learning/preview/aic20_sp04 Weblink to Equivalent Virtual Lab if relevant: https://www.tinkercad.com/ Any pertinent media (recorded lectures, YouTube, etc.) if relevant: 1. https://www.youtube.com/watch?v=DPqiIzK97K0 2. https://www.youtube.com/watch?v=JnJIKX5J0Cc&list=PLwWF-ICTWmB7-b9bsE3UcQzz-7ipI5tbR 3. https://www.youtube.com/playlist?list=PL9ooVrP1hQOGccfBbP5tJWZ1hv5sIUWJl			

Assessment Rubric: Internal for Theory Course (Major)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI

THEORY EXAMINATION
B.Sc. III, SEMESTER – VI (NEP)

Theory	Course Code: 109223/110223	Course Title: IoT Applications	Max Marks: 20
Sr. No.	Assessment Criteria		Marks
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)		10
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)		5
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, Case Study, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)		5

Major Course: Laboratory on Programming with LISP and IoT Applications

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	109224 / 110224	Laboratory on Programming with LISP and IoT Applications	2	60	4Hrs	50

Course Objectives:	1. To understand the basic concepts of LISP programming including data types, operators, lists, and control structures. 2. To develop problem-solving skills using functions, recursion, string handling, and list processing in LISP. 3. To perform practical implementation of file handling and simple AI-based programming applications using LISP. 4. To understand the basics of Arduino programming, sensor interfacing, and serial communication in IoT systems. 5. To develop practical skills in controlling electronic components such as LEDs, buzzers, and sensors using Arduino UNO. 6. To implement simple IoT-based applications using sensors for monitoring environmental parameters and real-time data processing.						
Course Outcomes:	After successful completion of this practical course, students will be able to: 1. Write and execute basic and advanced LISP programs using lists, functions, and conditional statements. 2. Develop recursive programs and perform string manipulation and file handling operations in LISP. 3. Apply LISP programming concepts for problem-solving and introductory Artificial Intelligence applications. 4. Write, compile, and execute Arduino programs for controlling input and output devices. 5. Interface various sensors such as LDR, temperature, and ultrasonic sensors with Arduino UNO. 6. Students will be able to design and implement basic IoT applications using Arduino and sensor modules for real-world problem solving.						
Contents					Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Practical's on LISP: 1. Write a LISP program to demonstrate atoms, symbols, variables, and data types. 2. Write a LISP program to perform arithmetic operations using operators and display the output. 3. Write a LISP program to create and manipulate lists using CAR, CDR, and CONS functions. 4. Write a LISP program to demonstrate LIST and APPEND functions with suitable examples. 5. Write a LISP program to implement conditional statements using IF and COND. 6. Write a LISP program to demonstrate looping concepts and sequence of execution. 7. Write a LISP program to create user-defined functions and lambda functions. 8. Write a LISP program to find factorial of a number using recursion.							

9. Write a LISP program to demonstrate string handling and mathematical functions. 10. Write a LISP program for file handling operations including reading and writing data into a file.				
Practical's on IoT: 1. Introduction to Arduino IDE and installation process. 2. Study of Arduino UNO board and identification of pins and components. 3. Write and execute a program to blink an LED using Arduino. 4. Write a program to control LED using a push button. 5. Demonstration of serial communication using Serial Monitor. 6. Write programs using decision-making statements and loops in Arduino. 7. Interfacing and controlling a buzzer using Arduino. 8. Interfacing LDR sensor with Arduino for light detection. 9. Interfacing temperature sensor with Arduino and display readings on Serial Monitor. 10. Interfacing ultrasonic sensor to measure distance. 11.				
References:	Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://onecompiler.com/commonlisp/3xe9k67cs 2. https://www.tinkercad.com/things/fIHpOFbJ1CN-arduino-simulator-and 3. Virtual Lab: https://labs.arduino.cc/en 4. Virtual Lab: https://iot-amrt.vlabs.ac.in/			

Assessment Rubric: External Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. III, SEMESTER – VI (NEP)				
Practical	Course Code:109224/110224	Laboratory on Programming with LISP and IoT Applications	Max Marks: 25	Time: 4 Hrs.
Sr. No.	Exercise			Marks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout			10
2.	Submitted Record book (Preferably handwritten)			05
3.	External Viva Voce			10

Assessment Rubric: Internal Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. III, SEMESTER – VI (NEP)			
Practical	Course Code:109224/110224	Laboratory on Programming with LISP and IoT Applications	Max Marks: 25
Sr.No.	Assessment Criteria		Marks
1.	Attendance/Regularity in practical's / Students' overall performance		05
2.	Record book Preparation (Preferably handwritten)		10
3.	Internal Viva Voce		10

Major Course (Elective-2): Artificial Intelligence

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	109225 / 110225	Artificial Intelligence	2	30	2 Hrs	30

Course Objectives:	1. To understand the fundamentals, history, evolution, and applications of Artificial Intelligence. 2. To analyse intelligent agents, search algorithms, and heuristic problem-solving techniques in AI. 3. To understand and apply knowledge representation and reasoning methods in Artificial Intelligence. 4. To understand uncertainty handling, probabilistic inference, and decision-making techniques in AI systems. 5. To gain knowledge of natural language processing techniques and apply AI concepts for real-world problem solving.				
Course Outcomes:	1. Understand the fundamental concepts, history, applications, and intelligent agents in Artificial Intelligence. 2. Apply search algorithms, heuristic techniques, and reasoning methods for AI problem solving. 3. Develop knowledge representation and inference techniques for intelligent decision-making systems.				
Unit System	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies	
Unit I	Introduction to AI Basic Definitions and terminology, Foundation and History of AI, Overview of AI problems, Evolution of AI - Applications of AI, Classification/Types of AI. Artificial Intelligence vs Machine learning. Intelligent Agent: Types of AI Agent, their structure, behaviour and environment. Turing Test in AI	7 Hrs	7 Marks	Use any pedagogical technique suitable for the topic	
Unit II	Search Algorithm in Artificial Intelligence: Terminologies, Properties of search Algorithms, Types of search algorithms: uninformed search and informed search, State Space search. Searching Techniques: Breadth First Search, Depth First Search, Hill climbing and its Variations, Heuristics Search Techniques: Best First Search, A* algorithm.	8 Hrs	8 Marks		
Unit III	Knowledge Representation: Techniques of knowledge representation, Propositional logic, Rules of Inference, First-Order Logic, Forward Chaining and backward chaining in AI, Issues in Knowledge Representation Predicate Logic: - Representing Instance and Isa Relationships, Computable Functions and predicates	8 Hrs	8 Marks		

	Reasoning in Artificial intelligence: Types of Reasoning and Probabilistic reasoning, Uncertainty.		
Unit IV	Dealing with Uncertainty and Inconsistencies: Truth Maintenance System, Default Reasoning, Probabilistic Reasoning, Bayesian Probabilistic Inference, Possible World Representations. Understanding Natural Languages: Parsing Techniques, Context-Free and Transformational Grammars, Recursive and Augmented Transition Nets.	7 Hrs	7 Marks
References :	Course Material/Learning Resources Text books: 1. Russell, S. and Norvig, P. 2015. Artificial Intelligence - A Modern Approach, 3rd edition, Prentice Hall 2. J. Gabriel, Artificial Intelligence: Artificial Intelligence for Humans (Artificial Intelligence, Machine Learning), Create Space Independent Publishing Platform, First edition , 2016 3. Peter Flach: Machine Learning: The Art and Science of Algorithms that Make Sense of Data, Cambridge University Press, Edition 2012. Reference Books: 1. Introduction to Artificial Intelligence & Expert Systems, Dan W Patterson, PHI, 2010 2. S Kaushik, Artificial Intelligence, Cengage Learning, 1st ed.2011. 2. Ric, E., Knight, K and Shankar, B. 2009. Artificial Intelligence, 3rd edition, Tata McGraw Hill. 3. Luger, G.F. 2008. Artificial Intelligence -Structures and Strategies for Complex Problem Solving, 6th edition, Pearson. 4. Alpaydin, E. 2010. Introduction to Machine Learning. 2nd edition, MIT. 5. Ethem Alpaydin: Introduction to Machine Learning, PHI 2nd Edition-2013. 6. Nilsson Nils J, “Artificial Intelligence: A new Synthesis, Morgan Kaufmann Publishers Inc. San Francisco, CA, and ISBN: 978-1-55-860467-4. Weblink to Equivalent MOOC on SWAYAM if relevant: 1. NPTEL – Introduction to Artificial Intelligence https://onlinecourses.nptel.ac.in/noc22_cs56/preview 2. edX – Artificial Intelligence Courses https://www.edx.org/learn/artificial-intelligence 3. Great Learning – Artificial Intelligence Free Course https://www.mygreatlearning.com/academy/learn-for-free/courses/artificial-intelligence-for-beginners 4. Coursera – Artificial Intelligence Courses https://www.coursera.org/courses?query=artificial%20intelligence 5. Class Central – Artificial Intelligence Courses https://www.classcentral.com/subject/ai 6. Unacademy – Artificial Intelligence Courses https://unacademy.com 7. Udemy – Artificial Intelligence Courses https://www.udemy.com/topic/artificial-intelligence/		

	8. Harvard edX – CS50’s Introduction to Artificial Intelligence with Python https://www.edx.org/learn/artificial-intelligence/harvard-university-cs50-s-introduction-to-artificial-intelligence-with-python Weblink to Equivalent Virtual Lab if relevant: 1. Programiz – Python Online Compiler https://www.programiz.com/python-programming/online-compiler/ 2. OnlineGDB – Python Compiler https://www.onlinegdb.com/online_python_compiler 3. OneCompiler – Python Online Compiler https://onecompiler.com/python 4. CodeChef – Python Online Compiler https://www.codechef.com/python-online-compiler
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Assessment Rubric: Internal for Theory Course (Major Elective-2)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. III, SEMESTER – VI (NEP)			
Theory	Course Code: 109225/110225	Course Title: Artificial Intelligence	Max Marks: 20
Sr. No.	Assessment Criteria		Marks
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)		10
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)		5
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, Case Study, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)		5

Major Course (Elective-2): Computer Animation

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	109226 / 110226	Computer Animation	2	30	2 Hrs	30

Course Objectives:	1. Understand the fundamentals of computer animation and multimedia. 2. Learn principles of 2D and 3D animation. 3. Develop skills in modeling, texturing, rendering etc. 4. Understand animation development pipeline and storytelling techniques						
Course Outcomes:	1. 1. Understand to design animated characters and environments. 2. 2. Apply visual effects and rendering techniques. 3. 3. Learnt to use animation software effectively. 4. 4. Build and animate simple 3D character, scene etc.						
Unit	Contents				Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	Introduction to Computer Animation: Definition, History, Types of Animation: 2D Animation, 3D Animation, Stop Motion Animation, Principles of Animation, Animation Pipeline: Pre-production (storyboard, animatic), Production (layout, animation, lighting), Post-production (compositing, sound, rendering), Applications of Computer Animation.				8 Hrs	8 Marks	Use any pedagogical technique suitable for the topic
Unit II	Design and Storyboarding in Animation: Elements of Design, Color Theory, Visual Composition, Character Design Basics, Storyboarding Techniques, Script Writing for Animation, Camera Angles and Shots, Scene, Sequence.				7 Hrs	7 Marks	
Unit III	2D Animation: Basics of 2D Animation, Vector vs. Raster animation, Keyframing and interpolation, Tweening Techniques, Layers and Timeline, Motion Graphics, Sound Synchronization.				8 Hrs	8 Marks	
Unit IV	3D Animation: Introduction to 3D Environment, 3D Space: Coordinates, Axes, Views, Basic Modeling Techniques: Extruding, Scaling, Rotating, Polygon Modeling, Keyframe Animation in 3D: Autokey, Set key. Basic Rendering.				7 Hrs	7 Marks	

References:	Course Material/Learning Resources Text books: 1. The Complete Animation course by Chris Patmore, Barons Educational Series (New York) 2. Introduction to 3D Modeling and Animation: Using 3ds Max by Adam Watkins Reference Books: 1. The Art of 3D Computer Animation and Effects by Isaac Kerlow 2. The Animator's Survival Kit by Richard Williams Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://onlinecourses.swayam2.ac.in/e-learning/preview/cec20_cs08 2. https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_ug/295
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Assessment Rubric: Internal for Theory Course (Major Elective-2)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. III, SEMESTER – VI (NEP)			
Theory	Course Code: 109226/110226	Course Title: Computer Animation	Max Marks: 20
Sr. No.	Assessment Criteria	Marks	
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)	10	
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)	5	
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, Case Study, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)	5	

Major Course (Elective-2 Laboratory): Laboratory on Artificial Intelligence

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	109227 / 110227	Laboratory on Artificial Intelligence	2	60	4 Hrs	50

Course Objectives:	1.To develop programming skills for implementing basic and intelligent agents insimulated environments. 2.To implement and analyze various uninformed and heuristic state-space searchalgorithms for problem-solving. 3.To practically apply knowledge representation techniques and logical Reasoningmechanisms through code. 4. To explore and program foundational probabilistic inference and basic naturallanguage processing tasks.						
Course Outcomes:	1.Design and program functional intelligent agents and simulate their interactionswithin a given environment. 2.Implement and evaluate search algorithms (such as BFS, DFS, and A*) to solvecomputational puzzles and pathfinding problems. 3.Build code-based systems that utilize propositional logic, forward chaining, andbackwardchaining for decision-making. 4.Develop basic scripts to perform probabilistic calculations and text parsingoperations used in AI applications.						
Contents					Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
1. Write programs to implement a basic reflex agent (e.g., simulating a simple thermostat or vacuum cleaner environment). 2. Write programs to simulate an intelligent agent interacting with and moving across a 2D grid. 3. Write programs to build a simple keyword-based chatbot to demonstrate a basic Turing Test interaction. 4. Write programs to classify different agent behaviors based on predefined environmental inputs. 5. Write programs to represent a state space graph using an adjacency matrix or adjacency list. 6. Write programs to demonstrate Breadth First Search (BFS) for graph traversal. 7. Write programs to demonstrate Depth First Search (DFS) for graph traversal. 8. Write programs to solve a basic state-space problem (like the Water Jug problem) using uninformed search. 9. Write programs to demonstrate the Hill Climbing algorithm to find a local optimum in a simple mathematical function. 10. Write programs to implement the Best First Search heuristic technique. 11. Write programs to demonstrate the A* algorithm for finding the shortest path between two nodes in a grid. 12. Write programs to solve the 8-puzzle problem using heuristic search techniques.							Use any pedagogical technique suitable for the topic

13. Write programs to evaluate basic propositional logic statements (AND, OR, NOT). 14. Write programs to generate a truth table dynamically for simple propositional logic formulas. 15. Write programs to demonstrate Forward Chaining to derive a conclusion from a predefined set of rules. 16. Write programs to demonstrate Backward Chaining to prove a specific goal using a set of inference rules. 17. Write programs to represent instance and "is-a" relationships using basic object-oriented classes or structs. 18. Write programs to calculate basic conditional probabilities to demonstrate Bayesian probabilistic inference. 19. Write programs to tokenize a given natural language sentence into individual words. 20. Write programs to demonstrate basic parsing by identifying and removing common stop words from a string.			
Suggested tools for Artificial Intelligence	Python, C++, Jupyter Notebook		

Assessment Rubric: External Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. III, SEMESTER – VI (NEP)				
Practical	Course Code:109227/110227	Laboratory on Artificial Intelligence	Max Marks: 25	Time: 4 Hrs.
Sr.No.	Exercise			Marks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout			10
2.	Submitted Record book (Preferably handwritten)			05
3.	External Viva Voce			10

Assessment Rubric: Internal Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. III, SEMESTER – VI (NEP)			
Practical	Course Code:109227/110227	Laboratory on Artificial Intelligence	Max Marks: 25
Sr.No.	Assessment Criteria		Marks
1.	Attendance/Regularity in practical's / Students' overall performance		05
2.	Record book Preparation (Preferably handwritten)		10
3.	Internal Viva Voce		10

Major Course (Elective-2 Laboratory): Laboratory on Computer Animation

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	109228 / 110228	Laboratory on Computer Animation	2	60	4 Hrs	50

Course Objectives:	1. Understand the fundamentals of computer animation and multimedia. 2. Learn principles of 2D and 3D animation. 3. Develop skills in modeling, texturing, rendering etc. 4. Understand animation development pipeline and storytelling techniques						
Course Outcomes:	1. 1. Understand to design animated characters and environments. 2. 2. Apply visual effects and rendering techniques. 3. 3. Learnt to use animation software effectively. 4. 4. Build and animate simple 3D character, scene etc.						
Contents					Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
List of Practical's: 1. Write programs to draw a circle. 2. Write programs to translate a rectangle. 3. Write programs to rotate a triangle 4. Write programs to draw a simple character using tools in 2D animation. 5. Write programs to create frame-by-frame animation in 2D. 6. Write programs to Text animation and motion effect in 2D animation. 7. Write programs to demonstrate Pendulum in 2D animation. 8. Write programs to demonstrate Adding background and foreground elements in 2D animation. 9. Write programs to demonstrate Walk cycle animation in 2D. 10. Write programs to demonstrate Character sketch design 11. Write programs to demonstrate Color palette creation 12. Write programs to creating simple 3D objects 13. Write programs to apply textures, colors 14. Write programs to simple environments using polygons. 15. Write programs to demonstrate Create simple 3D animation movement.							Use any pedagogical technique suitable for the topic

Suggested tools for 2D & 3D Animation • OpenToonz • Pencil2D • Synfig • Blender			

Assessment Rubric: External Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. III, SEMESTER – VI (NEP)				
Practical	Course Code: 109228/110228	Laboratory on Computer Animation	Max Marks: 25	Time: 4 Hrs.
Sr. No.	Exercise			Marks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout			10
2.	Submitted Record book (Preferably handwritten)			05
3.	External Viva Voce			10

Assessment Rubric: Internal Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. III, SEMESTER – VI (NEP)			
Practical	Course Code: 109228/110228	Laboratory on Computer Animation	Max Marks: 25
Sr. No.	Assessment Criteria		Marks
1.	Attendance/Regularity in practical's / Students' overall performance		05
2.	Record book Preparation (Preferably handwritten)		10
3.	Internal Viva Voce		10

Minor Course: **Advanced Python Programming**

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	109267/ 110267	Advanced Python Programming	2	30	2 Hrs.	30

Course Objectives:	1. To understand advanced concepts of Python programming. 2. To develop problem-solving skills using Python. 3. To work with files, databases, and GUI applications. 4. To introduce students to real-world Python applications.				
Course Outcomes:	Students will be able to – 1. Apply advanced Python programming concepts. 2. Develop object-oriented Python applications. 3. Create GUI-based applications. 4. Create database-driven applications.				
Unit	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies	
Unit I	Advanced Python Fundamentals: Review of Python Basics, Functions and Recursion, Lambda Functions, Modules and Packages, Exception Handling, File Handling, Python Collections: List, Tuple, Dictionary, Set. String Manipulation, Regular Expressions (Introduction), Introduction to Popular Python Libraries.	8 Hrs.	8 Marks	Use any pedagogical technique suitable for the topic	
Unit II	Object Oriented Programming in Python: Introduction to OOP, Classes and Objects, Constructors and Destructors, Inheritance, Polymorphism, Encapsulation, Method Overloading and Overriding, Abstract Classes, Python Built-in Methods. Applications: Employee management system, Library management example, Banking application example.	7 Hrs.	7 Marks		
Unit III	GUI Programming: Introduction to GUI Programming, Tkinter Basics, Labels, Buttons, Textbox, Frames. Event Handling, Form Design using Tkinter, Message Box and Dialog Box,	8 Hrs.	8 Marks		
Unit IV	Database Programming: Database Connectivity using SQLite/MySQL, CRUD Operations using Python, Applications: Student database management, Login form, Simple desktop application.	7 Hrs.	7 Marks		

References:	Course Material/Learning Resources Text books: 1. Python Crash Course by Eric Matthes. 2. Core Python Programming by R. Nageswara Rao 3. Programming in Python 3 by Mark Summerfield. Reference Books: 1. Automate the Boring Stuff with Python by Al Sweigart. 2. Python for Data Analysis by Wes McKinney. 3. Python Data Science Handbook by Jake VanderPlas. 4. Python GUI Programming with Tkinter by Alan D. Moore. Weblink to Equivalent MOOC on SWAYAM if relevant: 1. https://onlinecourses.swayam2.ac.in/e-learning/preview/aic20_sp44 2. https://onlinecourses.swayam2.ac.in/e-learning/preview/aic20_sp33 3. https://onlinecourses.swayam2.ac.in/e-learning/preview/imb26_mgl30 Weblink to Equivalent Virtual Lab if relevant: https://anaconda.org/ Any pertinent media (recorded lectures, YouTube, etc.) if relevant: https://www.youtube.com/watch?v=_xQNeOTRyig&list=PLEiEAq2VkUUJO27b6PyoSd7CJjWIPyHYO
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Assessment Rubric: Minor Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI THEORY EXAMINATION B.Sc. III, SEMESTER – VI (NEP)			
Theory	Course Code: 109267110267	Course Title: Advanced Python Programming	Max Marks: 20
Sr. No.	Assessment Criteria		Marks
1	Any Two of the Activity (weekly or monthly assignment/ Unit Test/Class Test) (CAT-1)		10
2	Any One of the Activity includes Open Book Test, MCQ Tests, / Theory related Class activity/Task etc.) etc. (CAT-2)		5
3	Participation in any one Activity includes Quiz, Seminar, Group Discussion, Industry visit, Case Study, Mini project, innovative work, etc. based on Theory Course. Involvement in subject related activities such as Conference, Workshop, Coding Competitions etc. (CAT-3)		5

Minor Course: Laboratory on Advance Python Programming

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	109268 / 110268	Laboratory on Advance Python Programming	2	60	4Hrs.	50

Course Objectives:	1. To understand advanced concepts of Python programming. 2. To develop problem-solving skills using Python. 3. To work with files, databases, and GUI applications. 4. To introduce students to real-world Python applications.						
Course Outcomes:	On completion of the following syllabus the students will be able to - 1. Apply advanced Python programming concepts. 2. Develop object-oriented Python applications. 3. Create database-driven and GUI-based applications. 4. Use Python for automation and modern computing applications.						
Contents					Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
1. Program using functions and recursion. 2. Implementation of exception handling. 3. File handling operations in Python. 4. Program using regular expressions. 5. Create class and object-based applications. 6. Program demonstrating inheritance and polymorphism. 7. Database connectivity using SQLite/MySQL. 8. CRUD operations using Python. 9. GUI application using Tkinter. 10. Design login form using Tkinter. 11. Data visualization using Matplotlib. 12. Basic data analysis using Pandas. 13. Simple web scraping application. 14. Email sending automation using Python. 15. Mini project based on Python applications.							Use any pedagogical technique suitable for the topic

16. Program using lambda functions and Python collections.			
17. Create a menu-driven application using Python.			
18. Design a simple calculator application using Tkinter.			
19. Read and write CSV files using Python.			
20. Image processing basics using OpenCV in Python.			

Assessment Rubric: External Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. III, SEMESTER – VI (NEP)				
Practical	Course Code: 109268/110268	Laboratory on Advance Python Programming	Max Marks: 25	Time: 4 Hrs.
Sr. No.	Exercise			Marks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout			10
2.	Submitted Record book (Preferably handwritten)			05
3.	External Viva Voce			10

Assessment Rubric: Internal Practical Course

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. III, SEMESTER – VI (NEP)			
Practical	Course Code: 109268/110268	Laboratory on Advance Python Programming	Max Marks: 25
Sr.No.	Assessment Criteria		Marks
1.	Attendance/Regularity in practical's / Students' overall performance		05
2.	Record book Preparation (Preferably handwritten)		10
3.	Internal Viva Voce		10

VSC: Laboratory on R Programming

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	109288/ 110288	Laboratory on R Programming	2	60	4Hrs.	50

Course Objectives:	1. To understand advanced concepts of R Programming. 2. To develop problem-solving skills using R Programming. 3. To work with Functions Arrays and Matrices. To introduce students to real-world R Programming applications.			
Course Outcomes:	On completion of the following syllabus the students will be able to - 1. Apply advanced R Programming concepts. 2. Develop R Programming applications. 3. Create Graphs . Charts and Histograms. 4. Use built-in datasets available in R applications.			
Contents		Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
	1. Write a program to study and explore the R and RStudio environment. 2. Write a program to perform basic arithmetic operations in R using variables and operators. 3. Write a program to demonstrate different data types and type conversion in R. 4. Write a program to perform input and output operations using R functions. 5. Write a program to implement conditional statements using if, if-else, and nested if. 6. Write a program to demonstrate the use of switch statement in R. 7. Write a program to implement looping statements using for, while, and repeat loops. 8. Write a program to create and use user-defined functions in R. 9. Write a program to create and manipulate vectors in R. 10. Write a program to perform matrix operations such as addition, subtraction, and multiplication. 11. Write a program to create and manipulate arrays in R. 12. Write a program to create and manipulate lists in R. 13. Write a program to create, access, and modify data frames in R. 14. Write a program to perform string manipulation using built-in string functions in R. 15. Write a program to read data from and write data to CSV files in R.			Use any pedagogical technique suitable for the topic

	16. Write a program to sort, filter, and subset data in R. 17. Write a program to calculate statistical measures such as mean, median, variance, and standard deviation in R. 18. Write a program to create different types of graphs such as bar charts, pie charts, and histograms in R. 19. Write a program to generate scatter plots and line graphs using R. 20. Write a program to explore and analyze built-in datasets available in R.			
References:	1. https://learn-r.org/ 2. https://digilabs.ai/our-main-courses/r-programming/			

Assessment Rubric: Internal Examination Practical Course |(VSC)

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI PRACTICAL EXAMINATION B.Sc. III, SEMESTER – VI (NEP)			
Practical	Course Code: 109288/110288	Laboratory on R Programming	Max Marks: 50
Q. No.	Assessment Criteria		Marks
1.	Single Program Writing, Algorithm, Flowchart, Execution, with Sample inputs and Outputs, and Printout		20
2.	Record book preparation (Preferably handwritten) / Assignments preparation during semester		10
3.	Attendance in practical session / Students' overall performance		10
4.	Internal Viva Voce		10

Internship/Apprenticeship:

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
5.5	VI	109294/110294	Internship/Apprenticeship in Computer Science	4	120	--	100

Course Objectives:	1. Gain practical exposure to industry, research organizations, startups, or professional work environments related to Computer Science. 2. Apply theoretical knowledge acquired during the academic program to real-world computing problems and industry practices. 3. Enhance professional skills such as communication, teamwork, leadership, project management, and workplace ethics. 4. Strengthen problem-solving, analytical thinking, innovation, and decision-making abilities through experiential learning. 5. Understand organizational structure, work culture, professional responsibilities, and industry standards.
Course Outcomes:	On completion of the following syllabus the students will be able to - 1. Demonstrate the ability to apply Computer Science concepts, tools, and technologies in real workplace or project environments. 2. Analyze industry-specific problems and develop appropriate technical solutions using modern computing techniques. 3. Communicate effectively with team members, supervisors, clients, and stakeholders through reports, presentations, and discussions. 4. Demonstrate teamwork, leadership qualities, project management skills, and collaborative learning abilities. 5. Prepare internship/apprenticeship reports documenting objectives, methodology, activities performed, outcomes achieved, and lessons learned. 6. Evaluate industry practices and identify opportunities for innovation, entrepreneurship, higher studies, research, and career development.

Contents

Internship/Apprenticeship in Computer Science Related to Major (During vacations/break period of Semester V and Semester VI) for duration of 120 hours mandatory to all the students, to be completed during vacations of Semester V and/or VI. This will carry 4 Credits for learning of 120 hours. Its credits and grades will be reflected in Semester VI credit grade report.

General Guidelines

1. The examinee shall be required to produce hard copy and soft copy of completion of internship/apprenticeship certificate duly signed by competent authority to Faculty Mentors.
2. Student can take internship work in the form of Online/Onsite mode.
3. Research internship under Faculty member (Internal and External), IISC, IIT's, NIT's, research project or innovative project and other Research organizations also be considered.

Guidelines for Internship/Research Internship for Under Graduate Students:

For understanding key principles of Guidelines for Internship/Research Internship for Under Graduate Students published by UGC on 2023. Please refer

Internship Work Evaluation:

1. The parent HEI will examine/evaluate the student's performance following its evaluation method.
2. The interns will be evaluated by research internship supervisor based on their efforts and research output.
3. The interns will be evaluated through seminar presentation or viva-voce at the HEI, (marks will be given by a group of experts from HEI including the supervisor).
4. Students will be allotted to faculty mentors/supervisor
5. Student need to submit at least one/two progress report, attendance, and regular supporting documents to faculty mentors/supervisor

Assessment Rubric/Internal evaluation for the Internship/Apprenticeship in Computer Application:

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI B.Sc. III, SEMESTER – VI (NEP)			
Internship/Apprenticeship	Course Code: 109294/110294	Internship/Apprenticeship in Computer Application (Regular/Vocational)	Max Marks: 100
Sr. No.	Exercise		Marks
1	Activity logbook and evaluation report of Internship Supervisor		10
2	Format of presentation and the quality of the intern’s report		10
3	Acquisition of skill sets by the intern		10
4	Originality and any innovative contribution		10
5	Significance of research outcomes		10
6	Regular Attendance		25
7	Seminar/Viva-Voce /Presentation (PPT) (Visual clarity, and confidence, Findings etc.)		25
Total:			100