B.E. in Mechatronics Engineering

Scheme of Teaching and Examinations2022

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2023-24)

V SEM	ESTER

				_	1	eaching	Hours /Wee	ek		Exam	ination	1	_
SI. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Theory Lecture	Tutorial	Practical/ Drawing	Self -Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
				ă	L	Т	Р	s	_				
1	HSMS	BMT501	Industrial Management and Entrepreneurship	TD: Mechatronics PSB: Mechatronics	3	0	0		03	50	50	100	3
2	IPCC	BMT502	Micro and Smart System Technology	TD: Mechatronics PSB: Mechatronics	3	0	2		03	50	50	100	4
3	PCC	BMT503	Control Theory and Virtual Instrumentation	TD: Mechatronics PSB: Mechatronics	3	2	0		03	50	50	100	4
4	PCCL	BMT504L	Virtual Instrumentation Lab	TD: Mechatronics PSB: Mechatronics	0	0	2		03	50	50	100	1
5	PEC	BMT515x	Professional Elective Course	TD: Mechatronics PSB: Mechatronics	3	0	0		03	50	50	100	3
6	PROJ	BMT586	Mini Project	TD: Mechatronics PSB: Mechatronics	0	0	4		03	100		100	2
7	AEC	BRMK557	Research Methodology and IPR	TD: Mechatronics PSB: Mechatronics	2	2	0		<mark>03</mark>	50	50	100	3
8	MC	BESK508	Environmental Studies	TD: CV/Env/Chem PSB:CV	2	0	0		02	50	50	100	2
		BNSK559	National Service Scheme (NSS)	NSS coordinator									
9	MC	BPEK559	Physical Education (PE) (Sports and Athletics)	Physical Education Director	0	0	2			100		100	0
		BYOK559	Yoga	Yoga Teacher									
						-			Total	500	300	800	22

PCC: Professional Core Course, PCCL: Professional Core Course laboratory, UHV: Universal Human Value Course, MC: Mandatory Course (Non-credit), AEC: Ability Enhancement Course, SEC: Skill Enhancement Course, L: Lecture, T: Tutorial, P: Practical S= SDA: Skill Development Activity, CIE: Continuous Internal Evaluation, SEE: Semester End Evaluation.K: This letter in the course code indicates common to all the stream of engineering. ESC: Engineering Science Course, ETC: Emerging Technology Course, PLC: Programming Language Course

Professional Elective Course									
BMT515A	Theory of Machines and Machine Design	BMT515C	Artificial Intelligence for Mechatronics						
BMT515B	Computer Integrated Manufacturing	BMT515D	Mechatronics System Design						
DIVITOIO	Compater integrated Manaracturing	DIVITOTOD	Weenationies System Design						

Professional Core Course (IPCC): Refers to Professional Core Course Theory Integrated with practical's of the same course. Credit for IPCC can be 04 and its Teaching–Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper. For more details, the regulation governing the Degree of Bachelor of Engineering /Technology (B.E./B.Tech.) 2022-23 may please be referred.

National Service Scheme /Physical Education/Yoga: All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE)(Sports and Athletics), and Yoga(YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of degree.

Mini-project work: Mini Project is a laboratory-oriented/hands on course that will provide a platform to students to enhance their practical knowledge and skills by the development of small systems/applications etc. Based on the ability/abilities of the student/s and recommendations of the mentor, a single discipline or a multidisciplinary Mini- project can be assigned to an individual student or to a group having not more than 4 students. CIE procedure for Mini-project: (i) Single discipline: The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two faculty members of the Department, one of them being the Guide. The CIE marks awarded for the Mini-project work shall be based on the evaluation of the project report, project presentation skill, and question and answer session in the ratio of 50:25:25. The marks awarded for the project report shall be the same for all the batches mates. (ii) Interdisciplinary: Continuous Internal Evaluation of the project report, project presentation skill, and question and answer session in the ratio 50:25:25. The marks awarded for the project report shall be the same for all the batch mates. No SEE component for Mini-Project.

Professional Elective Courses (PEC): A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses that are added supplement the latest trend and advanced technology in the selected stream of engineering. Each group will provide an option to select one course. The minimum number of students' strengths for offering a professional elective is 10. However, this conditional shall not be applicable to cases where the admission to the program is less than 10.

B.E. in Mechatronics Engineering

Scheme of Teaching and Examinations2022

Outcome Based Education (OBE) and Choice Based Credit System (CBCS) (Effective from the academic year 2023-24)

						Teaching	Hours /Wee	k		Exam	ination		
SI. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Theory Lecture	Tutorial	Practical/ Drawing	Self -Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
					L	Т	Р	S				_	
1	IPCC	BMT601	Programmable Logic Controller and SCADA Technology	TD: Mechatronics PSB: Mechatronics	3	0	2		03	50	50	100	4
2	PCC	BMT602	Industrial Robotics	TD: Mechatronics PSB: Mechatronics	4	0	0		03	50	50	100	4
3	PEC	BMT613x	Professional Elective Course	TD: Mechatronics PSB: Mechatronics	3	0	0		03	50	50	100	3
4	OEC	BMT654x	Open Elective Course	TD: Mechatronics PSB: Mechatronics	3	0	0		03	50	50	100	3
5	PROJ	BMT685	Project Phase I	TD: Mechatronics PSB: Mechatronics	0	0	4		03	100		100	2
6	PCCL	BMT606L	Robotics Lab	TD: Mechatronics PSB: Mechatronics	0	0	2		03	50	50	100	1
7					If the co	course is offered as a Theory							
	AEC/SDC	BMT657x	Ability Enhancement Course/Skill	TD: Mechatronics	1	0	0		01	50	50	100	1
	AEC/3DC	DIVITOS/X	Development Course V	PSB: Mechatronics	If cours	e is offe	ered as a p	ractical	01	50	50	100	1
					0	0	2						
		BNSK658	National Service Scheme (NSS)	NSS coordinator									
8	MC	BPEK658	Physical Education (PE) (Sports and Athletics)	Physical Education Director	0	0	2			100		100	0
		ВУОК658	Yoga	Yoga Teacher									
9	MC	IKS	Indian Knowledge System		1	0	0			100	0	100	0
				•		•	•		Total	500	300	800	18
-			Prof	essional Elective Cou	rse				Į.			1	
BMT	613A	Power Elec	tronics	ВМТ6	13C	Auto	motive I	lectroni	ics and H	lvbrid V	ehicles		

BMT613B	Smart Factory and Industry 4.0	BMT613D	Signal Processing		
	Open Elective	e Course			
BMT654A	Automation in Manufacturing	BMT654C	Mechatronics Engineering		
BMT654B	Electric and Hybrid Vehicles	BMT654D	Micro Electro-Mechanical Systems		
	Ability Enhancement Course / S	kill Enhancement C	Course-V		
BMT657A	MATLAB for Mechatronics (0-0-2)	BMT657C	Finite Element Modelling and Analysis (0-0-2)		
BMT657B	BMT657B Embedded systems (0-0-2) BMT657D Al and ML (0-0-2)				

PCC: Professional Core Course, PCCL: Professional Core Course laboratory, UHV: Universal Human Value Course, MC: Mandatory Course (Non-credit), AEC: Ability Enhancement Course, SEC: Skill Enhancement Course, L: Lecture, T: Tutorial, P: Practical S= SDA: Skill Development Activity, CIE: Continuous Internal Evaluation, SEE: Semester End Evaluation. K: The letter in the course code indicates common to all the stream of engineering. PROJ: Project /Mini Project. PEC: Professional Elective Course. PROJ: Project Phase -I, OEC: Open Elective Course

Professional Core Course (IPCC): Refers to Professional Core Course Theory Integrated with practical of the same course. Credit for IPCC can be 04 and its Teaching–Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper. For more details, the regulation governing the Degree of Bachelor of Engineering /Technology (B.E./B.Tech.) 2022-23

National Service Scheme /Physical Education/Yoga: All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE)(Sports and Athletics), and Yoga(YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of degree.

Professional Elective Courses (PEC): A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses that are added supplement the latest trend and advanced technology in the selected stream of engineering. Each group will provide an option to select one course. The minimum number of students' strengths for offering professional electives is 10. However, this conditional shall not be applicable to cases where the admission to the program is less than 10.

Open Elective Courses: Students belonging to a particular stream of Engineering and Technology are not entitled to the open electives offered by their parent Department. However, they can opt for an elective offered by other Departments, provided they satisfy the prerequisite condition if any. Registration to open electives shall be documented under the guidance of the Program Coordinator/ Advisor/Mentor. The minimum numbers of students' strength for offering Open Elective Course is 10. However, this condition shall not be applicable to class where the admission to the program is less than 10.

Project Phase-I : Students have to discuss with the mentor /guide and with their help he/she has to complete the literature survey and prepare the report and finally define the problem statement for the project work.

B.E. in Mechatronics Engineering

Scheme of Teaching and Examinations2022

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2023-24)

Scheme -A- VII SEMESTER (Swappable VII and VIII SEMESTER)

Introduction to Smart Factory and Industry 4.0

						Teaching	Hours /Wee	k		Exam	ination		
SI. No			Teaching Department (TD)	Teaching epartment (TD) and Question Paper Setting Board (PSB)	Theory	Tutorial	Practical/ Drawing	Self -Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
				٥	L	Т	Р	S					
1	IPCC	BMT701	Thermal Engineering	TD: Mechatronics PSB: Mechatronics	3	0	2		03	50	50	100	4
2	IPCC	BMT702	Introduction to HDL	TD: Mechatronics PSB: Mechatronics	3	0	2		03	50	50	100	4
3	PCC	BMT703	Industrial Automation	TD: Mechatronics PSB: Mechatronics	4	0	0		03	50	50	100	4
4	PEC	BMT714x	Professional Elective Course	TD: Mechatronics PSB: Mechatronics	3	0	0		03	50	50	100	3
5	OEC	BMT755x	Open Elective Course	TD: Mechatronics PSB: Mechatronics	3	0	0		03	50	50	100	3
6	PROJ	BMT786	Major Project Phase-II	TD: Mechatronics PSB: Mechatronics	0	0	12		03	100	100	200	6
										400	300	700	24
	•	•	•	Professional Elective Co	ourse		•		•	•	•	•	
BMT7	14A	Digital Ima	ge Processing and Robot Vision	BMT7	14C	Control Systems and Engineering							
BMT7	14B	Digital Con	trollers	BMT7	14D	Additive Manufacturing							

PCC: Professional Core Course, PCCL: Professional Core Course laboratory, PEC: Professional Elective Course, OEC: Open Elective Course PR: Project Work, L: Lecture, T: Tutorial, P: Practical S= SDA: Skill Development Activity, CIE: Continuous Internal Evaluation, SEE: Semester End Evaluation. TD- Teaching Department, PSB: Paper Setting department, OEC: Open Elective Course, PEC: Professional Elective Course. PROJ: Project work

Open Elective Course

BMT755C

Robotics for Industry

BMT755A

Note: VII and VIII semesters of IV years of the program (1) Institutions can swap the VII and VIII Semester Schemes of Teaching and Examinations to accommodate research internships/ industry internships after the VI semester.

(2) Credits earned for the courses of VII and VIII Semester Scheme of Teaching and Examinations shall be counted against the corresponding semesters whether the VII or VIII semesters is completed during the beginning of the IV year or the later part of IV years of the program.

Professional Elective Courses (PEC): A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses that are added supplement the latest trend and advanced technology in the selected stream of engineering. Each group will provide an option to select one course. The minimum number of students' strengths for offering professional electives is 10. However, this conditional shall not be applicable to cases where the admission to the program is less than 10.

Open Elective Courses: Students belonging to a particular stream of Engineering and Technology are not entitled to the open electives offered by their parent Department. However, they can opt for an elective offered by other Departments, provided they satisfy the prerequisite condition if any. Registration to open electives shall be documented under the guidance of the Program Coordinator/ Advisor/Mentor. The minimum numbers of students' strength for offering Open Elective Course is 10. However, this condition shall not be applicable to class where the admission to the program is less than 10.

PROJECT WORK (21MEP75): The objective of the Project work is

- (i) To encourage independent learning and the innovative attitude of the students.
- (ii) To develop interactive attitude, communication skills, organization, time management, and presentation skills.
- (iii) To impart flexibility and adaptability.
- (iv) To inspire team working.
- (v) To expand intellectual capacity, credibility, judgment and intuition.
- (vi) To adhere to punctuality, setting and meeting deadlines.
- (vii) To install responsibilities to oneself and others.
- (viii) To train students to present the topic of project work in a seminar without any fear, face the audience confidently, enhance communication skills, involve in group discussion to present and exchange ideas.

CIE procedure for Project Work:

- 1. Single discipline: The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the Guide. The CIE marks awarded for the project work, shall be based on the evaluation of the project work Report, project presentation skill, and question and answer session in the ratio 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.
- 2. Interdisciplinary: Continuous Internal Evaluation shall be group-wise at the college level with the participation of all guides of the college. Participation of external guide/s, if any, is desirable. The CIE marks awarded for the project work, shall be based on the evaluation of project work Report, project presentation skill, and question and answer session in the ratio 50:25:25. The marks awarded for the project report shall be the same for all the batch mates. SEE procedure for Project

Work: SEE for project work will be conducted by the two examiners appointed by the University. The SEE marks awarded for the project work shall be based on the evaluation of project work Report, project presentation skill, and question and answer session in the ratio 50:25:25.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

B.E. in Mechatronics Engineering

Scheme of Teaching and Examinations2022

Outcome Based Education (OBE) and Choice Based Credit System (CBCS) (Effective from the academic year 2023-24)

Scheme -A- VIII SEMESTER (Swappable VII and VIII SEMESTER)

		,			1	eaching	Hours /Wee	k		Exam	ination		
SI. No		ourse and urse Code	Course Title	Teaching epartment (TD and Question Paper Setting Board (PSB)	Theory Lecture	Tutorial	Practical/ Drawing	Self -Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
				Δ	L	T	P	S					
1	PEC	BMT801x	Professional Elective (Online Courses)	TD: Mechatronics PSB: Mechatronics	3	0	0		03	50	50	100	3
2	OEC	BMT802x	Open Elective (Online Courses)	TD: Mechatronics PSB: Mechatronics	3	0	0		01	50	50	100	3
3	INT	BMT803	Internship (Industry/Research) (14 - 20 weeks)		0	0	12		03	100	100	200	10
										200	200	400	16
i			Duefeesieur	al Flankina Cannas IOnli		1							

Professional Elective Course (Online courses)

Open Elective Courses (Online Courses)									
	(SWAYAM)								
BMT801B	Electronic Systems Design: Hands-on Circuits and PCB Design with CAD Software	BMT801D	Mechanics and Control of Robotic Manipulators (NPTEL)						
BMT801A	Computer Vision (SWAYAM)	BMT801C	Machinery Fault Diagnosis and Signal Processing (NPTEL)						

BMT802A Transducers for instrumentation (NPTEL) BMT802C Computer Integrated Manufacturing (NPTEL)
BMT802B Mechanics and Control of Robotic Manipulators (NPTEL) BMT802D Principles of Hydraulic Machines and System Design (SWAYAM)

L: Lecture, T: Tutorial, P: Practical S= SDA: Skill Development Activity, CIE: Continuous Internal Evaluation, SEE: Semester End Evaluation. TD- Teaching Department, PSB: Paper Setting department, OEC: Open Elective Course, PEC: Professional Elective Course. PROJ: Project work, INT: Industry Internship / Research Internship / Rural Internship

Note: VII and VIII semesters of IV years of the program Swapping Facility • Institutions can swap VII and VIII Semester Scheme of Teaching and Examinations to accommodate research internships/ industry internships/Rural Internship after the VI semester. • Credits earned for the courses of VII and VIII Semester Scheme of

Teaching and Examinations shall be counted against the corresponding semesters whether VII or VIII semester is completed during the beginning of IV year or later part of IV year of the program.

Elucidation: At the beginning of IV years of the program i.e., after VI semester, VII semester classwork and VIII semester Research Internship /Industrial Internship / Rural Internship shall be permitted to be operated simultaneously by the University so that students have ample opportunity for an internship. In other words, a good percentage of the class shall attend VII semester classwork and a similar percentage of others shall attend to Research Internship or Industrial Internship or Rural Internship. Research/Industrial /Rural Internship shall be carried out at an Industry, NGO, MSME, Innovation centre, Incubation centre, Start-up, centre of Excellence (CoE), Study Centre established in the parent institute and /or at reputed research organizations/institutes. The mandatory Research internship /Industry internship / Rural Internship is for 14 to 20 weeks. The internship shall be considered as a head of passing and shall be considered for the award of a degree. Those, who do not take up/complete the internship shall be declared to fail and shall have to complete it during the subsequent University examination after satisfying the internship requirements. Research internship: A research internship is intended to offer the flavour of current research going on in the research field. It helps students get familiarized with the field and imparts the skill required for carrying out research. Industry internship: Is an extended period of work experience undertaken by students to supplement their degree for professional development. It also helps them learn to overcome unexpected obstacles and successfully navigate organizations, perspectives, and cultures. Dealing with contingencies helps students recognize, appreciate, and adapt to organizational realities by tempering their knowledge with practical constraints. Rural Internship: Rural development internship is an initiative of Unnat Bharat Abhiyan Cell, RGIT in association with AICTE to involve students of all departments studying in different academic years for exploring various opportunities in techno-social fields, to connect and work with Rural India for their upliftment. The faculty coordinator or mentor has to monitor the student's internship progress and interact with them to guide for the successful completion of the internship. The students are permitted to carry out the internship anywhere in India or abroad. University shall not bear any expenses incurred in respect of the internship. With the consent of the internal guide and Principal of the Institution, students shall be allowed to carry out the internship at their hometown (within or outside the state or abroad), provided favourable facilities are available for the internship and the student remains regularly in contact with the internal guide. University shall not bear any cost involved in carrying out the internship by students. However, students can receive any financial assistance extended by the organization

Professional Elective /Open Elective Course: These are ONLINE courses suggested by the respective Board of Studies. Details of these courses shall be made available for students on the VTU web portal.

B.E. in the title of the program

Scheme of Teaching and Examinations2022

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2023-24)

Scheme B-VI SEMESTER for the candidates who seek a two-semester internship with project work /Start-up **Teaching Hours / Week** Examination Practical/ Drawing Tutorial Duration in hours Theory Lecture Marks **Fotal Marks** Credits SEE Marks SDA SI. Course and **Course Title Course Code** No Р S Т Programmable Logic Controller and SCADA 4 100 BXX601 2 IPCC 3 0 03 50 50 1 Technology PCC BXX602 **Industrial Robotics** 0 0 03 50 50 100 4 3 0 03 50 50 100 3 3 PEC BXX613x **Professional Elective Course** 0 4 3 50 100 3 OEC BXX654x **Open Elective Course** 0 0 03 50 5 **PCCL** BXXL606 0 0 03 50 50 100 1 Robotic Lab If the course is offered as a Theory 6 Ability Enhancement Course/Skill Development AEC/SDC BXX657x 01 50 50 100 1 If course is offered as a practical Course V 0 NSS coordinator BNSK658 National Service Scheme (NSS) **Physical Education** Physical Education (PE) (Sports and Athletics) 2 BPEK658 0 0 100 100 0 7 MC Director Yoga Teacher **BYOK658** Yoga **BIKS609** 0 0 01 100 0 100 0 8 IKS Indian Knowledge System 1 500 800 16 **Total** 300

	Professional Elective Course									
BMT613A Power Electronics BMT613C Automotive Electronics and Hybrid Vehicles										
BMT613B	Smart Factory and Industry 4.0	BMT613D	Signal Processing							
	Open Elective	Course								
BMT654A	Automation in Manufacturing	BMT654C	Mechatronics Engineering							

BMT654B	Electric and Hybrid Vehicles	BMT654D	Micro Electro-Mechanical Systems						
	Ability Enhancement Course / Skill Enhancement Course-V								
BMT657A	MATLAB for Mechatronics (0-0-2)	BMT657C	Finite Element Modelling and Analysis (0-0-2)						
BMT657B	Embedded systems (0-0-2)	BMT657D	Al and ML (0-0-2)						

B.E. in the title of the program

Scheme of Teaching and Examinations2022

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2023-24)

Schem	e B VII and	d VIII semesters	for the candidates who seek an internship with project	work									
					1	eaching	Hours /Wee	k		Exam	ination	1	_
SI. No		urse and urse Code	Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Theory	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
				Δ	L	T	Р	S					
1	IPCC	BXX701	To be completed in 5 th /6 th semester		3	0	2		03	50	50	100	4
2	IPCC	BXX702	To be completed in 5 th /6 th semester		3	0	2		03	50	50	100	4
3	PCC	BXX703	To be completed in the 6 th semester		4	0	0		03	50	50	100	3
4	PEC	BXX714x	Professional Elective Course (MOOC Courses)		3	0	0		03	50	50	100	3
5	OEC	BXX755x	Open Elective Courses (MOOC courses)		3	0	0		01	50	50	100	3
1	PEC	Bxx801x	Professional Elective (MOOC Courses)		3	0	0		03	50	50	100	3
2	OEC	Bxx802x	Open Elective (MOOC Courses)		3	0	0		01	50	50	100	3
3	PROJ	BXX883	Project - outcome of training		0	0	12		03	100	100	200	9
4	INT	Bxx804	Internship (Industry/Research) (02 semesters)		0	0	12		03	100	100	200	10
										200	200	400	42