VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI
B.E. in Aerospace Engineering
Scheme of Teaching and Examinations2022
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2023-24)

V SEMESTER

Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination					Credits
					Theory Lecture	Tutorial	Practical	Self-Study	Duration in hours	CIE Marks	SEE Marks	Total Marks		
					L	T	P	S						
1	HSMS	BAS501/BAE501	Aviation Management	TD: AS PSB: AS	3	0	0		03	50	50	100		3
2	IPCC	BAS502	Theory of Vibrations	TD: AS PSB: AS	3	0	2		03	50	50	100		4
3	PCC	BAS503	Aerospace Structures	TD: AS PSB: AS	4	0	0		03	50	50	100		4
4	PCCL	BASL504	Aerospace structures Lab	TD: AS PSB: AS	0	0	2		03	50	50	100		1
5	PEC	BAS515x	Professional Elective Course	TD: AS PSB: AS	3	0	0		03	50	50	100		3
6	PROJ	BAS586	Mini Project	TD: AS PSB: AS	0	0	4		03	100		100		2
7	AEC	BRMK557	Research Methodology and IPR	TD: AnyDepartment PSB: As identified by University	2	2	0		02	50	50	100		3
8	MC	BESK508	Environmental Studies	TD: Civil/ Environ/Che/Biotech.PSB: Civil	2	0	0		02	50	50	100		2
9	MC	BNSK559	National Service Scheme (NSS)	NSS coordinator	0	0	2			100		100		0
		BPEK559	Physical Education (PE) (Sports and Athletics)	Physical Education Director										
		BYOK559	Yoga	Yoga Teacher										
									Total	500	300	800		22
				Professional Elective Course										

BAS515A/BAE515A	Finite Element Methods	BAS515C	Satellite Communication
BAS515B	Wind Tunnel Techniques	BAS515D	Introduction to Astrophysics and Space Environment

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 al the stream of engineering. **PROJ**: Project /Mini Project. **PEC**: Professional Elective Course

Professional Core Course (IPCC): Refers to Professional Core Course Theory Integrated with practicals 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.

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 shall be group-wise at the college level with the participation of all the guides of the project.

The CIE marks awarded for the Mini-project, shall be based on the 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.

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VI SEMESTER

Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
					Theory Lecture L	Tutorial T	P	Self -Study S					
1	IPCC	BAS601	Avionics Systems	TD: AS PSB: AS	3	0	2		03	50	50	100	4
2	PCC	BAS602	Rockets and Missiles	TD: AS PSB: AS	4	0	0		03	50	50	100	4
3	PEC	BAS613x	Professional Elective Course	TD: AS PSB: AS	3	0	0		03	50	50	100	3
4	OEC	BAS654x	Open Elective Course	TD: AS PSB: AS	3	0	0		03	50	50	100	3
5	PROJ	BAS685	Project Phase I	TD: AS PSB: AS	0	0	4		03	100	--	100	2
6	PCCL	BASL606	Space Flight Simulation Lab	TD: AS PSB: AS	0	0	2		03	50	50	100	1
7	AEC/SDC	BAS657x	Ability Enhancement Course/Skill Development Course V	TD: AS PSB: AS	If the course is offered as a Theory				01	50	50	100	1
					1	0	0						
					If course is offered as a practical								
					0	0	2						
8	MC	BNSK658	National Service Scheme (NSS)	NSS coordinator	0	0	2			100	---	100	0
		BPEK658	Physical Education (PE) (Sports and Athletics)	Physical Education Director									
		BYOK658	Yoga	Yoga Teacher									
9	MC	BIKS609	Indian Knowledge System		1	0	0			100	0	100	0
									Total	**500**	**300**	**800**	**18**
			Professional Elective Course										

BAS613A	Space Mechanics		BAS613C	Spacecraft Systems
BAS613B	Flight Mechanics		BAS613D/ BAE613D	Heat and Mass Transfer
Open Elective Course				
BAS654A/ BAE654A	Introduction to Aerospace History		BAS654C	Indian Aviation
BAS654B/BAS654B	Introduction to Helicopters		BAS654D	Airline and Airport management
Ability Enhancement Course / Skill Enhancement Course-V				
BAS657A/ BAE657A	Probability and statistics for Aerospace Engineering		BAS657C	Introduction to Data Analytics
BAS657B/ BAE657B	Virtual Aircraft simulation		BAS657D	Air and Missile Defence Systems

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 al 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 practicals 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 helphe/she has to complete the literature survey and prepare the report and finally define the problem statement for the project work.

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VII SEMESTER (Swappable VII and VIII SEMESTER)

Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Theory Lecture L	Tutorial T	Practical / Drawing P	Self-Study S	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
1	IPCC	BAS701	Global Navigation Satellite Systems	TD: AS PSB: AS	3	0	2		03	50	50	100	4
2	IPCC	BAS702/ BAE702	Computational Fluid Dynamics	TD: AS PSB: AS	3	0	2		03	50	50	100	4
3	PCC	BAS703/ BAE703	Control Engineering	TD: AS PSB: AS	4	0	0		03	50	50	100	4
4	PEC	BAS714x	**Professional Elective Course**	TD: AS PSB: AS	3	0	0		03	50	50	100	3
5	OEC	BAS755x	**Open Elective Course**	TD: AS PSB: AS	3	0	0		01	50	50	100	3
6	PROJ	BAS786	**Major Project Phase-II**	TD: AS PSB: AS	0	0	12		03	100	100	200	6
										400	300	700	24

Professional Elective Course

BAS714A	Hypersonics	BAS714C/ BAE714C	Flight Testing
BAS714B	Cryogenics	BAS714D/ BAE714D	AI and ML for Aerospace Applications

Open Elective Course

BAS755A/BAE755A	Earth and Space Sciences	BAS755C	Industrial Aerodynamics
BAS755B/BAE755B	Air Traffic and Weather	BAS755D/BAE755D	Aviation and Internet Infrastructure

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

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 (21XXP75): 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.

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VIII SEMESTER (Swappable VII and VIII SEMESTER)

Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Theory Lecture L	Tutorial T	Practical/ Drawing P	Self-Study S	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
1	PEC	BAS801x	**Professional Elective (Online Courses)**		3	0	0		03	50	50	100	3
2	OEC	BAS802x	**Open Elective (Online Courses)**		0	2	0		01	50	50	100	3
3	INT	BAS803	**Internship (Industry/Research) (14 - 20 weeks)**		0	0	12		03	100	100	200	10
										200	**200**	**400**	**16**
			Professional Elective Course (Online courses)										
			Open Elective Courses (Online Courses)										

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 center, Incubation center, Start-up, center 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 flavor 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 favorable 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.

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VI SEMESTER(A) semesters for the candidate those who seek an internship with project work (A)

Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Theory Lecture (L)	Tutorial (T)	Practical/ Drawing (P)	SDA (S)	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
1	IPCC	BXX601	Avionics Systems		3	0	2		03	50	50	100	4
2	PCC	BXX602	Rockets and Missiles		4	0	0		03	50	50	100	4
3	PEC	BXX613x	Professional Elective Course		3	0	0		03	50	50	100	3
4	OEC	BXX654x	Open Elective Course		3	0	0		03	50	50	100	3
5	PCCL	BXXL606	Space Flight Simulation Lab		0	0	2		03	50	50	100	1
6	AEC/SDC	BXX657x	Ability Enhancement Course/Skill Development Course V		If the course is offered as a Theory				01	50	50	100	1
					1	0	0						
					If course is offered as a practical								
					0	0	2						
7	MC	BNSK658	National Service Scheme (NSS)	NSS coordinator	0	0	2			100	---	100	0
		BPEK658	Physical Education (PE) (Sports and Athletics)	Physical Education Director									
		BYOK658	Yoga	Yoga Teacher									
8	IKS	BIKS609	Indian Knowledge System		1	0	0		01	100	0	100	0
								Total		**500**	**300**	**800**	**16**

Professional Elective Course			
BAS613A	Space Mechanics	BAS613C	Spacecraft Systems
BAS613B	Flight Mechanics	BAS613D/ BAE613D	Heat and Mass Transfer

Open Elective Course			
BAS654A/ BAE654A	Introduction to Aerospace History	BAS654C	Indian Aviation
BAS654B/BAS654B	Introduction to Helicopters	BAS654D	Airline and Airport management

Ability Enhancement Course / Skill Enhancement Course-V			
BAS657A/ BAE657A	Probability and statistics for Aerospace Engineering	BAS657C	Introduction to Data Analytics
BAS657B/ BAE657B	Virtual Aircraft simulation	BAS657D	Air and Missile Defence Systems

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VII and VIII semesters for the candidate those whoseekan internship with project work (A)

Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Theory Lecture (L)	Tutorial (T)	Practical/ Drawing (P)	SDA (S)	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
1	IPCC	BXX701	To be completed in 5th/6th semester		3	0	2		03	50	50	100	4
2	IPCC	BXX702	To be completed in 5th /6th semester		3	0	2		03	50	50	100	4
3	PCC	BXX703	To be completed in the 6th 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**