RAMAIAH UNIVERSITY OF APPLIED SCIENCES

Programme Specifications

B.Sc.(Hons). Programme

Programme: Robotics	Department: Mechanical and Manufacturing Engineering

Faculty of Mathematical & Physical Sciences

M.S. Ramaiah University of Applied Sciences

University House, New BEL Road, MSR Nagar, Bangalore – 560 054

www.msruas.ac.in

Programme Specifications: Robotics	
Faculty	Engineering and Technology (FET)
Department	Mechanical and Manufacturing Engineering
Programme	Robotics
Dean of Faculty	Prof. H M Rajashekhar Swamy
HOD	Prof. T. N. Srikantha Dath

1. **Title of the Award**

   B.Tech. in Robotics

2. **Modes of study**

   Full-Time

3. **Awarding Institution / Body**

   M. S. Ramaiah University of Applied Sciences – Bengaluru, India

4. **Joint Award**

   Not Applicable

5. **Teaching Institution**

   Faculty of Engineering and Technology

   M. S. Ramaiah University of Applied Sciences - Bengaluru, India

6. **Date of Programme Specifications**

   March 2020

7. **Date of Programme Approval by the Academic Council of MSRUAS**

   July 2020

8. **Next Review Date**

   July 2024

9. **Programme Approving Regulatory Body and Date of Approval**

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10. **Programme Accrediting Body and Date of Accreditation**

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11. **Grade Awarded by the Accreditation Body**

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12. **Programme Accreditation Validity**

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13. **Programme Benchmark**

    Not Applicable

14. Rationale for the Programme

The world is rapidly moving towards human independent systems and processes in almost all aspects of life. Robotics are the primary drivers of these systems. This happens through synergistic integration of various streams, namely, Mechanics and Mechanical Engineering, Electronics, Computer Technology and IT that enables to produce and enhance products and systems. Robotics finds its application in wide variety of industrial sectors like aerospace, automotive, manufacturing, communications, defense, electronics and healthcare.

Robots are general-purpose, re-programmable machines that respond to the sensory signals received from the system environment. Robots are considered a typical representative of mechatronics and aspects of manipulation, sensing, control, and communication are integrated in Robotics. Robot system development for an application involves achieving functionality and performance through integration of variety of technologies involving sensors, measurement systems, drives, actuation systems, microprocessor systems and software engineering. A sound background in mechatronics and the use of adequate design methods form the basis of creative, time-efficient and effective robot development.

As a rapidly growing economy, India has huge potential to become a major player in the area of robotic technologies and systems development. Robotic engineers should be able to conceptualize and design, model, simulate, analyse and validate the robots using modern tools. In order to achieve this, engineers need to be well versed in the areas like geometric modelling of robotic components, mechanisms, kinematics and dynamic analysis of robotic system. In addition, they should have complete knowledge of sensors, actuators, drives and control systems, image processing, embedded systems and programming of robots. The proposed B.Tech. Programme on Robotics is designed to cater to the above mentioned needs.

15. Programme Mission

The purpose of the programme is creation of innovative problem solvers in multi-disciplinary settings, entrepreneurs and leaders applying the knowledge, understanding, cognitive abilities, practical skills and transferable skills gained through systematic, flexible and rigorous learning in the chosen academic domain.

16. Graduate Attributes

1. Ability to apply knowledge of mathematics, science, and Engineering fundamentals to solve complex problems in engineering
2. Ability to analyse engineering problems, interpret data and arrive at meaningful conclusions involving mathematical inferences
3. Ability to design an engineering system, component, or process to meet desired needs considering public health and safety, and the cultural, societal, and environmental considerations
4. Ability to understand and solve complex engineering problems by conducting experimental investigations
5. Ability to apply appropriate tools and techniques and understand utilization of resources appropriately to complex engineering activities
6. Ability to understand the effect of engineering solutions on legal, cultural, social and public health and safety aspects
7. Ability to develop sustainable solutions and understand their effect on society and environment
8. Ability to apply ethical principles to engineering practices and professional responsibilities
9. Ability to work as a member of a team, to plan and to integrate knowledge of various engineering disciplines and to lead teams in multidisciplinary settings
10. Ability to make effective oral presentations and communicate technical ideas to a broad audience using written and oral means
11. Ability to lead and manage multidisciplinary teams by applying engineering and management principles
12. Ability to adapt to the changes and advancements in technology and engage in independent and life-long learning

17. Programme Goal
   The programme goal is to produce graduates with critical, analytical and problem solving skills, and ability to think independently, to pursue a career in Robotics.

18. Programme Objectives

The robotics degree programme will impart knowledge of robotic systems and their sub systems; enhances the understanding of underlying engineering principles that govern the behaviour of robotic systems; teach analytical modeling, simulation and analysis to study the behaviour of robotic systems; provide the skills to design, build and test robotic systems. It also trains students on personal development and interactive skills with a feel for society.

The objectives of the programme are :

1. 1. To facilitate understanding on importance of robots in various applications

2. To facilitate understanding on the underlying engineering principles of robotic systems to explain their construction and working

3. To identify sensors, actuators, drives and control systems for robots based on application

4. To Model, simulate and analyse the behaviour of robotic systems to predict and improve their performance

5. To develop on board real-time decision making capabilities in robots through image and signal processing

6. To develop a career in Robotics and automation

7. To educate on professional ethics, economics, social sciences and interpersonal skills relevant to professional practice

8. To provide a general perspective and opportunities for a career in industry, business and commerce

19. Intended Learning Outcomes of the Programme

The Intended Learning Outcomes (ILOs) are listed under four headings:
1. Knowledge and Understanding, 2. Cognitive Skills 3. Practical Skills and 4. Capability / Transferable Skills.

1. Knowledge and Understanding

After undergoing this programme, a student will be able to:

KU1: Identify and describe the various systems of relevance to robotics

KU2: Explain the underlying science and engineering principles that govern the systems/processes relevant to robotics

KU3: Compare and contrast newer technologies over the existing technologies

KU4: Collect, classify and interpret information relevant to robotics

2. Cognitive Skills

After undergoing this programme, a student will be able to:

CS1: Design robot systems/processes based on the desired function

CS2: Model and simulate robotic systems to analyse the behaviour

CS3: Modify the existing design/processes to meet newer requirements

CS4: Apply science and engineering principles to evaluate performance of robot systems and answer "what if" question

3. Practical Skills

After undergoing this programme, a student will be able to:

PS1: Manufacture/Fabricate robot components and assemble the system

PS2: Instrument a system and test for its performance

PS3: Operate and maintain a robot for efficient and safe operations

PS4: Program/Control a robot to deliver desired level of performance

4. Capability / Transferable Skills

After undergoing this programme, a student will be able to:

TS1: Manage information, develop technical reports and make presentations

TS2: Build, Manage and Lead a team to successfully complete a project and communicate across teams and organizations to achieve professional objectives

TS3: Work under various constraints to meet project targets

TS4: Adopt to the chosen profession by continuously upgrading his/her knowledge and understanding through Life-long Learning philosophy

20. Programme Structure

Semester: 1, Physics Cycle

Sl. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	20MTB101A	Engineering Mathematics-1	3	1	0	4	100
2	20PHB102A	Engineering Physics	3	0	0	3	100
3	20CES101A	Engineering Mechanics	3	0	0	3	100
4	20ECS102A	Elements of Electronics Engineering	3	0	0	3	100
5	20MES103A	Engineering Drawing	1	0	4	3	100
6	20PHL103A	Engineering Physics Laboratory	0	0	2	1	50
7	20ECL104A	Basic Electronics Laboratory	0	0	2	1	50
8	20TSH101A	Constitution, Human Rights and Law	2	0	0	2	50
		Total	**15**	**01**	**08**	**20**	**650**
	Total number of contact hours per week		**24 hours**				
	Number of credits can be registered		**Minimum**	**16**		**Maximum**	**20**

Semester: 2, Chemistry Cycle

Sl. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	20MTB104A	Engineering Mathematics-2	3	1	0	4	100
2	20CHB105A	Engineering Chemistry	3	0	0	3	100
3	20MES105A	Elements of Mechanical Engineering and Work shop Practice	2	0	2	3	100
4	20EES106A	Elements of Electrical Engineering	3	0	0	3	100
5	20CSS107A	Elements of Computer Science and Engineering	3	0	0	3	100
6	20CHL106A	Engineering Chemistry Laboratory	0	0	2	1	50
7	20CSL108A	Computer Programming Laboratory	0	0	2	1	50
8	20EEL109A	Basic Electrical Engineering Laboratory	0	0	2	1	50
9	20TSH102A	Professional Communication	2	0	0	2	50
		Total	**16**	**01**	**08**	**21**	**700**
	Total number of contact hours per week		**25 hours**				
	Number of credits can be registered		**Minimum**		**17**	**Maximum**	**21**

Semester: 1, Chemistry Cycle

Sl. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	20MTB101A	Engineering Mathematics-1	3	1	0	4	100
2	20CHB105A	Engineering Chemistry	3	0	0	3	100
3	20MES105A	Elements of Mechanical Engineering and Work shop Practice	2	0	2	3	100
4	20EES106A	Elements of Electrical Engineering	3	0	0	3	100
5	20CSS107A	Elements of Computer Science and Engineering	3	0	0	3	100
6	20CHL106A	Engineering Chemistry Laboratory	0	0	2	1	50
7	20CSL108A	Computer Programming Laboratory	0	0	2	1	50
8	20EEL109A	Basic Electrical Engineering Laboratory	0	0	2	1	50
9	20TSH102A	Professional Communication	2	0	0	2	50
		Total	**16**	**01**	**08**	**21**	**700**
	Total number of contact hours per week		**25 hours**				
	Number of credits can be registered		**Minimum**		17	**Maximum**	**21**

Semester: 2, Physics Cycle

Sl. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	20MTB104A	Engineering Mathematics-2	3	1	0	4	100
2	20PHB102A	Engineering Physics	3	0	0	3	100
3	20CES101A	Engineering Mechanics	3	0	0	3	100
4	20ECS102A	Elements of Electronics Engineering	3	0	0	3	100
5	20MES103A	Engineering Drawing	1	0	4	3	100
6	20PHL103A	Engineering Physics Laboratory	0	0	2	1	50
7	20ECL104A	Basic Electronics Laboratory	0	0	2	1	50
8	20TSH101A	Constitution, Human Rights and Law	2	0	0	2	50
		Total	**15**	**01**	**08**	**20**	**650**
	Total number of contact hours per week		**24 hours**				
	Number of credits can be registered		**Minimum**	16		**Maximum**	**20**

SEMESTER 3

Sl. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	20MTB201A	Engineering Mathematics – 3	2	2	0	4	100
2	20RTC201A	Strength of Materials	3	0	0	3	100
3	20RTC202A	Measurements, Data Acquisition and Processing	3	1	0	4	100
4	20RTC203A	Introduction to Robotics and Mechatronics	3	0	0	3	100
5	20RTC204A	Electrical Machines Drives and Actuators	3	1	0	4	100
6	20RTL205A	Strength of Materials Laboratory	0	0	2	1	50
7	20RTL206A	Measurements Laboratory	0	0	2	1	50
8	20MEL206A	Machine Drawing	0	0	4	2	100
9	20CEM210A	Environmental Studies	2	0	0	0	Audit
		Total	**16**	**04**	**08**	**22**	**700**
	Total number of contact hours per week		**28 hours**				
	Number of credits can be registered		**Minimum**	**17**		**Maximum**	**22**

SEMESTER 4

Sl. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	20MTB211A	Engineering Mathematics - 4	2	2	0	4	100
2	20RTC212A	Analog and Digital Electronics	3	0	0	3	100
3	20RTC213A	Machine Dynamics and Laboratory	3	0	2	4	100
4	20RTC214A	Artificial Intelligence for Robotics	2	2	0	4	100
5	20RTC215A	Digital Signal Processing	3	1	0	4	100
6	20RTC216A	Fluid Power Systems for Robots	3	0	0	3	100
7	20RTL217A	Analog and Digital Electronics Laboratory	0	0	2	1	50
8	20MEL207A	Mechanical Dissection	0	0	2	1	50
		Total	**16**	**05**	**06**	**24**	**700**
	Total number of contact hours per week		**27 hours**				
	Number of credits can be registered		**Minimum**	**19**		**Maximum**	**24**

SEMESTER 5

Sl. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	20RTC301A	Design of Machine Elements	3	1	0	4	100
2	20RTC302A	Embedded Processor and Controllers	3	0	0	3	100
3	20RTC303A	Robot Kinematics and laboratory	3	0	2	4	100
4	20RTC304A	Computer Vision	3	1	0	4	100
5	20RTC305A	Control System	3	1	0	4	100
6	20RTL306A	Control Systems Laboratory	0	0	2	1	50
7	20RTL307A	Embedded Processor and Controllers Laboratory	0	0	2	1	50
Total			**15**	**03**	**06**	**21**	**600**
Total number of contact hours per week			**24 hours**				
Number of credits can be registered			**Minimum**	**16**	**Maximum**		**21**

SEMESTER 6

Sl. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	20RTC311A	Robotic Programming and Simulation	2	0	2	3	100
2	20RTC312A	Robotics Dynamics and Laboratory	3	0	2	4	100
3	20RTC313A	Robotic System Design	3	1	0	4	100
4	20RTC314A	Applied Control Systems	3	0	0	3	100
5	20RTC315A	Digital Image Processing	3	1	0	4	100
6	20MEH301A	Engineering Economics and Cost Estimation	3	0	0	3	100
7	20RTC316A	Seminar	0	0	2	1	50
Total			**17**	**02**	**06**	**22**	**650**
Total number of contact hours per week			**24 hours**				
Number of credits can be registered			**Minimum**	**17**	**Maximum**		**22**

SEMESTER 7

Sl. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	20RTE41XA	Professional Core Elective -1	4	0	0	4	100
2	20RTE42XA	Professional Core Elective -2	4	0	0	4	100
3	20OEE41XA	Open Elective - 1/Online/ Competitions/ Paper presentation	3	0	0	3	100
4	20RTP401A /20RTI401A	I] Project Work - 1 II]Internship (Choose one)	0	0	8	4	100
		Total	**11**	**0**	**8**	**15**	**400**
	Total number of contact hours per week		**19 hours**				
	Number of credits can be registered		**Minimum**	**11**	**Maximum**		**15**

SEMESTER 8

Sl. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	20RTE43XA	Professional Core Elective -3	4	0	0	4	100
2	20OEE42XA	Open Elective - 2/Online/ Competitions/ Paper presentation	3	0	0	3	100
3	20RTP402A	Project Work - 2	0	0	16	8	300
		Total	**7**	**0**	**16**	**15**	**500**
	Total number of contact hours per week		**23 hours**				
	Number of credits can be registered		**Minimum**	**11**	**Maximum**		**15**

Professional Core Elective Courses:

Sem	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
7	20RTE411A	CAE for Robotics and Laboratory	4	0	0	4	100
7	20RTE412A	Statistical & Optimization Tools for Robotics	4	0	0	4	100
7	20MTE401A	Probability and Statistics	4	0	0	4	100
7	20MTE411A	Advanced Mathematics	4	0	0	4	100
7	20RTE421A	Industrial Robotics and Automation	4	0	0	4	100
7	20RTE422A	Multi-agent Systems for Robotics	4	0	0	4	100
7	20CSE421A	Data Science Foundation	4	0	0	4	100
7	20MTE421A	Optimization Technique -1	4	0	0	4	100
8	20RTE431A	Autonomous Robots	4	0	0	4	100
8	20RTE432A	Systems Engineering	4	0	0	4	100
8	20CSE441A	Data Analytics	4	0	0	4	100
8	20MTE431A/ 20MTE441A	Advanced Numerical Methods / Optimization Techniques -2	4	0	0	4	100

Sem	Professional Core Elective	Group-1 (Applied Robotics)		Group- 2 (Collaborative Robotics)	
		Course Code	Course Name	Course Code	Course Name
7	1	20RTE411A	CAE for Robotics and Laboratory	20RTE412A	Statistical & Optimization Tools for Robotics
7	2	20RTE421A	Industrial Robotics and Automation	20MEE422A	Multi-agent Systems for Robotics
8	3	20RTE431A	Autonomous Robots	20MEE432A	Systems Engineering

Sem	Professional Core Elective	Group-1 (Applied Robotics)		Group- 2 (Collaborative Robotics)	
		Course Code	Course Name	Course Code	Course Name
7	1	20MTE401A	Probability and Statistics	20MTE411A	Advanced Mathematics
7	2	20RTE421A	Data Sciences Foundation	20MTE421A	Optimisation Techniques -1
8	3	20CSE441A	Data Analytics	20MTE431A / 20MTE441A	Advanced Numerical Methods/ Optimisation Techniques -2

Note:

Totally student needs to select any two professional core elective courses during 7th and 8th Semester

Open Electives:

A number of electives from faculty of engineering, management and commerce, art and design, hospitality management and catering technology, pharmacy, dental sciences as mentioned in university website. Students can choose the open electives on their own choice.

21. Course Delivery
As per Time Table

22. Teaching and Learning Methods

The module delivery comprises of a combination of few or all of the following:

1. Face to face lectures using audio-visuals
2. Workshops-group discussions, debates, presentations
3. Demonstrations
4. Guest lectures
5. Laboratory-work/Field work/Workshop
6. Industry visit
7. Seminars
8. Group Exercises
9. Project Work
10. Project Exhibitions
11. Technical Events

23. Assessment and Grading

1. Every course will be assessed for a weight of 100%

2. **For the courses having 100% theory**

Total Marks: 100

There are two components-Component-1 and Component-2
Component-1 (CE) carries a weight of 50% and Component -2 (SEE) carries a weight of 50%

Component-1 (CE): 50 % Weight

The course leader will indicate the mode of assessment in consultation and approval of the respective HoD and the faculty Dean, before commencement of the semester. The template for weightage of CE and SEE in percentages for each course is indicated in Table below.

ILO No.	Intended Learning Outcomes	Continuous Assessment , 50% Marks			Semester End Examination, 50% Marks
		CE-1, x%	CE-2, Y%	CE-3, Z %	
1	ILO -1				
2	ILO -2				
3	ILO -3				
4	ILO -4				
5	ILO -5				

CE – can be from any combination of the following:
Assignments, term Tests, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, others, if any.

Component -2 (SEE): 50 % weight.

A 3 hour duration semester end examination will be conducted for a maximum of 100 marks and will be reduced to 50 % weight

A student is required to score a minimum of 40 % marks in semester end examination and 40 % overall in each theory course

3.   For Laboratory/Practical Courses

Total Marks: 50
Component -1(CE): Conduction of Laboratory Exercises and Submission of Report: 50% weight
Component -2:(SEE): Semester End Laboratory Examination: 50% weight
A 3 hour duration semester end examination will be conducted for a maximum of 50 marks.

The course leader will indicate the mode of assessment in consultation and approval of the respective HoD and the faculty Dean, before the commencement of the semester.

The template for weightage of CE and SEE in percentages for each course is indicated in the Table below.

ILO No.	Intended Learning Outcomes	Continuous Assessment , 50% Marks				Semester End Examination, 50% Marks
		Conduction of Lab %	Lab Record Submission %	Viva %	Lab est (%)	
1	ILO -1					
2	ILO -2					
3	ILO -3					
4	ILO -4					

A student is required to score a minimum of 40 % marks in semester end examination and 40% mark overall in each laboratory course.

4.   For courses with a combination of theory and laboratory :

Total Marks: 100

There are two components-Component-1 and Component-2
Component-1 (CE) carries a weight of 50% and Component -2 (SEE) carries a weight of 50%.

Component -1 (CE): 50% Weight

The course leader will indicate the mode of assessment in consultation and approval of the respective HoD and the faculty Dean, before the commencement of the semester.

The template for weightage of CE and SEE in percentages for each course is indicated in the Table below.

ILO No.	Intended Learning Outcomes	Continuous Assessment , 50% Marks			Semester End Examination, 50% Weightage 50 Marks
		CE-1, x%	CE-2, Y%	CE-3, Lab Z %	
1	ILO -1				
2	ILO -2				
3	ILO -3				
4	ILO -4				
5	ILO -5				

CE – can be from any combination of the following:
Assignments, term Tests, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study,

others, if any.

A 3 hour duration semester end examination will be conducted for a maximum of 100 marks and will be reduced to 50 % weight

A student is required to score a minimum of 40 % marks in semester end examination and 40 % overall in each theory course

5. The marks distribution for each course is given in the programme structure-section 20

6. Other flexibilities (exceptions) as per the programme regulations.

24. Attendance

A minimum of 80% attendance compulsory to appear for semester end examinations. Any condoning is as per the programme regulations.

25. Award of Class

As per the Academic Regulations for B.Tech. Programme

26. Student Support for Learning

Students are given the following support:

1. Course notes
2. Reference books in the library
3. Magazines and Journals
4. Internet facility
5. Computing facility
6. Laboratory facility
7. Workshop facility
8. Staff support
9. Lounges for discussions
10. Any other support that enhances their learning

27. Quality Control Measures

Following are the Quality Control Measures:

1. Review of course notes
2. Review of question papers and assignment questions
3. Student Feedback
4. Moderation of assessed work
5. Opportunities for the students to see their assessed work
6. Review by external examiners and external examiners reports
7. Staff Student Consultative Committee meetings
8. Student exit feedback
9. Subject Assessment Board (SAB)
10. Programme Assessment Board (PAB)

28. Curriculum Map

Course Code					Intended Learning Outcomes											
					Knowledge and Understanding				Cognitive (Thinking) Skills (Critical, Analytical, Problem Solving)				Practical skills			
20TS/CE/ME	20MT/PH/CH/ME/CE/EC/EE/CS	20RT	20OE	20RT*	KU1	KU2	KU3	KU4	CS1	CS2	CS3	CS4	PS1	PS2	PS3	PS4
a	b	c	d	e												
H110A	B101A	C202A	X4XX-A	E411A	cde	bcde	cde	cde	cde	e	e	e				
H102A	B102A	C203A	X4XX-B	E421A	cde	bcde	de	de	ce					c		
M210A	S101A	C204A		E422A	ace	ace	ace	ce	ce	bce	bc	bc		c		c
H301A	S102A	L205A		E423A	abce	abce	abe	abce	e	e	e	e	e	ce	ce	e
	S103A	C212A		CSE421A	ce	ce	ce	e	bce	be	be	bce				c
	L103A	C213A		E431A	ce	ce		ce	ce	ce	e		b	bc	b	b
	L104A	C201A		E432A	ce	ce	c	ce	ce	ce		ce	b	b	b	b
	B104A	C215A		E433A	ce	bce	ce	ce	ce	ce	ce	ce	be	be	be	bce
	B105A	C216A		CSE441A	bce	bce	be	bce	ce	ce	ce	be		c		
	S105A	L217A			bc	bc	b	bc	bc	bc	b	b	b	bc	b	bc
	S106A	C301A			c	bc	c	c	c	c	c	c		c		c
	S107A	C302A			c	bc	c	c	c	c	c	c	c	c		
	L106A	C303A			c	c		c	c	c	c		b	bc	bc	b
	L108A	C304A			c	c	c	bc	c	c	c	c	b	b	b	bc
	L109A	C305A			c	c		c	c		c		b	b	b	bc
	B201A	C306A			c	bc	c	c	c	c	c	c		b	b	bc
	C214A	L307A			bc	bc	bc	bc	c	c	c	c				c
	B211A	L308A			bc	bc	bc	bc	bc	c	bc	bc	c	c	c	c
	L206A	C311A			bc	bc	bc	bc	c	c	c	c		c	c	
	L207A	C312A			c	c	c	c	c	c	c	c	bc	bc	bc	bc
	E401A	C313A			bc	bc	bc	bc	c	c						
	E411A	C314A			c	bc	c	c	c	bc	c	bc		c		c
	E421A	C315A			c	bc	c	c	c	bc	c	bc				
	E431A	C316A			c	bc	c	c	c	bc	c	bc		c	c	c
	E441A	P401A/I401A			c	bc	c	c	c	bc	c	bc	c	c	c	c
		P402A			c	c	c	c	c	c	c	c	c	c	c	c
04	19	28	13	09	Total: 160 credits											

*Depends on elective Course chosen

29. Capability / Transferable Skills Map

Course Code					Skills									
20TS/CE/ME	20MT/PH/CH/ME/CE/EC/EE/CS	20RT	20OE	20RT	GK	SL	WC	OC	P	B	IM	PM	L	AO
a	b	c	d	e										
H110A	B101A	C202A	E401A	E412A	abd	abcde	abcde	a	ae	a	abcde	abcde	a	a
H102A	B102A	C203A	E402A	E421A	abd	abcde	abcde	abd	ae	a	abcde	abde	a	a
M210A	S101A	C204A	E403A	E422A	abcde	abcde	abcde	ab	ae	a	abcde	abcde	a	a
H301A	S102A	L206A	E404A	E423A	abcd	abcde	abcde	ac			abcde	abcd		
	S103A	C212A	E405A	CSE421A	bd	bcde	bcde	de	e		bcde	bde		
	L103A	C213A	E406A	E411A	bcd	bcde	bcde	b			bcde	bcde		
	L104A	C201A	E451A	E432A	bcde	bcde	bcde		e		bcde	bcd	e	
	B104A	C215A	E452A	E431A	bd	bcde	bcde				bcde	bd		
	B105A	C216A	E453A	CSE441A	d	bcde	bcde	c	c	c	bde	bde		
	S105A	L217A	E454A		cd	bcd	bcd				bcd	bd		
	S106A	C301A	E455A		d	bcd	bcd	cd	c	c	bcd	bcd		
	S107A	C302A	E456A		cd	bcd	bcd	cd			bcd	bd		
	L106A	C303A	E457A		d	bcd	bcd	d			bcd	bcd		
	L108A	C304A				bc	bc	b			bc	b		
	L109A	C315A			c	bc	bc	bc			bc	bc		
	B201A	C306A			c	bc	bc	b			bc	bc		
	B211A	L307A			c	bc	bc				bc	b		
	C214A	L308A			bc	bc	bc	bc			bc	bc		
		C311A			c	bc	bc				bc	bc		
	L206A	C312A			bc	bc	bc	c	c	c	bc	bc		
	L207A	C313A				bc	bc	c			bc	bc		
	E401A	C314A			bc	bc	bc	b			bc	bc		
	E411A	C316A			c	bc	c	c			c	bc		
	E421A	L316A			c	bc	c	c			c	bc	c	
	E431A	P401A/I401A			c	bc	c	c	c	c	c	bc	c	c
	E441A	P402A			c	bc	c	c	c	c	c	bc	c	c

GK: Group Work; SL: Self Learning; WC: Written Communication; OC: Oral Communication P: Presentation; B: Behavioural; IM: Information Management; PM: Personal Management L: Leadership

30. Co-curricular Activities

Students are encouraged to take part in co-curricular activities like seminars, conferences, symposium, paper writing, attending industry exhibitions, project competitions and related activities to enhance their knowledge and network.

31. Cultural and Literary Activities

To remind and ignite the creative endeavours annual cultural festivals held and the students are made to plan and organize the activities.

32. Sports and Athletics

Students are encouraged to develop a habit of taking part in outdoor and indoor games on regular basis.

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