

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
BOARD OF STUDIES IN COMPUTER SCIENCE &ENGINEERING

B.E. III & IV Semester

Computer Science & Engineering

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
FOUR YEAR DEGREE COURSE IN BACHELOR OF ENGINEERING
BRANCH: COMPUTER SCIENCE & ENGINEERING - SEMESTER PATTERN (CREDIT GRADE SYSTEM)
SEMESTER: FIRST/SECOND "GROUP A"

Sr No			Subject Code			Subject Name			Teaching Scheme			Examination Scheme									
									Hours per Week			Total Hours/Week	Credit	Theory					Practical		
									Lecture	Tutorial	P/D			Duration of paper (Hr)	Max Marks Theory Paper	Max Marks College Assessment	Total	Min Passing Marks	External	Internal	Total

Theory

1	1A1	Engineering Mathematics - I	3	1		4	4
2	1A2	Engineering Physics	4			4	4
3	1A3	Engineering Mechanics	3	1		4	4
4	1A4	Computer Programming	3			3	3

3	80	20	100	40			
3	80	20	100	40			
3	80	20	100	40			
4	80	20	100	40			

Practicals

5	1A5	Workshop Practice			4	4	2
6	1A6	Engineering Physics Laboratory			2	2	1
7	1A7	Engineering Mechanics Laboratory			2	2	1
8	1A8	Computer Programming Laboratory			2	2	1
Total			13	2	10	25	20

					25	25	50	25
					25	25	50	25
					25	25	50	25
					25	25	50	25
Total							400	

Total 600

Three Week Induction Program to be undertaken as suggested by AICTE

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
FOUR YEAR DEGREE COURSE IN BACHELOR OF ENGINEERING
BRANCH: COMPUTER SCIENCE & ENGINEERING - SEMESTER PATTERN (CREDIT GRADE SYSTEM)
SEMESTER: FIRST/SECOND "GROUP B"

			Teaching Scheme					Examination Scheme											
Sr No	Subject Code	Subject Name	Hours per Week			Total Hours/Week	Credit	Theory					Practical						
			Lecture	Tutorial	P/D			Max Marks Theory Paper	Max Marks College Assessment	Total	Min Passing Marks	External	Internal	Total	Min Passing Marks				
Theory																			
1	1B1	Engineering Mathematics - II	3	1		4	4	3	80	20	100	40							
2	1B2	Engineering Chemistry	4			4	4	3	80	20	100	40							
3	1B3	Basic Electrical Engineering	3	1		4	4	3	80	20	100	40							
4	1B4	Engineering Graphics	3			3	3	3	80	20	100	40							
Practicals																			
5	1B5	English Communication Skill Lab			4	4	2						25	25	50	25			
6	1B6	Engineering Chemistry Laboratory			2	2	1						25	25	50	25			
7	1B7	Basic Electrical Engineering Lab			2	2	1						25	25	50	25			
8	1B8	Engineering Graphics Laboratory			2	2	1						25	25	50	25			
Total			13	2	10	25	20				400				200				
												Total	600						

Three Week Induction Program to be undertaken as suggested by AICTE

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
FOUR YEAR DEGREE COURSE IN BACHELOR OF ENGINEERING
BRANCH: COMPUTER SCIENCE & ENGINEERING - SEMESTER PATTERN (CREDIT GRADE SYSTEM)
SEMESTER: THIRD

			Teaching Scheme					Examination Scheme									
			Hours per Week			Total Hours/Week	Credit	Theory					Practical				
			Lecture	Tutorial	P/D			Duration of paper (Hr)	Max Marks Theory Paper	Max Marks College Assessment	Total	Min Passing Marks	External	Internal	Total	Min Passing Marks	
Theory																	
1	3KS01	Mathematics-III	3	1		4	4	3	80	20	100	40					
2	3KS02	Discrete Structure & Graph Theory	3			3	3	3	80	20	100	40					
3	3KS03	Object Oriented Programming	3			3	3	3	80	20	100	40					
4	3KS04	Data Structures	3			3	3	3	80	20	100	40					
5	3KS05	Analog & Digital Electronics	3			3	3	3	80	20	100	40					
6	4ES06	Environmental Studies *	2			2	0										
Practicals																	
7	3KS06	Object Oriented Programming (Java) Lab			2	2	1						25	25	50	25	
8	3KS07	Data Structures Lab			2	2	1						25	25	50	25	
9	3KS08	Analog & Digital Electronics Lab			2	2	1						25	25	50	25	
10	3KS09	C Skill-Lab I (#)			2	2	1						25	25	50	25	
		Total	17	1	8	26	20				500				200		
														Total	700		

* As per the Ordinance No. 42 of 2005

C Skill Lab I - based on technology like **-Python/Django** etc. to be decided by Individual Dept. of respective College

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
FOUR YEAR DEGREE COURSE IN BACHELOR OF ENGINEERING
BRANCH: COMPUTER SCIENCE & ENGINEERING - SEMESTER PATTERN (CREDIT GRADE SYSTEM)
SEMESTER: FIFTH

			Teaching Scheme					Examination Scheme									
			Hours/Week			Total Hours/Week	Credit	Theory					Practical				
			Lecture	Tutorial	P/D			Duration of paper (Hr)	Max Marks Theory Paper	Max Marks College Assessment	Total	Min Passing Marks	External	Internal	Total	Min Passing Marks	
Sr No	Subject Code	Subject Name															
Theory																	
1	5KS01	Database Management Systems	4			4	4	3	80	20	100	40					
2	5KS02	Compiler Design	3			3	3	3	80	20	100	40					
3	5KS03	Computer Architecture & Organization	3			3	3	3	80	20	100	40					
4	5KS04	Professional Elective-I (#)	3			3	3	3	80	20	100	40					
5	5KS05	Open Elective - I (\$)	3			3	3	3	80	20	100	40					
Practicals																	
6	5KS06	Database Management Systems Lab (@)			2	2	1							25	25	50	25
7	5KS07	Compiler Design Lab			2	2	1							25	25	50	25
8	5KS08	Emerging Technology Lab# I			2	2	1							25	25	50	25
9	5KS09	C Skill Lab III (*)			2	2	1							25	25	50	25
		Total	16	0	8	24	20				500					200	
																Total	700

Track	# Professional Elective-I
AI	Cognitive Technologies
DS	Data Science and Statistics
IoT	Internet of Things
Cy. Security	Introduction to Cyber Security

\$ Open Elective - I
Fundamentals of Finance & Accounting
Principles of Marketing for Engineering
Entrepreneurship

@ Practicals using MongoDB,MySQL

FOSS Tools & Technology for Practicals	
Track	Emerging Technology Lab# I
AI	IBM Watson, Microsoft Cognitive Toolkit , TensorFlow, Apache SystemML, Caffe, OpenNN, Torch, Neuroph
DS	R, Python, Cassandra, Apache Hadoop
IoT	Arduino, DeviceHive, Kaa, Home Assistant
CS	Kali Linux, OpenVPN, NMAP, Metasploit Framework

* C Skill Lab III - based on technology like - **Angular & React, Express, Node.js** etc. to be decided by Individual Dept. of respective College

An Orientation Program of 15 hours duration /MOOC on Indian Constitution to be offered to the students during the Vth Semester

Open Elective I to be opted from the courses offered by other engineering technology boards of the university /Massive Open learning Courses (MOOC) such as SWAYAM pertaining to the profession

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
FOUR YEAR DEGREE COURSE IN BACHELOR OF ENGINEERING
BRANCH: COMPUTER SCIENCE & ENGINEERING - SEMESTER PATTERN (CREDIT GRADE SYSTEM)
SEMESTER: SIXTH

Sr No			Subject Code			Subject Name			Teaching Scheme					Examination Scheme							
									Hours per Week			Total Hours/Week	Credit	Theory					Practical		
									Lecture	Tutorial	P/D			Duration of paper (Hr)	Max Marks Theory Paper	Max Marks College Assessment	Total	Min Passing Marks	External	Internal	Total
Theory																					
1	6KS01	Security Policy & Governance	3			3	3		3	80	20	100	40								
2	6KS02	Design & Analysis of Algorithm	4			4	4		3	80	20	100	40								
3	6KS03	Software Engineering	3			3	3		3	80	20	100	40								
4	6KS04	Professional Elective-II (#)	3			3	3		3	80	20	100	40								
5	6KS05	Open Elective - II (\$)	3			3	3		3	80	20	100	40								
Practicals																					
6	6KS06	Design & Analysis of Algorithm Lab			2	2	1							25	25	50	25				
7	6KS07	Software Engineering Lab		v	2	2	1							25	25	50	25				
8	6KS08	Emerging Technology Lab# II			2	2	1							25	25	50	25				
9	6KS09	C Skill Lab IV (*)			2	2	1							25	25	50	25				
			Total	16	8	24	20					500				200					
														Total	700						

Track	# Professional Elective-II
AI	Natural Language Processing
DS	Big Data Analytics
IoT	Sensors & Actuators
Cy.Security	Cryptography

\$ Open Elective - II
Computational Biology
Cyber Law & Ethics
Intellectual Property Right

FOSS Tools & Technology for Practicals	
Track	Emerging Technology Lab# II
AI	Natural Language Toolkit (NLTK), SpaCy, PyTorch-NLP, Natural, Retext, TextBlob
DS	KNIME, Spark, Neo4J, MongoDB, Hive, Storm,
IoT	Devicehub, Zetta, Node-RED, Flutter, M2MLabs Mainspring
CS	VeraCrypt, ModSecurity, AdBlocker, CheckShortURL, SPAMfighter, SpamBully

* C Skill Lab IV - based on technology like - DevOp to be decided by Individual Dept. of respective College

An Orientation Program of 15 hours duration /MOOC on Indian Constitution to be offered to the students during the Vth Semester

Open Elective II to be opted from the courses offered by other engineering technology boards of the university /Massive Open learning Courses (MOOC) such as SWAYAM pertaining to the profession

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
FOUR YEAR DEGREE COURSE IN BACHELOR OF ENGINEERING
BRANCH: COMPUTER SCIENCE & ENGINEERING - SEMESTER PATTERN (CREDIT GRADE SYSTEM)
SEMESTER: SEVENTH

Sr No			Subject Code			Subject Name			Teaching Scheme					Examination Scheme							
									Hours per Week			Total Hours/Week	Credit	Theory					Practical		
									Lecture	Tutorial	P/D			Duration of paper (Hr)	Max Marks Theory Paper	Max Marks College Assessment	Total	Min Passing Marks	External	Internal	Total
Theory																					
1	7KS01	Social Science & Engineering Economics	3			3	3		3	80	20	100	40								
2	7KS02	Computer Graphics	3			3	3		3	80	20	100	40								
3	7KS03	Cloud Computing	4			4	4		3	80	20	100	40								
4	7KS04	Professional Elective-III (#)	3			3	3		3	80	20	100	40								
5	7KS05	Professional Elective-IV (\$)	3			3	3		3	80	20	100	40								
Practicals																					
6	7KS06	Computer Graphics Lab			2	2	1							25	25	50	25				
7	7KS07	Emerging Technology Lab# III			2	2	1							25	25	50	25				
8	7KS08	Emerging Technology Lab# IV			2	2	1							25	25	50	25				
9	7KS09	Project & Seminar			8	8	4								50	50	25				
			Total	16	14	30	23					500				200					
														Total	700						

Track	# Professional Elective-III
AI	Robotics
DS	Data Warehousing & Mining
IoT	Embedded Systems
Cy.Security	Digital Forensics

Emerging Technology Lab# III
ROS, YARP, MRPT, Gazebo, OROCOS.
RapidMiner, Weka, Scrapy, Pandas
ThingsBoard, Kinoma, SiteWhere
Security Onion, LastPass, KeePass

Emerging Technology Lab# V
Ethereum, BigchainDB, Corda
OpenCV, SimpleCV, Keras, Caffe
OpenEagles, Repast, OpenSimulator

← FOSS Tools & Technology for Practicals ↑

\$ Professional Elective-IV	Blockchain Fundamentals	Image Processing	Optimization Techniques
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FOUR YEAR DEGREE COURSE IN BACHELOR OF ENGINEERING
BRANCH: COMPUTER SCIENCE & ENGINEERING - SEMESTER PATTERN (CREDIT GRADE SYSTEM)
SEMESTER: EIGHTH

Sr No			Subject Code			Subject Name			Teaching Scheme					Examination Scheme							
									Hours per Week			Total Hours/Week	Credit	Theory					Practical		
									Lecture	Tutorial	P/D			Duration of paper (Hr)	Max Marks Theory Paper	Max Marks College Assessment	Total	Min Passing Marks	External	Internal	Total
Theory																					
1	8KS01	Object Oriented Analysis & Design			3			3	3	3	80	20	100	40							
2	8KS02	Professional Ethics & Management			3			3	3	3	80	20	100	40							
3	8KS03	Professional Elective-V (#)			3			3	3	3	80	20	100	40							
4	8KS04	Professional Elective-VI (§)			3			3	3	3	80	20	100	40							
Practicals																					
5	8KS05	Emerging Technology Lab# V						2	2	1					25	25	50	25			
6	8KS06	Emerging Technology Lab# VI						2	2	1					25	25	50	25			
7	8KS07	Project & Seminar						12	12	6					75	75	150	75			
				Total	12		16	28	20				400				250				
														Total	650						

Track	# Professional Elective-V
AI	Virtual & Augmented Reality
DS	Machine Learning and AI
IoT	Wireless Sensor Networks
Cy.Security	System & Software Security

Emerging Technology Lab# IV
Google's ARCore, AR.js, ARToolKit, DroidAR, Brio, Adobe Aero
R Studio, Orange, D3.js, Ggplot2, Jupyter Notebooks
DSA, Thinger, RIOT, OpenRemote, Anjay
Wireshark, Burp Suit, Nessus

Emerging Technology Lab# VI
Hyperledger, HydraChain, MultiChain, Elements
Google Colab, GPUImage, Cuda, Aforge/Accord.NET
OR-Tools, Locust.io, httpperf, Apache JMeter, Siege

← **FOSS Tools & Technology for Practical** ↑

§ Professional Elective-VI	Distributed Ledger Technology	Multimedia Computing	Modeling & Simulation
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FOUR YEAR DEGREE COURSE IN BACHELOR OF ENGINEERING
BRANCH: COMPUTER SCIENCE & ENGINEERING

Baskets for Open Electives & Professional Electives

Open Elective - I	Open Elective - II
Fundamentals of Finance & Accounting	Computational Biology
Principles of Marketing for Engineering	Cyber Law & Ethics
Entrepreneurship	Intellectual Property Right

Track	Professional Elective-IV	Professional Elective-VI
	Blockchain Fundamentals	Distributed Ledger Technology
	Image Processing	Multimedia Computing
	Statistics using R	Modeling & Simulation

Track	Professional Elective-I	Professional Elective-II
AI	Cognitive Technologies	Natural Language Processing
DS	Data Science	Big Data Analytics
IoT	Internet of Things	Sensors & Actuators
Cyber Security	Introduction to Cyber Security	Cryptography

Track	Professional Elective-III	Professional Elective-V
AI	Robotics	Virtual & Augmented Reality
DS	Data Warehousing & Mining	Machine Learning and AI
IoT	Embedded Systems	Wireless Sensor Networks
Cyber Security	Digital Forensics	System & Software Security

Specialization option can be supported by Professional Electives I, II, III, IV, V & VI can also be opted through SWAYAM which needs to be mentored by Faculty.

C Skill Lab I - IV covers the technology essentials for **Full Stack Developer** Skill set

Wherever possible students should be encouraged to opt for Virtual Labs apart from the normal Physical Labs for all the subjects specifically from Professional electives baskets. (Various Virtual Labs were floated by Ministry of HRD <http://www.vlab.co.in/>)

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FOUR YEAR DEGREE COURSE IN BACHELOR OF ENGINEERING
BRANCH: COMPUTER SCIENCE & ENGINEERING

Tentative FOSS Tools & Technology for Practicals
(Free and open-source software)

Track	Emerging Technology Lab#1
AI	IBM Watson, Microsoft Cognitive Toolkit , TensorFlow, Apache SystemML, Caffe, OpenNN, Torch, Neuroph
DS	R, Python, Cassandra, Apache Hadoop,
IoT	Arduino, DeviceHive, Kaa, Home Assistant
Cyber Security	Kali Linux, OpenVPN, NMAP, Metasploit Framework

Emerging Technology Lab#2
Natural Language Toolkit (NLTK),SpaCy, PyTorch-NLP, Natural, Retext, TextBlob
KNIME, Spark, Neo4J, MongoDB, Hive, Storm,
Devicehub, Zetta, Node-RED, Flutter, M2MLabs Mainspring
VeraCrypt, ModSecurity, AdBlocker, CheckShortURL, SPAMfighter, SpamBully

Track	Emerging Technology Lab#3
AI	ROS, YARP, MRPT, Gazebo, OROCOS.
DS	RapidMiner, Weka, Scrapy, Pandas
IoT	ThingsBoard, Kinoma, SiteWhere
Cyber Security	Security Onion, LastPass, KeePass

Emerging Technology Lab#4
Google's ARCore, AR.js, ARToolKit, DroidAR, Holokit. Mixare, Brio, Adobe Aero
R Studio, Orange, D3.js, Ggplot2, Jupyter Notebooks
DSA,Thinger,RIOT, OpenRemote,Anjay
Wireshark, Burp Suit, Nessus

Track	Emerging Technology Lab# V
Block Chain	Ethereum,BigchainDB, Corda
Image Processing	OpenCV, SimpleCV, Keras, Caffe
Optimization	OpenEagles, Repast, OpenSimulator

Emerging Technology Lab# VI
Hyperledger, HydraChain, MultiChain, Elements
Google Colab, GPUImage, Cuda, AForge.NET/ Accord.NET
OR-Tools, Locust.io, httpperf, Apache JMeter, Siege