

**CURRICULUM**  
**B.TECH. COMPUTER SCIENCE & ENGINEERING (BIG DATA & ANALYTICS)**  
**(IN ASSOCIATION WITH IBM)**  
**CHOICE BASED CREDIT SYSTEM**

**STUDENTS LEARNING OUTCOMES**

The curriculum and syllabi of B.Tech Computer Science & Engineering (Big Data & Analytics) program (2017-18) conforms to Outcome Based Education (OBE) for a flexible and structured Choice Based Credit System (CBCS). In general, **ELEVEN STUDENT OUTCOMES** (a-k) have been identified and the curriculum and syllabi have been chosen in such a way that each of the modules meets one or more of these outcomes. Student outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire as they progress through the program. Further, each module in the program spells out clear instructional objectives which are mapped to the student outcomes.

**The Student Outcomes are:**

- (a) Ability to apply knowledge of Mathematics and science in software engineering solutions.
- (b) Ability to understand the engineering concepts and their applications using the acquired broad based knowledge.
- (c) Ability to practice and develop software for interpretation and analysis of data.
- (d) Ability to use the techniques, skills, and modern engineering tools necessary for software and hardware practices.
- (e) Ability to identify and analyze Computer Science and Engineering problems in related multiple disciplines including software development, middleware, software testing, computer networks, cloud and mobile computing.
- (f) Ability to design, develop and verify a software system to meet desired needs ensuring its reliability and security in addition to satisfying economic, social and ethical constraints.
- (g) Ability to apply Enterprise level application software for design of engineering product/process.
- (h) Ability to function as consultant for the development of sustainable software solutions.
- (i) An understanding of professional and ethical values.
- (j) Ability to communicate effectively in diverse groups and exhibit leadership skills.
- (k) To develop an understanding of global environment and its protection.

**CURRICULUM**  
**B. TECH. COMPUTER SCIENCE & ENGINEERING (BIG DATA & ANALYTICS)**  
**(IN ASSOCIATION WITH IBM)**  
**CHOICE BASED CREDIT SYSTEM**

Category		Sub-Category	Total Number of Credits (B.Tech)	Total Number of Credits (B.Tech-LEET)	Min Required Credits (B.Tech)	Min Required Credits (B.Tech-LEET)	Percentage of Total credits
<b>G</b>	General		<b>52</b>	<b>0</b>	<b>48</b>	<b>0</b>	26%
<b>E</b>	Engineering	Program Core (PC)	78	78	78	78	
		Program Elective (PE)	23	23	19	19	
		Generic Elective (GE)	8	8	4	4	
		Project (PD)	20	20	20	20	
<b>Total : Engineering</b>			<b>129</b>	<b>129</b>	<b>121</b>	<b>121</b>	65%
<b>M</b>	Management		<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	4%
<b>P</b>	Professional Enrichment	Ability enhancement (AE)	8	8	7	7	
		Skill enhancement (SE)	4	4	4	4	
		Creativity & Innovation (CI)	1	1	0	0	
		Co-Curricular Activity (CA)	1	1	0	0	
<b>Total : Professional Enrichment</b>			<b>14</b>	<b>14</b>	<b>11</b>	<b>11</b>	6%
<b>Overall Total</b>			<b>202</b>	<b>150*</b>	<b>187</b>	<b>139*</b>	<b>100%</b>

**Note:**

Students are to earn at least 187/139\*credits out of 202/150\* credits to become eligible for the award of B.Tech degree.

\* FOR LATERAL ENTRY

# PROGRAM SCHEME

## SEMESTER - I

MODULE CODE	CATEGORY	SUB CATEGORY	MODULE	L	T	P	C	Internal Marks	External Marks	Total Marks
ENG0101	G		ENGLISH	3	0	0	3	25	75	100
MATH0101	G		APPLIED MATHEMATICS - I	3	1	0	3.5	50	100	150
CHEM0101	G		INDUSTRIAL CHEMISTRY	3	0	0	3	25	75	100
CHEM0102	G		CHEMISTRY LAB	0	0	2	1	25	25	50
PHYS0101	G		APPLIED PHYSICS – I	3	1	0	3.5	50	100	150
PHYS0102	G		PHYSICS LAB – I	0	0	2	1	25	25	50
CSEI1103	G		SOFTWARE FOUNDATION AND PROGRAMMING 1 (WITH C)	3	0	0	3	25	75	100
CSEI1104	G		SOFTWARE FOUNDATION AND PROGRAMMING 1 (WITH C) LAB	0	0	2	1	25	25	50
ECEN0101	G		BASICS OF ELECTRONIC AND ELECTRICAL SCIENCE	4	0	0	4	50	100	150
ECEN0103	G		BASICS OF ELECTRONIC & ELECTRICAL SCIENCE LAB	0	0	2	1	25	25	50
MECH0101	G		ENGINEERING GRAPHICS	1	0	4	3	75	50	125
<b>TOTAL</b>				<b>20</b>	<b>2</b>	<b>12</b>	<b>27</b>	<b>400</b>	<b>675</b>	<b>1075</b>

**L = Lecture**

**T = Tutorial**

**P = Practical**

**C = Credit Point**

## SEMESTER - II

MODULE CODE	CATEGORY	SUB CATEGORY	MODULE	L	T	P	C	Internal Marks	External Marks	Total Marks
MATH0116	G		APPLIED MATHEMATICS-II	4	1	0	4.5	50	100	150
PHYS0103	G		APPLIED PHYSICS-II	3	1	0	3.5	50	100	150
PHYS0104	G		APPLIED PHYSICS-II LAB	0	0	2	1	25	25	50
ENGC0101	G		ENVIRONMENTAL SCIENCE AND GREEN CHEMISTRY	4	0	0	4	50	100	150
ENGC0102	G		ENVIRONMENTAL SCIENCE AND GREEN CHEMISTRY LAB	0	0	2	1	25	25	50
MECH2104	G		ENGINEERING MECHANICS	4	0	0	4	50	100	150
MECH2105	G		ENGINEERING MECHANICS LAB	0	0	2	1	25	25	50
MATH0117	G		NUMERICAL METHODS	3	0	0	3	25	75	100
CSE11105	E	PC	SOFTWARE FOUNDATION AND PROGRAMMING 1 (WITH C++)	3	0	0	3	25	75	100
CSE11106	E	PC	SOFTWARE FOUNDATION AND PROGRAMMING 1 (WITH C++) LAB	0	0	2	1	25	25	50
CIVL0101	G		BASICS OF CIVIL ENGINEERING	2	0	0	2	25	50	75
CIVL0102	G		BASICS OF CIVIL ENGINEERING LAB	0	0	2	1	25	25	50
<b>TOTAL</b>				<b>23</b>	<b>2</b>	<b>10</b>	<b>29</b>	<b>400</b>	<b>725</b>	<b>1125</b>

**L = Lecture**

**T = Tutorial**

**P = Practical**

**C = Credit Point**

## SEMESTER - III

MODULE CODE	CATEGORY	SUB CATEGORY	MODULE	L	T	P	C	Internal Marks	External Marks	Total Marks
CSEI2101	E	PC	DATA STRUCTURES AND PROGRAM DESIGN	3	0	0	3	25	75	100
CSEI2102	E	PC	DATA STRUCTURES AND PROGRAM DESIGN LAB	0	0	3	1.5	25	50	75
CSEN2103	E	PC	DISCRETE STRUCTURE	3	1	0	3.5	50	100	150
CSEN2104	E	PC	COMPUTER ARCHITECTURE & ORGANIZATION	3	1	0	3.5	50	100	150
CSEB2101	E	PC	OBJECT ORIENTED PROGRAMMING USING JAVA	3	0	0	3	25	75	100
CSEB2102	E	PC	OBJECT ORIENTED PROGRAMMING USING JAVA LAB	0	0	2	1	25	25	50
	E	PE	ELECTIVE-I	4	0	0	4	50	100	150
MGMT0002	M		PROFESSIONAL ECONOMICS AND FINANCIAL ANALYSIS	3	0	0	3	25	75	100
VALU0119	P	AE	APTITUDE – I	2	0	0	2	25	50	75
VALU0123	P	SE	PROFESSIONAL COMMUNICATION – I	2	0	0	2	25	50	75
ENGL0109	P	AE	ACADEMIC WRITING	0	0	2	1	25	25	50
	P	AE	YOGA/MEDITATION/NSS	0	0	2	1	50	0	50
<b>TOTAL</b>				<b>23</b>	<b>2</b>	<b>9</b>	<b>28.5</b>	<b>400</b>	<b>725</b>	<b>1125</b>

**L = Lecture**

**T = Tutorial**

**P = Practical**

**C = Credit Point**

### ELECTIVE I

MODULE CODE	MODULE
CSEN2103	INTERNET & WEB TECHNOLOGY
CSEN2205	E-COMMERCE
CSEN2206	DIGITAL ELECTRONICS

### YOGA / MEDITATION / NSS

MODULE CODE	MODULE
VALU0118	YOGA
VALU0121	MEDITATION
VALU0122	NSS

## SEMESTER – IV

MODULE CODE	CATEGORY	SUB CATEGORY	MODULE	L	T	P	C	Internal Marks	External Marks	Total Marks
CSEI2103	E	PC	DATABASE MANAGEMENT SYSTEM	3	0	0	3	25	75	100
CSEI2104	E	PC	DBMS LAB	0	0	2	1	25	25	50
CSEN2115	E	PC	PRINCIPLES OF OPERATING SYSTEM	3	0	0	3	25	75	100
CSEN2116	E	PC	OPERATING SYSTEM LAB	0	0	2	1	25	25	50
CSEN2117	E	PC	DESIGN AND ANALYSIS OF ALGORITHMS	3	1	0	3.5	50	100	150
CSEN2118	E	PC	ALGORITHM DESIGN LAB	0	0	2	1	25	25	50
CSEN3101	E	PC	COMPUTER NETWORKS	3	1	0	3.5	50	100	150
CSEN3102	E	PC	COMPUTER NETWORKS LAB	0	0	2	1	25	25	50
CSEB2103	E	PC	FOUNDATION IN BUSINESS ANALYTICS USING IBM COGNOS INSIGHT	4	0	0	4	50	100	150
	E	PE	ELECTIVE-II	4	0	0	4	50	100	150
<b>TOTAL</b>				<b>20</b>	<b>2</b>	<b>8</b>	<b>25</b>	<b>350</b>	<b>650</b>	<b>1000</b>

**L = Lecture**

**T = Tutorial**

**P = Practical**

**C = Credit Point**

### ELECTIVE II

MODULE CODE	MODULE
CSEN2220	NATURAL LANGUAGE PROCESSING
CSEN2222	SOFT COMPUTING
CSEN2223	FUZZY LOGIC

**Note: Each student has to undergo practical training of 6 weeks during summer vacation and its evaluation shall be carried out in the V semester.**

## SEMESTER – V

MODULE CODE	CATEGORY	SUB CATEGORY	MODULE	L	T	P	C	Internal Marks	External Marks	Total Marks
CSEI3101	E	PC	ESSENTIALS OF SOFTWARE ENGINEERING (OOAD & SW LIFECYCLE)	3	0	0	3	25	75	100
CSEI3102	E	PC	SOFTWARE ENGINEERING (OOAD & SW LIFECYCLE) LAB	0	0	3	1.5	25	50	75
CSEB3101	E	PC	FOUNDATION COURSE IN ENTERPRISE APPLICATION DEVELOPMENT	3	0	0	3	25	75	100
CSEB3102	E	PC	IBM RATIONAL TOOLS LAB	0	0	2	1	25	25	50
CSEN3105	E	PC	THEORY OF AUTOMATA & COMPUTATION	3	1	0	3.5	50	100	150
CSEN3106	E	PD	INDUSTRIAL TRAINING I (TRAINING TO BE UNDERGONE AFTER IV SEMESTER)	0	0	2	1	50	0	50
CSEN3107	E	PD	SPECIALIZED MINOR PROJECT (GROUP)	0	0	4	2	50	50	100
	E	PE	ELECTIVE-III	4	0	0	4	50	100	150
	E	PE	ELECTIVE-IV	4	0	0	4	50	100	150
VALU0136	P	AE	APTITUDE-II	2	0	0	2	25	50	75
VALU0140	P	SE	PROFESSIONAL COMMUNICATION-II	2	0	0	2	25	50	75
<b>TOTAL</b>				<b>21</b>	<b>1</b>	<b>11</b>	<b>27</b>	<b>375</b>	<b>700</b>	<b>1100</b>

### ELECTIVE – III

**L = Lecture**  
**T = Tutorial**  
**P = Practical**  
**C = Credit Point**

MODULE CODE	MODULE
CSEN2210	SYSTEM PROGRAMMING & SYSTEM ADMINISTRATION
CSEN3208	MOBILE APPLICATION DEVELOPMENT
CSEN3209	BIG DATA ANALYSIS

### ELECTIVE – IV

MODULE CODE	MODULE
CSEN3210	COGNITIVE NETWORKS
CSEN3211	CRYPTOGRAPHY
CSEN3213	IMAGE PROCESSING

## SEMESTER – VI

MODULE CODE	CATEGORY	SUB-CATEGORY	MODULE	L	T	P	C	Internal Marks	External Marks	Total Marks
CSEN3114	E	PC	ARTIFICIAL INTELLIGENCE	3	1	0	3.5	50	100	150
CSEN3115	E	PC	ARTIFICIAL INTELLIGENCE LAB	0	0	2	1	25	25	50
CSEB3103	E	PC	FOUNDATION COURSE IN HADOOP & BIG DATA ANALYTICS	3	0	0	3	25	75	100
CSEB3104	E	PC	HADOOP & BIG DATA ANALYTICS LAB	0	0	2	1	25	25	50
CSEB3105	E	PC	ENTERPRISE REPOTING USING IBM COGNOS BI	3	0	0	3	25	75	100
CSEB3106	E	PC	ENTERPRISE REPOTING USING IBM COGNOS BI LAB	0	0	3	1.5	25	50	75
	E	PE	ELECTIVE-V	3	1	0	3.5	50	100	150
	E	GE	ELECTIVE-A	4	0	0	4	50	100	150
CSEN3119	E	PD	SPECIALIZED MINOR PROJECT (INDIVIDUAL)	0	0	8	4	100	100	200
CSEN3120	P	CI	CREATIVITY AND INNOVATION	0	0	2	1	0	50	50
<b>TOTAL</b>				<b>16</b>	<b>2</b>	<b>17</b>	<b>25.5</b>	<b>375</b>	<b>700</b>	<b>1075</b>

- L = Lecture**  
**T = Tutorial**  
**P = Practical**  
**C = Credit Point**

### ELECTIVE – V

MODULE CODE	MODULE
CSEN3221	WIRELESS SENSOR NETWORKS
CSEN3222	ADVANCED COMPUTER ARCHITECTURE
CSEN4208	NEURAL NETWORKS

### GENERIC ELECTIVE - A<sup>ψ</sup>

SAPA0320 SAP-ABAP / SAPM0321 SAP-MM / SAPS0322 SAP-SD
ONE/TWO MOOCS MODULES (Consisting 4 credits in total)

<sup>ψ</sup>Additional fee, if any, shall be borne by the student.

**Note:** Each student has to undergo practical training of 6 weeks during summer vacation and its evaluation shall be carried out in the VII semester.



## SEMESTER – VII

MODULE CODE	CATEGORY	SUB-CATEGORY	MODULE	L	T	P	C	Internal Marks	External Marks	Total Marks
CSEN4101	E	PC	COMPILER DESIGN	3	0	0	3	25	75	100
CSEN4102	E	PC	COMPILER DESIGN LAB	0	0	2	1	25	25	50
CSEN4103	E	PC	DATA WAREHOUSING & DATA MINING	4	0	0	4	50	100	150
CSEB4101	E	PC	BIG DATA ANALYTICS PROGRAMMING	3	0	0	3	25	75	100
CSEB4102	E	PC	BIG DATA ANALYTICS PROGRAMMING LAB	0	0	3	1.5	25	50	75
	E	PE	ELECTIVE-VI	3	1	0	3.5	50	100	150
	E	GE	ELECTIVE-B**	4	0	0	4	50	100	150
CSEN4106	E	PD	SPECIALIZED MAJOR PROJECT (GROUP)##	0	0	8	4	100	100	200
CSEN4107			INDUSTRIAL TRAINING II Training to be undergone after VI semester)	0	0	2	1	50	0	50
CLUB0101	P	CA	<i>Co-Curricular Activity</i>	0	0	0	1	25	25	50
<b>TOTAL</b>				<b>17</b>	<b>1</b>	<b>15</b>	<b>26</b>	<b>425</b>	<b>650</b>	<b>1075</b>

**L = Lecture**  
**T = Tutorial**  
**P = Practical**  
**C = Credit Point**

### ELECTIVE VI

MODULE CODE	MODULE
CSEI4201	ADVANCED RDBMS
CSEN4209	ETHICAL HACKING
CSEI4202	MACHINE LEARNING

\*\* To be chosen from Generic Electives offered by departments other than the parent Department.

## Only advisory support shall be provided by the faculty.

## SEMESTER – VIII

MODULE CODE	CATEGORY	SUB-CATEGORY	MODULE	L	T	P	C	Internal Marks	External Marks	Total Marks
CSEN4111	E	PD	SPECIALIZED MAJOR PROJECT (INDIVIDUAL)##	0	0	16	8	200	200	400
ENVS0101	P	AE	ENVIRONMENTAL SCIENCES	2	0	0	2	25	50	75
MGMT0103	M		ENTREPRENEURSHIP	4	0	0	4	50	100	150
<b>TOTAL</b>				<b>6</b>	<b>0</b>	<b>16</b>	<b>14</b>	<b>275</b>	<b>350</b>	<b>625</b>

**L = Lecture**

**T = Tutorial**

**P = Practical**

**C = Credit Point**

**## Only advisory support shall be provided by the faculty.**