Framework for 4 years UG Programme under NEP-2020 based on AICTE 2023 Model Curriculum Guidelines

1. Implementation of Four Year UG Engineering Curriculum in First Phase with effect from Academic Year 2023-24:
   The credit and Multidisciplinary Curricular Framework, designed on the lines of the National Credit Framework and AICTE Approval Process Handbook, is to be made applicable to in first phase to the AICTE-regulated UG (B.E./B. Tech. or equivalent) Engineering/ Technology Programs conducted in NIAMT, Ranchi with effect from Academic Year 2023-24.

2. Credit Framework under Four-Year UG Engineering Programme with Multiple Entry and Multiple Exit options:
   The Four-year Bachelor's Multidisciplinary Engineering Degree Programme allows the students to experience the full range of holistic and multidisciplinary education in addition to a focus on the chosen major and minors as per their choices and the feasibility of exploring learning in different institutions. The minimum and maximum credit structure for different levels under the Four-year Bachelor's Multidisciplinary Engineering UG Programme with multiple entry and multiple exit options are as given below:

Semester wise Credit distribution Structure for Four Year UG Engineering Program: One Major and One Minor/Honors

Sl. No.	Year	Credit Point	
		ODD	EVEN
1	First	22	22
2	Second	20	20
3	Third	20	20
4	Fourth	20	16
Total Credit Point		**82**	**78**
		160	

Distribution of Credits

CourseCategory	Number of Subjects	As per AICTE Recom.	Proposed Credit Point
Humanities, Social Science, and Management Courses	**04**	**12**	**12**
Basic Science Course (BSC)	08	29	**24**
Engineering Science Course (ESC)	08	27	**24**
Professional Core Course (PCC)	18	58	**60**
Professional Elective Course (PEC)	04	9	**13**
Open Elective Course (OEC)	03	9	**09**
Project work, Seminar, and Internship in industry or elsewhere (PrSI)	04	16	**10+02+04=16**
Mandatory Courses [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Knowledge Tradition] (AUC)	03	(non credit)	**02**
TotalCreditPoint			**160**
Minor Courses	04 - 05	18 - 20	**18-20**
Honors Courses	05	20	**20**

HUMANITIES & SOCIAL SCIENCES COURSES [HS] & MANAGEMENT COURSES

(2 compulsory + 2 others)

(i) Number of Humanities & Social Science Courses:4
(ii) Credits:12

Sl.	Code No.	Subject	Semester	Credits
1	HSMC 01	Communication Skills / English (Compulsory	2	2:0:2=3
2	HSMC 02	Universal Human Values-2 (Compulsory course)	2	2:1:0=3
3	HSMC 03	Industrial Psychology	5 / 6	3:0:0=3
4	HSMC 04	Operations Research	5 / 6	3:0:0=3
5	HSMC 05	Project Management	5 / 6	3:0:0=3
6	HSMC 06	Finance & Accounting / Engineering Economics	5 / 6	3:0:0=3
			Total Credits:	**12**

BASIC SCIENCE COURSE [BSC] (Total 8)

Sl.	Code No.	Subject	Semester	Credits
1	BSC 101	Engineering Physics	1	3:1:2=4
2	BSC 102	Engineering Mathematics-1	1	3:1:0=4
3	BSC 103	Engineering Chemistry	2	2:0:2=3
4	BSC 104	Engineering Mathematics-2	2	3:1:0=4
5	BSC 202	Engineering Mathematics-3	3	3:1:0=4
6	BSC 202	Engineering Mathematics-4 (Numerical Methods / Statistics for Engineers)	4	2:1:0=3
7	BSC 203	Biology for Engineers	2	2:0:0=2
8	BSC 204	Environment Science (Audit)	3	2:0:0=0
			Total Credits:	**25**

ENGINEERING SCIENCE COURSE [ESC] (Total 8)

Sl.	Code No.	Subject	Semester	Credits
1	ESC 101	Basic Electrical Engineering	1	2:0:2=3
2	ESC 102	Engineering Drawing & Computer Graphics	2	1:0:4=3
3	ESC 103	Data Visualization and Pre-Processing (Audit)	1	0:0:2=1
4	ESC 104	Programming for Problem Solving	1	2:0:4=3
5	ESC 105	Engineering Mechanics	1	3:0:2=4
6	ESC 201	Basic Electronic Engineering	2	3:0:0=3
7	ESC 202	Fundamentals of Measurement and Sensors	2	3:0:0=3
8	ESC 203	Computer Integrated Manufacturing	3	3:1:0=4
			Total Credits:	**24**

Guidelines for minor/major Degree to be awarded by the Institute:

1. Selecting a particular "Specialization track" by studying subjects of specialization in the form of elective subjects; "Specialization#1" to "Specialization#5 in semesters 4, 5, 6, and 7.
2. B.Tech. Minor (M) and Honors (H) programmes by earning extra credits 18-20 through subjects "(M/H#1)" to "(M/H#5/5)" in semesters 4 to 8.
3. If a student successfully completes (i) Specialization track, (ii) Minor, or (iii) Honors, the UG degree will be awarded accordingly.
4. At present the specialization and Honors will be offered by the respective departments to the students of own disciplines, whereas the Minor will be offered to the students of other departments.
5. There shall be one division for a particular Minor or Honors programme with minimum of 15 students and maximum number of 75 students. The selection of students for specialization track, Minor or Honors programmes is based on CGPA upto 3rd semester as a merit criterion without any backlog and 'FF' grade.
6. For the students who are opting for specialization track and Minor/Honors programmes, the CGPA of 7.0 should be maintained in the subjects of the respective specialization track or Minor/Honor program and there should not be 'FF' grade in any subject of specialization track, otherwise Minor/Honor will not be awarded.

Course Scheme of B.Tech. (Computer Engineering)

SEMESTER–I (Completed)

Sl. No.	Course Code	Course Name	Credits		L	T	P	C
1	05 BSC 01	Engineering Mathematics-I	3+1	4	3	1	0	4
2	05 BSC 02	Engineering Physics	3+1	4	3	0	2	4
3	05 ESC 01	Basics of Electrical Engineering	3	3	3	0	0	3
4	05 ESC 02	Engineering Mechanics	3+1	3	3	0	2	4
5	05 ESC 03	Programming for Problem Solving	3	3	2	0	2	3
6	05 ESC 04	Data Visualization and Pre-Processing	1	1	0	0	2	1
7	05 AUC 01	Indian Knowledge Systems	2	2	2	0	0	2
8	05 AUC 02	Sports & Yoga or NSS/NCC (Audit)	1	1	0	0	2	1
	Total							**22**

SEMESTER–II (Completed)

Sl. No.	Course Code	Course Name	Credits		L	T	P	C
1	05 HSMC 01	Communication Skills	1	1	0	0	2	1
2	05 BSC 03	Engineering Mathematics -II	3+1	4	3	1	0	4
3	05 BSC 04	Engineering Chemistry	3	3	2	0	2	3
4	05 ESC 05	Elements of Electronics Engineering	3	3	2	0	2	3
5	05 ESC 06	Engineering Drawing & Computer Graphics	3	3	1	0	4	3
6	05 AUC 03	Sports & Yoga or NSS/NCC (Audit)	1	1	0	0	2	1
7	05 BSC05	Biology for Engineers	2	2	2	0	0	2
8	05 ESC 07	Fundamentals of Measurement and Sensors	3	3	2	0	2	3
9	05 PrSI 01	Summer Internship/**	2	2	8hrs/day For 4 weeks			2
(Optional) Mandatory for exit with UG certificate		Vocational / Industrial Training /Laboratory Work/ Specialized course offered by respective department	4	4	8hrs/day for 4 weeks/ 4 credit course			4
	Total							**22/26**

NOTE: Mandatory Vocational / Industrial Training(4Weeks) OR Laboratory Work/ Specialized course offered by respective department for student opting for exit after first year with UG certificate

SEMESTER–III

Sl. No.	Course Code	Course Name	Credits		L	T	P	C
1	05 BSC-06	Engineering Mathematics-III	3+1	4	3	1	0	4
2	05 PCC 01	Fundamental of Computer Science	2	2	2	0	0	2
3	05 BSC 07	Environmental Science	0	0	2	0	0	0
4	05 PCC 02	Data Structures	3+1	4	3	0	2	4
5	05 ESC 08	Computer Integrated Manufacturing	3+1	4	3	1	0	4
6	05 PCC 03	Object Oriented Programming	3	3	3	0	0	3
7	05 HSMC 02	Universal Human Values-2	2+1	3	2	1	0	3
	Total							**20**

SEMESTER–IV

Sl.No.	Course Code	Course Name	Credits		L	T	P	C
1	05 BSC-08	Numerical Methods and Computational Techniques	3	**3**	3	0	0	3
2	05 PCC 04	Design & Analysis of Algorithm	3+1	3	3	0	2	4
3	05 PCC 05	Digital Logic Design	3+1	4	3	0	2	4
4	05 PCC 06	Formal Languages and Automata Theory	3	3	3	0	0	3
5	05 PCC 07	Discrete Structures	3	3	3	0	0	3
6	05 PCC 08	Analog Circuit	3	3	3	0	0	3
(Optional) Mandatory for exit with UG Diploma certificate		Vocational / Industrial Training /Laboratory Work/ Specialized course offered by respective department	4	4	8hrs/day for 4 weeks/ 4 credit course			4
	Total							**20/ 24**
	05 M01/H01	XXXXXXXXXX	**4/4**	**4/4**	**-**	**-**	**-**	**4/4**

NOTE: Mandatory Vocational / Industrial Training (4 Weeks) OR Laboratory Work/ Specialized course offered by respective department for student opting for exit after 2nd year with UG Diploma Certificate.

SEMESTER–V

Sl.No.	Course Code	Course Name	Credits		L	T	P	C
1	05 PCC 09	Operating Systems	3+1	3	3	0	2	4
2	05 PCC 10	Computer Organization & Architecture	3+1	4	3	0	2	4
3	05 PCC 11	Compiler Design	3	3	3	0	0	3
4	05 PCC 12	Modelling and Optimization Techniques	3	3	3	0	0	3
5	05 PEC 01	Artificial Intelligence in Manufacturing	3	3	3	0	0	3
6	05 HSMC 03	HSMC Elective - 1	2+1	3	2	1	0	3
	Total							**20**
	05 M02/**H**02	XXXXXXXXXX	4/4	4/4	-	-	-	4/4

SEMESTER–VI

Sl.No.	Course Code	Course Name	Credits		L	T	P	C
1	05 PCC 13	Microprocessor & Microcontroller	3	3	3	0	0	3
2	05 PCC 14	Artificial Intelligence & Machine Learning	3	3	3	0	0	3
3	05 PCC 15	Database Management Systems	4	4	3	0	2	4
4	05 PEC 02	Computer Networks	3+1	4	3	1	0	4
5	05 OEC 01	Another department may opt	3	3	3	0	0	3
6	05 HSMC 04	HSMC Elective - 2	3	3	2	1	0	3
(Optional) Mandatory for exit with BSc Engineering		Vocational / Industrial Training /Laboratory Work/ Specialized course offered by respective department	4	4	8hrs/day for 4 weeks/ 4 credit course			4
	Total							**20/ 24**
	05 M03/**H**03	XXXXXXXXXX	3/4	34	-	-	-	3/4

NOTE: Mandatory Vocational / Industrial Training (4 Weeks) OR Laboratory Work/ Specialized course offered by respective department for student opting for exit after 3rd year with BSc Engineering

SEMESTER–VII

Sl.No.	Course Code	Course Name	Credits		L	T	P	C
1	05 PCC 16	Cryptography & Network Security	3	3	3	0	0	3
2	05 PCC 17	Internet & Web Technology	3+1	4	3	0	2	4
3	05 PCC 18	System Software	3	3	2	0	2	3
4	05 PEC 03	Digital Image Processing / MOOCs	3	3	3	0	0	3
5	05 OEC 02	Another department may opt /MOOCs	3	3	3	0	0	3
6	05 PrSI 02	Colloquium/Seminar	2	2	0	0	4	2
7	05 PrSI 03	Summer Internship **	2	2	8hrs/day For 4 weeks			2
	Total							**20**
	05 M04/**H**04	XXXXXXXXXX	3/4	3/4	-	-	-	3/4

** students have to do summer internship in summer vacation (after 6thsem) and evaluation of the same will be done in 7th semester

SEMESTER–VIII

Sl.No.	Course Code	Course Name	Credits		L	T	P	C
1	05 PEC 04	Introduction of Blockchain Technology and Applications (Swayam/NPTEL)	3	3	3	0	0	3
2	05 OEC 03	MOOCs (OpenElective-3)	3	3	3	0	0	3
3	05 PrSI 04	Research Project/ Dissertation-II	10	10	-	-	-	10
	Total							**16**
	05 M05/**H**05	MOOCs (ProgramElective-6)	3/4	3/4	-	-	-	3/4

NOTE: MOOC' s courses approved by Department will be studied by the students.

xx will be the department code from where courses are offered.

1. Department of Foundry and Forge technology, **xx-01**
2. Department of Mechanical and Manufacturing Engineering, **xx-02**
3. Department of Materials and Metallurgical Engineering, **xx -03**
4. Department of applied science and Humanities, **xx - 04**
5. Department of Computer and Electronics Engineering, **xx -05**

Multiple Entry and Exit after 1st ,2nd , 3rd and 4th year

UG	Program Level	Minimum Credit earned	Exit- Equivalence forwarding degree	Entry–Requirement (UG7 years – Credit Expiry)
UG 1st year	5	40	UG-Certificate	1.12th and JEE (through JoSAA/CSAB)
UG 2nd year	6	40	UG-Diploma	1. 12th and JEE Qualified 2. 1st year UG- Certificate 3. Screening based on Branch Specific Prerequisite (Written test)
UG 3rd year	7	42	B.Sc. Engineering	1. 12th and JEE Qualified 2. 2nd year UG- Diploma Certificate 3. Screening based on Branch. Specific Prerequisite (Written test)

*The students of Department of ECE may also have to choose a subject offered by other department as open elective.

1. Professional Elective (PCEs)

1) Artificial Intelligence in Manufacturing
2) Computer Networks
3) Digital Image Processing
4) Introduction to Blockchain Technology & Applications

2. List of Open Elective Subjects (OECs)

2.1 Group 1 (OEC 01)

1. Fundamental of Power System
2. Wireless Sensor Networks
3. Pattern Recognition
4. Software project Management
5. Distributed Operating Systems
6. System Software and Administration
7. Intellectual property rights
8. **Advanced Manufacturing Technology**
9. Computer Vision and Image Processing
10. Big Data Analytics
11. Industrial Automation & Robotics
12. Mechatronics
13. Digital Instrumentation

2.2 Group 2 (OEC 02)

1. Digital Manufacturing
2. Cloud Computing
3. Metrology and Computer aided Inspection
4. Edge Computing
5. Advanced Operating Systems
6. **Additive Manufacturing**
7. Soft Computing
8. 3D Printing
9. Advanced Computer Architecture
10. Advanced Algorithms
11. Formal Methods in Software Engineering

2.3 Group 3 (OEC 03)

1. Automation in Manufacturing

2. Smart Machines
3. **Digital Manufacturing**
4. Smart Grid Technology
5. Electric Energy Generation & Control
6. Introduction to Industry 4.0
7. Cloud Computing
8. Information Retrieval
9. Intrusion Detection Systems
10. Software Reliability Techniques
11. Cyber Law & IPR

Internship

- Summer Internship - I: Student will go for internship during summer vacation (after 4^{th} semester) for a period of 4 weeks. The assessment will be done on 5^{th} semester.
- Summer Internship - II: Student will go for internship during summer vacation (after 6^{th} semester) for a period of 4 weeks. The assessment will be done on 7^{th} semester.

Minor Program

Minor 1 – Machine Learning and Data Science

Minor 2 – Integrated Chip Design

Minor 3 – IoT & Cyber Physical Systems

Minor 4 – Robotics & Automation

Minor 1 (Machine Learning and Data Science)						
S. No.	**Course Code**	**Course Name**	**Credits**			
			L	**T**	**P**	**C**
1	M01	Fundamentals of Python	3	0	2	4
2	M02	Fundamentals of Data Science	3	0	2	4
3	M03	Data Mining and Data Warehousing	3	0	2	4
4	M04	Machine Learning	3	0	0	3
5	M05	Social Media Analytics	3	0	0	3
	Total					**18**

Minor 2 (Integrated Chip Design)						
S. No.	**Course Code**	**Course Name**	**Credits**			
			L	**T**	**P**	**C**
1	M01	Digital Electronics	3	0	2	4
2	M02	Microprocessor	3	0	2	4
3	M03	Semiconductor devices and Circuits	3	0	2	4
4	M04	Digital Instrumentation	3	0	0	3
5	M05	Embedded System Design	3	0	0	3

	Total				**18**

Minor 3 (IoT & Cyber Physical System)						
S. No.	**Course Code**	**Course Name**	**Credits**			
			L	**T**	**P**	**C**
1	M01	Computer Networks	3	0	2	4
2	M02	Cloud & Edge Computing	3	1	0	4
3	M03	Internet of Things	3	0	2	4
4	M04	Foundations of Cyber Physical System	3	0	0	3
5	M05	Network Security	3	0	0	3
	Total					**18**

Minor 4 (Robotics & Automation)						
S. No.	**Course Code**	**Course Name**	**Credits**			
			L	**T**	**P**	**C**
1	M01	Mechatronics	3	0	2	4
2	M02	Industrial Automation and Robotics	3	0	2	4
3	M03	Advanced CAD	3	0	2	4
4	M04	Additive Manufacturing	3	0	0	3
5	M05	Automation in Manufacturing	3	0	0	3
	Total					**18**

Honors program

Honors Course						
S. No.	**Course Code**	**Course Name**	**Credits**			
			L	**T**	**P**	**C**
1	H01	Formal Methods in Computer Science	3	1	0	4
2	H02	VLSI Design for Parallel Architectures	3	0	2	4
3	H03	High Performance Computer Architecture	3	0	2	4
4	H04	Recommender Systems	3	1	0	4
5	H05	Deep Learning	3	0	2	4
	Total					**20**