BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

**(Autonomous Institute affiliated to VTU, Belagavi, Approved by AICTE New Delhi,
Accredited by NAAC with 'A' Grade and 7 Programs accredited by NBA)
Avalahalli, Doddaballapura Main Road, Yelahanka, Postbox No: 6443
Web: https://bmsit.ac.in, e-mail: principal@bmsit.in, Ph: 080-68730444
Bengaluru – 560064**

Autonomous

Governing Regulations for B. E, M. Tech, MCA and Research Programs(With Effect from Academic Year – 2021-22)

FOUNDERS

Founder
Dharmaprakasha Rajakarya Prasaktha
Late. Sri B. M. Sreenivasaiah

Founder of BMS Educational Trust (BMSET)
Year of Establishment – 1946

Late Sri. B. S. Narayan
Former Donor Trustee
Vision and Mission of BMS Educational Trust

Vision:
"Promoting Prosperity of Mankind by Augmenting Human Resource Capital Through Quality Technical Education and Training"

Mission:
"Accomplish Excellence in the Field of Technical Education Through Education Research and Service Needs of Society"

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

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Regulations Governing B.E, M.Tech, MCA and Research Programs

(With Effect from Academic Year - 2021-22

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(Autonomous Institute affiliated to VTU)

Scheme of Teaching and Examination: Effective from AY 2021 – 22 Choice Based Credit System (CBCS)

UG PROGRAM: BE Artificial Intelligence and Machine Learning (AIML) | **Semester: IV**

Sl. No	Course Category	Course Code	Course Title	Teaching Dept.	Teaching Hours /Week			Credits	Examination			
					L	T	P		Duration	CIE Marks	SEE Marks	Total Marks
1	BS	21MTB41	Advanced Engineering Mathematcis-2	MAT	3	1	1	4	3	50	50	100
2	HS	21KSK42	Samskrutika Kannada	HS	1	0	0	1	2	50	50	100
		21KBK42	Balake Kannada									
		OR										
		21CPC42	Constitution of India and Professional Ethics									
3	UHV	21UHV43	Universal Human Values - II	HS	0	2	0	1	2	50	50	100
4	HS	21HSS44	Environmental Studies	HS	2	0	0	2	2	50	50	100
5	PC	21CS45	Microcontroller and Embedded Systems	AIML	3	0	0	3	3	50	50	100
6	PC	21CS46	Design and Analysis of Algorithms	AIML/ CSE/ISE	3	0	0	3	3	50	50	100
7	PC	21AM47	Computer Organization and Architecture	AIML	3	0	0	3	3	50	50	100
8	PC	21CSL48A	Microcontroller and Embedded Systems Laboratory	AIML	0	0	2	1	3	50	50	100
9	PC	21CSL48B	Design and Analysis of Algorithms Laboratory	AIML	0	0	2	1	3	50	50	100
10	PC	21AML48C	Object Oriented Programming with JAVA Laboratory	AIML	0	0	2	1	3	50	50	100
				TOTAL	**15**	**3**	**7**	**20**	**----**	**500**	**500**	**1000**

9	NCMC	21DIP41A	Diploma Mathematics-II	MAT	3	0	0	0	3	100	--	100

- For Lateral Entry Students assessment of Internship – I to be conducted during 4th semester.
- The Assessment Pattern of 1/2/3 credit courses shall be done as per the VTU guidelines.
- BS – MTX (X- Variable) Eg: Core Branches; ME, CV, EEE, ETE, ECE – MTA, Digital Branches: CSE, ISE & AIML – MTB.
- Diploma Mathematics I and II shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.
- Successful completion of the course Diploma Mathematics II shall be indicated as satisfactory in the grade card. Non completion of the courses Diploma mathematics II shall be indicated as unsatisfactory.

B.E ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
Choice Based Credit System (CBCS)
SEMESTER – IV

Advanced Engineering Mathematics - II (3:1:1) 4
(Common to CSE/ISE/AI&ML Branches)
(Effective from the academic year 2021-22)

Course Code	**21MTB41**	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:1:1	SEE Marks	50
Total Number of Contact Hours	50	Exam Hours	3

Course Objectives:

This course will enable students to:

1. Solve the first and second orders ordinary differential equations numerically.
2. Familiarize students with the concepts of Complex Analysis
3. Acquire the knowledge of Optimization techniques to solve the linear programming problems by using various methods.
4. Apply the concept of probability in Stochastic Process and Queuing theory problems.
5. Analyze the statistical data for testing of hypothesis and to draw the conclusions.

Module – I

Introduction: Understanding the importance of the study of Complex Analysis, Transformations, Numerical techniques, Statistics, Probability and Sampling Distributions and their applications in the field of Science, Engineering, Business & Research.

Numerical Methods: Numerical solution of algebraic and transcendental equations by Regula Falsi method and Newton Raphson method.

Numerical solution of ordinary differential equations of first order and first degree, Taylor's series method, modified Euler's method. 4^{th} order Runge -Kutta method, Milne's predictor and corrector methods.

Self-Learning Component: Picard's method

Lab Session 1:

1. Solution of differential equation using Euler Method, 4th order Runge- Kutta method.
2. Determination of roots of a polynomial by Newton Raphson method, Regula Falsi method. **(10 Hours)**

Module – II

Complex Variables: Analytic functions - Cauchy-Riemann equations in Cartesian and Polar forms, Construction of analytic functions by Milne's method. Complex line integrals - Cauchy's theorem and Cauchy's integral formula.

Transformation: Conformal transformation, discussion of transformations: $w = z^2, w = e^z, w = z + \frac{1}{z}$ $(z \neq 0)$. Bilinear transformation-problems.

Self-Learning Component: Residue, poles, Cauchy's Residue theorem (without proof) and problems.

Lab Session 2:

1. Conformal mapping using matlab for $W = e^z, W = z^2, W = z + \frac{1}{z}$ $(z \neq 0)$, complex valued functions.
2. Compute residues and poles for complex functions. **(10 Hours)**

Module – III

Linear Programming Problems (LPP): Mathematical Formulation of LPP, Graphical solution of LLP, Simplex method, Big M method and Game theory: Introduction, Two Person Zero-Sum Game.

Self Learning Component: Linear Programming method for solving games.

Lab Session 3:

1. Maximization/Minimization of functions using
   a) Graphical Method
   b) Simplex Method
   c) Big M Method **(10 hours)**

Module – IV

Stochastic process and Queueing Theory: Stochastic processes, Probability Vector, Stochastic matrices, Regular stochastic matrices, Markov chains, Higher transition probabilities, Stationary distribution of Regular Markov chains and absorbing states.

Queuing theory: Introduction, Poisson processes, Concepts and M/M/1 queuing systems, Transient and Steady state solution of M/M/1 queue, Performance measure of M/M/1 queue, problems.

Self Learning Component: M/M/1/N queuing systems.

Lab Session 4:

1. Modeling of Markov process and basic queuing systems. **(10 hours)**

Module – V

Sampling and Statistical Inference: Sampling, Sampling distributions, Test of hypothesis for means, Confidence limits for means, Z-test, Student's t-distribution, Chi-square distribution as a test of goodness of fit.

Self Learning Component: ANOVA Table.

Lab Session 5:

Testing of hypothesis by

1. Z-test
2. Student's t-distribution
3. Chi-square distribution

Summary of the course: Various numerical techniques to solve ordinary differential equations, LPP, Stochastic process, Sampling and Statistical inferences. **(10 hours)**

Course outcomes:

The students will be able to

CO1: Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.

CO2: Explain the concepts of analytic functions, describe conformal and Bilinear transformation arising in field theory and signal processing.

CO3: Optimize the linear programming problem by using various methods.

CO4: Apply the concept of probability in Stochastic Process and queuing problems.

CO5: Demonstrate the validity of testing the hypothesis.

Question paper pattern:

SEE will be conducted for 100 marks.

- **Part A:** First question with 20 MCQs carrying 1 mark each.

- **Part B:** Each full question is for 16 marks. (Answer five full questions out of 10 questions with intra modular choice). In every question, there will be a maximum of three sub-questions.

CIE will be announced prior to the commencement of the course.

- 25 marks for test. Average of three tests will be taken.
- 25 marks for Alternate Assessment Method.

B.E ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
Choice Based Credit System (CBCS)
SEMESTER – III / IV

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ **Samskrutika Kannada (1:0:0):1**

(Effective from the academic year 2021-2022)

ವಿಷಯ ಸಂಕೇತ Course Code	**21KSK42**	ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನದ ಅಂಕಗಳು CIE Marks	50
ಒಂದು ವಾರಕ್ಕೆ ಬೋಧನಾ ಅವಧಿ Teaching hours/Week (L: T:P)	1-0-0	ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು SEE Marks	50
ಒಟ್ಟು ಬೋಧನಾ ಅವಧಿ Total Number of contact hours	13	ಪರೀಕ್ಷೆಯ ಅವದಿ Exam Hours	02

ಸಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು

1. ವೃತ್ತಿಪರ ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿವಾಗಿ ಪರಿಚಯಿಸಿ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಢಿಸುವುದು.
3. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಗಳು ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.

ಘಟಕ–1

ಲೇಖನಗಳು:

ಕರ್ನಾಟಕ ಏಕೀಕರಣ: ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ–ಜಿ.ವೆಂಕಟಸುಬ್ಬಯ್ಯ
ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ–ಡಾ.ಎಲ್.ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ.ವಿ.ಕೇಶವಮೂರ್ತಿ **2 ಗಂಟೆಗಳು**

ಘಟಕ–2

ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ:

ವಚನಗಳು–ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ
ಕೀರ್ತನೆಗಳು–ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ–ಪುರಂದರದಾಸರು
ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ–ಕನಕದಾಸರು **3 ಗಂಟೆಗಳು**

ಘಟಕ–3

ಆಧುನಿಕ ಕಾವ್ಯ ಭಾಗ:

ಡಿ.ವಿ.ಜಿ.ಯವರ ಮಂಕು ತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದ ಕೆಲವು ಭಾಗಗಳು.
ಹೊಸ ಬಾಳಿನ ಗೀತೆ: ಕುವೆಂಪು **2 ಗಂಟೆಗಳು**

ಘಟಕ–4

ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ, ವಿಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನ:

ಡಾ.ಸರ್.ಎಂ.ವಿಶ್ವೇಶ್ವರಯ್ಯ:ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ–ಎ.ಎನ್.ಮೂರ್ತಿರಾವ್
ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ–ಕರೀಗೌಡ ಬೀಚನಹಳ್ಳಿ **4 ಗಂಟೆಗಳು**

ಘಟಕ–5

ಪ್ರವಾಸ ಕಥನ:

ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ: ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ **2 ಗಂಟೆಗಳು**

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಅನುಕೂಲಗಳು ಮತ್ತು ಫಲಿತಾಂಶಗಳು: **Course outcomes**

1. ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯವಾಗುತ್ತದೆ.
2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳು ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಆಸಕ್ತಿಯು ಮೂಡುತ್ತದೆ.
3. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವಾಗುತ್ತದೆ.
4. ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ, ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯವಾಗುತ್ತದೆ

Question paper pattern:

- **SEE** will be conducted for 100 marks. The same will be reduced to 50 Marks.
- **There shall be 100** MCQs, each carrying 1 mark.
- **CIE** will be announced prior to the commencement of the course.
- 50 marks for test. Average of three tests will be taken and reduced to 25.
- 25 marks for Alternate Assessment Method.

Textbook:

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ

ಡಾ.ಹಿ.ಚಿ ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ,

ಪ್ರಸಾರಾಂಗ ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ

B.E ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
Choice Based Credit System (CBCS)
SEMESTER – III / IV

ಬಳಕೆ ಕನ್ನಡ Balake Kannada (1:0:0):1

(Common to all Branches)
(Effective from the academic year 2021-22)

ವಿಷಯ ಸಂಕೇತ Course Code	**21KBK42**	ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನದ ಅಂಕಗಳು CIE Marks	**50**
ಒಂದು ವಾರಕ್ಕೆ ಬೋಧನಾ ಅವಧಿ Teaching hours/Week (L: T:P)	**1-0-0**	ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು SEE Marks	**50**
ಒಟ್ಟು ಬೋಧನಾ ಅವಧಿ Total Number of contact hours	**13**	ಪರೀಕ್ಷೆಯ ಅವಧಿ Exam Hours	**02**

ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು Course Learning Objectives:

1. To Create awareness regarding the necessity of learning local language for comfortable and healthy life.
2. To enable learners to Listen and understand the Kannada language properly.
3. To speak, read and write Kannada language as per requirement.
4. To train the learners for correct and polite conversation.

Module-1

Introduction, Necessity of learning a local language. Methods to learn the Kannada language.

Easy learning of a Kannada Language: A few tips. Hints for correct and polite conservation,

Listening and Speaking Activities Key to Transcription.

ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸೂಚಕ/ಸಂಬಂಧಿತ ಸರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು

Personal Pronouns, Possessive Forms, Interrogative words

(3 Hours)

Module-2

ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು

Possessive forms of nouns, dubitive question and Relative nouns

ಗುಣ, ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು

ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು – Qualitative, Quantitative and Color Adjectives, Numerals

ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ (ಅ, ಅದು, ಅವು, ಅಲ್ಲಿ) Predictive Forms, Locative Case

(3 Hours)

Module-3

ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು Dative cases and Numerals

ಸಂಖ್ಯಾಗುಣವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು Ordinal numerals and Plural makers

ನ್ಯೂನ/ನಿಷೇದಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು ಮತ್ತು ವರ್ಣ ಗುಣವಾಚಕಗಳು Defective /Negative Verbs and Colour Adjectives

(3 Hours)

Module-4

ಅಪ್ಪಣೆ/ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು Permission, Commands, encouraging and urging words (Imperative words and sentences)

ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಕಾರಗಳು Accusative Cases and Potential Forms used in General Communication

(2 Hours)

Module-5

"ಇರು ಮತ್ತು ಇರಲ್ಲ" ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು, ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು Helping verbs "iru and iralla" Corresponding Future and Negation Verbs

ಹೋಲಿಕೆ(ತರತಮ), ಸಂಬಂಧಸೂಚಕ ಮತ್ತು ವಸ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇದಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ Comparitive, Relationship, Identification and Negation words **(2 Hours)**

ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಅನುಕೂಲಗಳು ಮತ್ತು ಫಲಿತಾಂಶಗಳು: Course outcomes

At the end of the Course, The Students will be able

1. To understand the necessity of learning of local language for comfortable life.
2. To Listen and understand the Kannada language properly.
3. To speak, read and write Kannada language as per requirement.
4. To communicate (converse) in Kannada language in their daily life with Kannada speakers.
5. To speak in polite conversation.

Question paper pattern:

- **SEE** will be conducted for 100 marks. The same will be reduced to 50 Marks.
- **There shall be 100** MCQs, each carrying 1 mark.
- **CIE** will be announced prior to the commencement of the course.
- 50 marks for test. Average of three tests will be taken and reduced to 25.
- 25 marks for Alternate Assessment Method.

Textbook:

ಬಳಕೆ ಕನ್ನಡ

ಲೇಖಕರು: ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ

ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ

B.E ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
Choice Based Credit System (CBCS)
SEMESTER – IV

Constitution of India and Professional Ethics (1:0:0) 1
(Common to all Branches)
(Effective from the academic year 2021-2022)

Course Code	**21CIP42**	CIE Marks	50
Teaching Hours/Week (L:T:P)	1-0-0	SEE Marks	50
Total Number of Lecture Hours	13	Exam Hours	02

Course objectives:

This course will enable students to

1. Familiarize with the Indian Constitution and have legal knowledge enabling them to take competitive exams and understand complex political issues.
2. Understand engineering ethics and responsibility and raise awareness and consciousness of the issues related to the profession, liability, risk and safety at work place.

Module – 1

Preamble: Significance and Scope of the course, Importance of the course in societal, political and economic growth of the nation.

Introduction and Basic information about the Indian Constitution:

Introduction, Definition and significance of the Indian Constitution, Historical Background of the Indian Constitution. Framing of the Indian constitution: Role of the Constituent Assembly, Preamble and Salient features of the Constitution of India.

(2 Hours)

Module – 2

Fundamental Rights, Directive Principles of State Policy and Fundamental Duties: Fundamental Rights and its limitations, Directive Principles of State Policy: Importance and its relevance. Fundamental Duties and their significance. Case Studies

(3 Hours)

Module – 3

Union Administration:

The Union Executive-The President and The Vice President, The Prime Minister and The Council of Ministers, The Union Legislature -Lok Sabha & Rajya Sabha, The Union Judiciary- The Supreme Court of India and its jurisdiction.

(3 Hours)

Module – 4

State Administration, Elections, Constitutional Amendments, Emergency Provisions and Special Constitutional Provisions:

The State Executive-The Governors, The Chief Ministers and The Council of Ministers, The State Legislature- Legislative Assembly and Legislative Council, The State Judiciary- The State HighCourts and its jurisdiction. Elections-Electoral Process in India, Election Commission of India: Powers & Functions, Constitutional Amendments- methods and Important Constitutional Amendments ie 42^{nd}, 44^{th}, 61^{st},74^{th}, 76^{th}, 77^{th}, 86^{th} ,91^{st}, 100, 101^{st}, 118^{th} , Emergency Provisions- types and its effect, Special Constitutional Provisions for Schedule Castes, Schedule Tribes & Other Backward Classes Women &Children.

(3 Hours)

Module – 5

Professional Ethics:

Definition of Ethics, Scope and Aim of Professional and Engineering Ethics, Code of ethics as defined in the Institution of Engineers (India), Responsibilities of Engineers and impediments to responsibilities, Honesty, Integrity and Reliability of Engineers, Risk, Safety and Liability in Engineering,Case Studies.

(2 Hours)

Course outcomes: The students will be able to:

CO1. Understand and have constitutional knowledge and legal literacy
CO2. Understand Engineering and Professional ethics and responsibilities of Engineers.

Question paper pattern:

- **SEE** will be conducted for 100 marks. The same will be reduced to 50 Marks.
- **There shall be 100** MCQs, each carrying 1 mark

CIE will be announced prior to the commencement of the course.50 marks for test. Averageof three tests will be taken and reduced to 25.

Textbooks

1. Durga Das Basu, Introduction to the Constitution of India, Lexis Nexis, 20th Edn, 2011.
Shubham Singles, Charles E. Haries and Et al, Constitution of India and Professional Ethics,Cengage Learning India Private Limited, Latest Edition, 2018.

References

1. M.Govindarajan, S.Natarajan, V.S.Senthilkumar, Engineering Ethics, Prentice –Hall of IndiaPvt. Ltd. New Delhi, 2004.

M.V.Pylee, An Introduction to Constitution of India, Vikas Publishing,2002.

B.E ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
Choice Based Credit System (CBCS)
SEMESTER – IV

Universal Human Values- II (1:0:0) 1
(Effective from the academic year 2021-2022)

Course Code	**21UHV43**	CIE Marks	50
Teaching Hours/Week (L: T:P)	1-0-0	SEE Marks	50
Total Number of Lecture Hours	13	Exam Hours	02

Course objectives:

This introductory course is intended to

1. Develop a holistic perspective based on self-exploration about family, society and nature/existence.
2. Understand harmony in the family, society and nature/existence
3. Strengthening of self-reflection.
4. Develop commitment and courage to act.

Module – 1

Preamble: Significance and Scope of the course, Importance of the course in societal, political and economic growth of the nation.

Harmony in the Family: Understanding values in human relationships; Family as basic unit; Harmony in family, Recognizing feelings in relationships-trust, respect, affection, care, guidance, reverence, glory, gratitude and love.

Case study and Group Discussion **(3 Hours)**

Module – 2

Harmony in Society: Extending relationship from family to society; Comprehensive human goal, Five dimensions of human endeavor; Harmony from family order to World family order.
Case study and Group Discussion

(2 Hours)

Module – 3

Harmony in the Nature: Understanding the harmony in the Nature; Interconnectedness, self-regulation and mutual fulfillment; four orders of nature; Recyclability, Natural characteristics.
Case study and Group Discussion

(3 Hours)

Module – 4

Harmony in Existence: Understanding existence as co-existence; Space; Co-existence of units in space, various attributes of units and space, Role of a human being in existence.
Case study and Group Discussion

(2 Hours)

Module – 5

Implications of the above Holistic Understanding of Harmony on Professional Ethics
Natural acceptance of human values; Definitiveness of Ethical Human Conduct; Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order; Competence in professional ethics, Holistic Technologies.
Typical Case Studies, Strategies for Transition towards Value-based Life and Profession
Case study and Group Discussion

(3 Hours)

Course outcomes: The students will be able to:

1. Understand the role of a human being in ensuring harmony in family, society and nature, significance of value inputs in a classroom and start applying them in their life and profession
2. Distinguish between values and skills, ethical and unethical practices, happiness and accumulation of physical facilities, Intention and Competence of an individual etc and start working out the strategy to actualize a harmonious environment wherever they work

Question paper pattern:

- **SEE** will be conducted for 100 marks. The same will be reduced to 50 Marks.
- **There shall be 100** MCQs, each carrying 1 mark.
- **CIE** will be announced prior to the commencement of the course.
- 50 marks for test. Average of three tests will be taken and reduced to 25.
- 25 marks for Alternate Assessment Method.

Textbooks

3. The Textbook A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
4. The Teacher's Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

References

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. Small Is Beautiful: A Study of Economics as if People Mattered, E. F. Schumacher, 1973, Blond & Briggs, UK
4. Vivekananda - Romain Rolland (English)

Relevant websites, documentaries

1. Value Education websites, http://uhv.ac.in,
2. Story of Stuff, http://www.storyofstuff.com

B.E ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
Choice Based Credit System (CBCS)
SEMESTER – IV

Environmental Studies (2:0:0) 2
(Common to all Branches)
(Effective from the academic year 2021-22)

Course Code	**21HSS44**	CIE Marks	50
Teaching Hours/Week (L:T:P)	2:0:0	SEE Marks	50
Total Number of Contact Hours	26	Exam Hours	03

Course Objectives:

This course will enable students to:

5. Recognize the ecological basis for regional and global Environmental issues, and lead by example as an environmental steward.
6. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
7. Analyze the trans-national character of environmental problems and ways of addressing them, including interactions across local to global scales.
8. Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as environmentalists.

Module – 1

Introduction: Relevance of the Subject to Historical and real-time Global, Economic and Societal Scenario. Internship and Job Opportunities in the current scenario.

Ecosystems (Structure and Function): Forest, Desert, Wetlands, Riverine, Oceanic and Lake.
Biodiversity: Types, Value; Hot-spots; Threats to Biodiversity.

***Field work:** Visit to a local area to document environmental assets: river / forest / grassland / hill

(5 Hours)

Module – 2

Environmental Pollution & Abatement (with Case-studies): Surface and Ground Water Pollution; Noise pollution; Soil Pollution and Air Pollution.
***Field work:** Visit to a local polluted Site-Urban/Rural/Industrial/Agricultural, so as to observe and document environmental pollution and recommend remedial measures.

(5 Hours)

Module – 3

Waste Management & Public Health Aspects: Bio-medical Wastes; Solid waste; Hazardous wastes; E-wastes; Industrial and Municipal Sludge.

(5 Hours)

***Field work:** Visit to a local polluted Site-Urban/Rural/Industrial/Agricultural, so as to observe and document environmental impacts and recommend remedial measures.

Module – 4

Global Environmental Concerns (Concept, policies and case-studies): Ground water depletion/recharging, Climate Change; Acid Rain; Ozone Depletion; Fluoride problem in drinking water; Cloud Seeding, and Carbon Trading.

(5 Hours)

***Field work:** Visit to a Green Building, followed by understanding of process and its brief documentation.

Module – 5

Latest Developments in Environmental Pollution Mitigation (Concept and Applications): G.I.S. and Remote Sensing, Environment Impact Assessment (E.I.A.), Environmental Management Systems (E.M.S.), ISO14001.

Case Studies: Environmental Stewardship, Environmental NGOs.

***Field work:** Visit to an Environmental Engineering Laboratory / Water Treatment Plant/Wastewater treatment Plant, followed by understanding of process and its brief documentation

Summary of the Course

(6 Hours)

(*Note: Any 1 among the 5 Field works is mandatory from the Exercises discussed in across the 5 modules, and Students have to submit a report)

Course outcomes:
The students will be able to:

CO1: Appraise the significance of ecological systems under the ambit of environment.
CO2: Analyze for the consequences owing from anthropogenic interactions on the Environmental processes.
CO3: Recommend solutions in the Anthropocene Epoch, with an in-depth understanding of the interdisciplinary facets of environmental issues.
CO4: Elucidate the trans-national character of environmental problems and ways of addressing them.

CO5: Appraise latest developments, concerns and ethical challenges associated with Environmental Protection.

Teaching Practice:

- Classroom teaching (Chalk and Talk)
- ICT – Power Point Presentation
- Audio & Video Visualization Tools
- Case Studies: Real-life Article Inferential Discussion
- Site-visit and Reporting

Question paper pattern:

- **SEE** will be conducted for 100 marks. The same will be reduced to 50 Marks.
- **There shall be 100** MCQs, each carrying 1 mark.
- **CIE** will be announced prior to the commencement of the course.
- 50 marks for test. Average of three tests will be taken and reduced to 25.
- 25 marks for Alternate Assessment Method.

Alternate Assessment Methods:

→ Any ONE Alternate Assessment Tool (AAT) from COE suggested list.

Text Books

1. Rajesh Gopinath and N. Balasubramanya, "Environmental science and Engineering", 1st Edition, City of Publisher, Cengage Learning India Private Limited, 2018.
2. J. S. Singh, S. P. Singh and S. R. Gupta, "Ecology, Environmental Science and Conservation", India, S. Chand Publishing, 2017.

References:

1. M. Gadgil and R. Guha, "This Fissured Land: An Ecological History of India", Univ. of California Press, 1993.
2. E. P. Odum and H. T. Odum, "Fundamentals of Ecology", Philadelphia: Saunders Publisher, 1971.
3. M. L. Mckinney, "Environmental Science systems & Solutions", Web enhanced Edition, City of Publisher, R. M. Publisher, 1996.

B.E ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
Choice Based Credit System (CBCS)
SEMESTER – IV

Microcontroller and Embedded Systems (3:0:0) 3
(Effective from the academic year 2021 -2022)

Course Code	**21CS45**	CIE Marks	50
Teaching Hours/Week (L: T:P)	3:0:0	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	3

Course Objectives:

This course will enable students to:

1. Understand the fundamentals of ARM based systems, basic hardware components, selection methods and attributes of an embedded system.
2. Program ARM controller using the various instructions
3. Identify the applicability of the embedded system
4. Comprehend the real time operating system used for the embedded system

Module – I

Preamble: This course is to make the students understand the architecture, programming, and interfacing of a system design of microprocessors and microcontrollers. Embedded systems are special-purpose computing systems embedded in application environments or in other computing systems and provide specialized support. The decreasing cost of processing power, combined with the decreasing cost of memory and the ability to design low-cost systems on chip, has led to the development and deployment of embedded computing systems in a wide range of application environments.

Microprocessors Versus Microcontrollers, ARM Embedded Systems: The RISC design philosophy, The ARM Design Philosophy, Embedded System Hardware, Embedded System Software. ARM Processor Fundamentals: Registers, Current Program Status Register, Pipeline, Exceptions, Interrupts, and the Vector Table, Core Extensions.

(9 Hours)

Module – II

Introduction to the ARM Instruction Set: Data Processing Instructions, Program, Instructions, Software Interrupt Instructions, Program Status Register Instructions, Coprocessor Instructions, Loading Constants. ARM programming using Assembly language: Writing Assembly code.

(8 Hours)

Module – III

Embedded System Components: Embedded vs. General computing system, History of embedded systems, Classification of Embedded systems, Major applications areas of embedded systems, purpose of embedded systems. Core of an Embedded System including all types of processor/controllers.

(7 Hours)

Module – IV

Embedded System Design Concepts and its Components: Memory, Sensors, Actuators, LED, 7 segment LED display, stepper motor, Keyboard, Communication Interface (onboard and external types), Embedded firmware, Other system components. Characteristics and Quality Attributes of Embedded Systems, Operational quality attributes, non-operational quality attributes, Embedded Systems-Application and Domain specific.

(7 Hours)

Module – V

RTOS and IDE for Embedded System Design: Hardware Software Co-Design and Program. Modelling, embedded firmware design and development, how to choose an RTOS, Embedded system Development Environment – Block diagram (excluding Keil), Disassembler / decompile.

(9 Hours)

Course Outcomes:

The students will be able to:

CO1: Designate the architectural features and instructions of ARM micro controller

CO2: Apply the knowledge gained for Programming ARM for different applications.

CO3: Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.

CO4: Analyze to understand the different concepts of a RTOS for embedded system applications.

CO5: Develop the knowledge of the hardware /software co-design and firmware design Approaches.

Question paper pattern:

- **SEE** will be conducted for 100 marks.
- **Part A:** First question with 20 MCQs carrying 1 mark each.
- **Part B:** Each full question is for 16 marks. (Answer five full questions out of 10 questions with intra modular choice). In every question, there will be a maximum of three sub-questions.
- **CIE** will be announced prior to the commencement of the course.
- 25 marks for test. Average of three test will be taken.
- **25 marks for Alternate Assessment Method.**

Text books:

1. Andrew N Sloss, Dominic Symes and Chris Wright, ARM system developers guide, Elsevier, Morgan Kaufman publishers, 2008.
2. Shibu KV, "Introduction to Embedded Systems", Tata McGraw Hill Education, Private Limited, 2nd Edition

References:

1. Raghunandan. G.H, Microcontroller (ARM) and Embedded System, Cengage learning Publication, 2019
2. The Insider's Guide to the ARM7 Based Microcontrollers, Hitex Ltd., 1st edition, 2005
3. Steve Furber, ARM System-on-Chip Architecture, Second Edition, Pearson, 2015.
4. Raj Kamal, Embedded System, Tata McGraw-Hill Publishers, 2nd Edition, 2008.

B.E ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
Choice Based Credit System (CBCS)
SEMESTER – IV

Design and Analysis Algorithm (2:2:0) 3
(Effective from the academic year 2021 -2022)

Course Code	**21CS46**	CIE Marks	50
Teaching Hours/Week (L:T:P)	2:2:0	SEE Marks	50
Total Number of Contact Hours	26(L)+26(T)	Exam Hours	3

Course Objectives:

This course will enable students to:

1. Understand various computational problem-solving techniques.
2. Apply appropriate Algorithmic techniques to solve a given problem.
3. Analyze the algorithms with respect to time and space.
4. Estimate the computational complexity of different algorithms.
5. Develop programs for real world applications using efficient algorithms.

Module – I

Preamble: The advancement in science and technology enhance the performance of processor, which proportionally affect the characteristics of computer system, such as security, scalability and reusability. Important problems such as sorting, searching, string processing, graph problems, Combinational problems, numerical problems are basic motivations for designing algorithm and analyzing it. Since algorithm design techniques are growing at a fast pace, it has become important for IT professionals to upgrade their knowledge in order to meet growing industry demand.

Introduction: Significance and scope of Algorithms in Economic growth of Nation, Impact of Algorithms on societal problems, sustainable solutions, Career perspective of Algorithms, current innovations in Algorithms.

What is an Algorithm? Algorithm Specification, The Analysis Framework, Performance Analysis: Space complexity, Time complexity, Asymptotic Notations: Big-Oh notation (O), Omega notation (Ω), Theta notation (θ), and Little- oh notation (o), Mathematical analysis of Non-Recursive and recursive Algorithms with Examples. Important Problem Types: Sorting, Searching, String processing, Graph Problems, Combinatorial Problems.

(11 Hours)

Module – II

Divide and Conquer: General method, Binary search, Finding the maximum and minimum, Merge sort, Quick sort, Strassen's matrix multiplication, Advantages and Disadvantages of divide and conquer.

Decrease and Conquer Approach: Topological Sort.

(10 Hours)

Module – III

Greedy Method: The General method, Coin Change Problem, Knapsack Problem, Job sequencing with deadlines.
Minimum cost spanning trees: Prim's Algorithm, Kruskal's Algorithm. Single source shortest paths: Dijkstra's Algorithm.
Transform and Conquer Approach: Heaps and Heap Sort.

(10 Hours)

Module – IV

Dynamic Programming: General method with Examples, Multistage Graphs, Warshall's Algorithm, Floyd's Algorithm, Optimal Binary Search Trees, Knapsack problem, Travelling Salesperson problem.

(10 Hours)

Module – V

Backtracking: General method, N-Queens problem, Sum of subsets problem, Graph Coloring, Hamiltonian cycles.
Branch and Bound: Assignment Problem, Travelling Salesman problem.
NP-Complete and NP-Hard problems: Basic concepts, nondeterministic algorithms, P, NP, NP-Complete, and NP-Hard classes.
Recap/Summary of the Course

(11 Hours)

Course Outcomes: The student will be able to:

CO1: Discuss computational solution to well-known problems like searching, sorting etc.
CO2: Apply different algorithmic technique for problem solving.
CO3: Analyze the asymptotic performance of algorithms.
CO4: Design and implement applications using suitable algorithmic techniques.

Question paper pattern:

- **SEE** will be conducted for 100 marks.
- **Part A:** First question with 20 MCQs carrying 1 mark each.
- **Part B:** Each full question is for 16 marks. (Answer five full questions out of 10 questions with intra modular choice). In every question, there will be a maximum of three sub-questions.
- **CIE** will be announced prior to the commencement of the course.
- 25 marks for test. Average of three test will be taken.

  25 marks for Alternate Assessment Method.

Text books:

1. Anany Levitin, Introduction to the Design and Analysis of Algorithms -, Pearson Education Limited. 3rd Edition, 2019.
2. Ellis Horowitz, Satraj Sahni and Rajasekaran, Computer Algorithms/C++, Universities Press 2nd Edition, 2014

References:

1. Thomas H. Cormen, Charles, E. Leiserson, Ronal L. Rivest, Clifford Stein, Introduction to Algorithms -. ISBN: 9788120340077, Prentice Hall Of India, 3rd Edition, 2017.

B.E ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Choice Based Credit System (CBCS)

SEMESTER – IV

COMPUTER ORGANIZATION AND ARCHITECTURE

Course Code	**21AM47**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Learning Objectives

CLO 1. Understand the organization and architecture of computer systems, their structure and operation
CLO 2. Illustrate the concept of machine instructions and programs
CLO 3. Demonstrate different ways of communicating with I/O devices
CLO 4. Describe different types memory devices and their functions
CLO 5. Explain arithmetic and logical operations with different data types
CLO 6. Demonstrate processing unit with parallel processing and pipeline architecture

Teaching-Learning Process (General Instructions)

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

Module-1

Basic Structure of Computers: Basic Operational Concepts, Bus Structures, Performance – Processor Clock, Basic Performance Equation, Clock Rate, Performance Measurement.

Machine Instructions and Programs: Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes

Textbook 1: Chapter1 – 1.3, 1.4, 1.6 (1.6.1-1.6.4, 1.6.7), Chapter2 – 2.2 to 2.5

Teaching-Learning Process	Chalk and board, Active Learning, Problem based learning

Module-2

Input/output Organization: Accessing I/O Devices, Interrupts – Interrupt Hardware, Direct Memory Access, Buses, Interface Circuits

Textbook 1: Chapter4 – 4.1, 4.2, 4.4, 4.5, 4.6

Teaching-Learning Process	Chalk and board, Active Learning, Demonstration

Module-3

Memory System: Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Speed, Size, and Cost, Cache Memories – Mapping Functions, Virtual memories

Textbook 1: Chapter 5 – 5.1 to 5.4, 5.5 (5.5.1, 5.5.2)

Teaching-Learning Process	Chalk and board, Problem based learning, Demonstration

Module-4

Arithmetic: Numbers, Arithmetic Operations and Characters, Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers

Basic Processing Unit: Fundamental Concepts, Execution of a Complete Instruction, Hardwired control, Microprogrammed control

Textbook 1: Chapter2-2.1, Chapter6 – 6.1 to 6.3
Textbook 1: Chapter7 – 7.1, 7.2,7.4, 7.5

Teaching-Learning Process	Chalk& board, Problem based learning

Module-5

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, Vector Processing, Array Processors

Textbook 2: Chapter 9 – 9.1, 9.2, 9.3, 9.4, 9.6, 9.7

Teaching-Learning Process	Chalk and board, MOOC

Course Outcomes

At the end of the course the student will be able to:

CO1. Explain the organization and architecture of computer systems with machine instructions and programs
CO2. Analyze the input/output devices communicating with computer system
CO 3. Demonstrate the functions of different types of memory devices
CO 4. Apply different data types on simple arithmetic and logical unit
CO 5. Analyze the functions of basic processing unit, Parallel processing and pipelining

Exam Conduction:

- **SEE** will be conducted for 100 marks.
- **Part A:** First question with 20 MCQs carrying 1 mark each.
- **Part B:** Each full question is for 16 marks. (Answer five full questions out of 10 questions with intra modular choice). In every question, there will be a maximum of three sub-questions.
- **CIE** will be announced prior to the commencement of the course.
- 25 marks for test. Average of three test will be taken.25 marks for Alternate Assessment Method.

Textbooks

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization, 5th Edition, Tata McGraw Hill
2. M. Morris Mano, Computer System Architecture, PHI, 3rd Edition

Reference:

1. William Stallings: Computer Organization & Architecture, 9th Edition, Pearson

Weblinks and Video Lectures (e-Resources):

1. https://nptel.ac.in/courses/106/103/106103068/
2. https://nptel.ac.in/content/storage2/courses/106103068/pdf/coa.pdf
3. https://nptel.ac.in/courses/106/105/106105163/
4. https://nptel.ac.in/courses/106/106/106106092/
5. https://nptel.ac.in/courses/106/106/106106166/
6. http://www.nptelvideos.in/2012/11/computer-organization.html

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Discussion and literature survey on real world use cases
- Quizzes

B.E ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Choice Based Credit System (CBCS)

SEMESTER – IV

Microcontroller and Embedded Systems Laboratory (0:0:2)1

(Effective from the academic year 2021 -2022)

Course Code	**21AML48A**	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Total Number of Contact Hours	24	Exam Hours	3

Course Objectives:

This course will enable students to:

1. Writing Assembly Language Program (ALP) using ARM7TDMI/LPC2148
2. Conduct the experiments on an ARM7TDMI/LPC2148 evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool/compiler

PART-A: Descriptions

Conduct the following experiments by writing program using ARM7TDMI/LPC2148 using an evaluation board/simulator and the required software tool.

1	Write a program to find the sum of first 10 integer numbers.
2	Write a program to find factorial of a number.
3	Write a program to add an array of 16 bit numbers and store the 32 bit result in internal RAM.
4	Write a program to find the largest/smallest number in an array of 32 numbers.
5	Write a program to arrange a series of 32 bit numbers in ascending/descending order.

PART-B: Descriptions

Conduct the following experiments on an ARM7TDMI/LPC2148 evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool/compiler.

6	Display “Hello World” message using Internal UART.
7	Interface and Control a DC Motor.
8	Interface a Stepper motor and rotate it in clockwise and anti-clockwise direction.
9	Interface a DAC and generate Triangular and Square waveforms.
10	Determine Digital output for a given Analog input using Internal ADC of ARM controller.
11	Interface a 4x4 keyboard and display the key code on an LCD.
12	Display the Hex digits 0 to F on a 7-segment LED interface, with an appropriate delay in between.

Course Outcomes: The student should be able to:

CO1: Apply assembly language instructions to the program written in ARM7.

CO2:Analyze the functioning of hardware devices and interfacing them into ARM7 Processor.

CO3:Conduct experiments on an ARM7TDMI/LPC2148 evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool/compiler.

Question paper pattern:

- **CIE (50 marks)**
- **SEE (50 marks)**

Conduct of Practical Examination:

- All laboratory experiments from Part A and Part B are to be included for practical Examination.

Marks Distribution:

A. Part A – Procedure + Execution + Viva = 6 + 28 + 6 = 40 Marks
B. Part B – Procedure + Execution + Viva = 9 + 42 + 9 = 60 Marks

(Final SEE which will be conducted for 100 Marks will be reduced to 50 Marks).

B.E ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
Choice Based Credit System (CBCS)
SEMESTER – IV

Design and Analysis of Algorithms Laboratory (0:0:2) 1
(Effective from the academic year 2021 -2022)

Course Code	**21CSL48B**	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Total Number of Contact Hours	26	Exam Hours	3

Course Objectives:
This course will enable students to:

1. Design and implement various algorithms in C/C++.
2. Employ various Algorithm Techniques for problem solving.
3. Measure and compare the performance of different algorithms.

Descriptions: Design, develop, and implement the specified algorithms for the following problems using C/C++ Language under LINUX /Windows environment.

Programs List

1.	Write C/C++ programs to perform Linear and Binary search of an element from a set of n elements. Run the program for varied values of n> 5000 and record the time taken to sort. Plot a graph of the time taken versus non graph sheet. The elements can be read from a file or can be generated using the random number generator. Demonstrate using C/C++ how the divide-and-conquer method works along with its time complexity analysis: worst case, average case and best case. Compare the performance of both the algorithms.
2.	Write C/C++ programs to sort a given set of n integer elements using Quick Sort method and compute its time Complexity. Run the program for varied values of n> 5000 and record the time taken to sort. Plot a graph of the time taken versus non graph sheet. The elements can be read from a file or can be generated using the random number generator. Demonstrate using C/C++ how the divide-and-conquer method works along with its time complexity analysis: worst case, average case and best case.
3.	Write C/C++ programs to Sort a given set of n integer elements using Merge Sort method and compute its time complexity. Run the program for varied values of n> 5000, and record the time taken to sort. Plot a graph of the time taken versus non graph sheet. The elements can be read from a file or can be generated using the random number generator. Demonstrate using C/C++ how the divide-and-conquer method works along with its time complexity analysis: worst case, average case and best case.
4.	Implement in C/C++, the 0/1 Knapsack problem using (a) Dynamic Programming method (b) Greedy method.
5.	From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm. Write the program in C/C++.
6.	Find Minimum Cost Spanning Tree of a given connected undirected graph using Kruskal's algorithm. Use Union-Find algorithms in your program. Write the program in C/C++.
7.	Find Minimum Cost Spanning Tree of a given connected undirected graph using Prim's algorithm. Write the program in C/C++.

8.	Write C/C++ programs to (a) Implement All-Pairs Shortest Paths problem using Floyd's algorithm. (b) Implement Travelling Sales Person problem using Dynamic programming.
9.	Implement the C/C++ programs to: a) Obtain the Topological ordering of vertices in a given digraph. b) Compute the transitive closure of a given directed graph using Warshall's Algorithm.
10.	Design and implement in C/C++ to find a subset of a given set S = {Sl, S2.. Sn} of n positive integers whose SUM is equal to a given positive integer d. For example, if S = {1, 2, 5, 6, 8} and d= 9, there are two solutions {1,2,6}and {1,8}. Display a suitable message, if the given problem instance doesn't have a solution.

Course Outcomes: The student should be able to:
CO1: Write programs to implement various algorithmic techniques for solving problems.
CO2: Demonstrate the theoretical and practical time complexities of the algorithms.

Assessment Patterns

- **CIE (50 marks)**
- **SEE(50 marks)**

Conduct of Practical Examination:

All laboratory experiments are to be included for practical examination.
For questions having only one part: Students are allowed to pick one experiment from the lot and are given equal opportunity.

Marks Distribution :

For questions having only one part – Procedure + Execution + Viva-Voce: =100 Marks (will be reduced to 50).

B.E ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Choice Based Credit System (CBCS)

SEMESTER – IV

OBJECT ORIENTED PROGRAMMING WITH JAVA LABORATORY

Course Code	**21AML48C**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	50
Total Hours of Pedagogy	24	Total Marks	100
Credits	1	Exam Hours	03

Course Objectives:

CLO 1. Demonstrate the use of Eclipse/Netbeans IDE to create Java Applications.
CLO 2. Using java programming to develop programs for solving real-world problems.
CLO 3. Reinforce the understanding of basic object-oriented programming concepts.

	Note: two hours tutorial is suggested for each laboratory sessions.
	Prerequisite
	• Students should be familiarized about java installation and setting the java environment. • Usage of IDEs like Eclipse/Netbeans should be introduced.
Sl. No.	***PART A - List of problems for which student should develop program and execute in the Laboratory***
1	Aim: Introduce the java fundamentals, data types, operators in java Program: Write a java program that prints all real solutions to the quadratic equation ax2+bx+c=0. Read in a, b, c and use the quadratic formula.
2	Aim: Demonstrating creation of java classes, objects, constructors, declaration and initialization of variables. Program: Create a Java class called **Student** with the following details as variables within it. USN Name Branch Phone Write a Java program to create n Student objects and print the USN, Name, Branch, and Phone of these objects with suitable headings.
3	Aim: Discuss the various Decision-making statements, loop constructs in java Program: A. Write a program to check prime number B. Write a program for Arithmetic calculator using switch case menu
4	Aim: Demonstrate the core object-oriented concept of Inheritance, polymorphism Design a super class called **Staff** with details as StaffId, Name, Phone, Salary. Extend this class by writing three subclasses namely Teaching (domain, publications), Technical (skills), and Contract (period). Write a Java program to read and display at least 3 staff objects of all three categories.
5	Aim: Introduce concepts of method overloading, constructor overloading, overriding. Program: Write a java program demonstrating Method overloading and Constructor overloading.
6	Aim: Introduce the concept of Abstraction, packages. Program: Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen to INR and vice versa), distance converter (meter to KM, miles to KM and vice versa), time converter (hours to minutes, seconds and vice versa) using packages.
7	Aim: Introduction to abstract classes, abstract methods, and Interface in java

	Program: Write a program to generate the resume. Create 2 Java classes Teacher (data: personal information, qualification, experience, achievements) and Student (data: personal information, result, discipline) which implements the java interface Resume with the method biodata().
8	Aim: Demonstrate creation of threads using Thread class and Runnable interface, multi-threaded programming. Program: Write a Java program that implements a **multi-thread** application that has three threads. First thread generates a random integer for every 1 second; second thread computes the square of the number and prints; third thread will print the value of cube of the number.
9	Aim: Introduce java Collections. Program: Write a program to perform string operations using ArrayList. Write functions for the following a. Append - add at end b. Insert – add at particular index c. Search d. List all string starts with given letter.
10	Aim: Exception handling in java, introduction to throwable class, throw, throws, finally. Program: Write a Java program to read two integers a and b. **Compute** a/b and print, when b is not zero. Raise an exception when b is equal to zero.
11	Aim: Introduce File operations in java. Program: Write a java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes
12	Aim: Introduce java Applet, awt, swings. Programs: Develop an applet that displays a simple message in center of the screen. Develop a simple calculator using Swings.
	PART B – Practical Based Learning
01	A problem statement for each batch is to be generated in consultation with the co-examiner and student should develop an algorithm, program and execute the program for the given problem with appropriate outputs.

Course Outcome (Course Skill Set)
At the end of the course the student will be able to:

CO 1. Use Eclipse/NetBeans IDE to design, develop, debug Java Projects.
CO 2. Analyze the necessity for Object Oriented Programming paradigm over structured programming and become familiar with the fundamental concepts in OOP.
CO 3. Demonstrate the ability to design and develop java programs, analyze, and interpret object-oriented data and document results.
CO 4. Apply the concepts of multiprogramming, exception/event handling, abstraction to develop robust programs.
CO 5. Develop user friendly applications using File I/O and GUI concepts.

Assessment Patterns

- **CIE (50 marks)**
- **SEE (50 marks)**

Conduct of Practical Examination:
All laboratory experiments are to be included for practical examination.
Experiment distribution

- For questions having only one part: Students are allowed to pick one experiment from the lot and are given equal opportunity.
- For questions having part A: Students are allowed to pick one experiment from part A.
- Change of experiment is allowed only once and marks allotted for procedure

part tobe made zero

Marks Distribution:

For questions having only one-part PART –A: Procedure + Conduction + Viva: 10 + 35 + 05 (50) Marks

Suggested Learning Resources:

1. E Balagurusamy, Programming with Java, Graw Hill, 6th Edition, 2019.
2. Herbert Schildt, C: Java the Complete Reference, McGraw Hill, 11th Edition, 2020

B.E ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Choice Based Credit System (CBCS)

SEMESTER – IV

Diploma Mathematics- II (3:0:0) NIL

COMMON TO ALL BRANCHES

(Effective from the academic year 2021-22)

Course Code	**21DIP41A**	CIE Marks	100
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	-
Total Number of Contact Hours	3	Exam Hours	3

Course Objectives:

This course will enable students to:

1. To provide an insight into linear & higher order ODE's and elementary probability theory.
2. To familiarize the important tools of Laplace transformations required to analyze the engineering problems.

Module – I

Introduction: Understanding the importance of Vector Differentiation, Differential equations, Laplace Transforms and Probability in the field of Science, Engineering, Business and Research.

Differential equations–I: Introduction-solutions of first order and first-degree differential equations: exact, Equations reducible to exact, linear differential equations and Bernoulli's equation.

(6 hours)

Module – II

Differential equations–II: Linear differential equations of second and higher order equations with constant coefficients. Homogeneous/non-homogeneous equations. Inverse differential operators. [Particular Integral restricted to $R(x)= e^{ax}$, sin ax, cos ax, polynomial for $f(D)y = R(x)$].

(6 hours)

Module – III

Probability: Introduction to Probability, Sample space and events. Axioms of probability. Addition & multiplication theorems. Conditional probability, Bayes' theorem, problems.

(6 hours)

Module – IV

Laplace Transforms: Definition and Laplace transforms of elementary functions, Laplace Transforms of $e^{at} f(t)$, $t^n f(t)$, n is a positive integer & $(f(t))/t$ (without proof), Periodic function (statement only) and Unit-step function – problems.

(6 hours)

Module – V

Inverse Laplace Transforms: Inverse Laplace Transform- Definition and problems, Convolution theorem (No Proof), Evaluation of Inverse Laplace Transform using Convolution theorem. Solution of linear differential equations using Laplace transforms technique.

Recap/Summary of the course.

(6 hours)

Course outcomes: The students will be able to:

CO1: Solve first and higher order ordinary differential equations.
CO2: Use Laplace transform and inverse Laplace transform in solving differential equation.
CO3: Apply elementary probability theory for related problems.

Question paper pattern:

CIE will be announced prior to the commencement of the course.

- 75 marks for test. Average of three tests will be taken.
- 25 marks for Alternate Assessment Method.

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers, 2015.
2. E. Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2015.
3. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill, 2010.

References:

1. N. P. Bali, Manish Goyal, "A Text Book of Engineering Mathematics", Laxmi Publishers, 2014.
2. C. Pandurangappa, Advanced Mathematics II (Lateral entry bridge course text book)", 3rd Edition. Sanguine Publishers, 2015.
3. S. Pal, S. C. Bhunia, Engineering Mathematics, 3rd Edition, Oxford University Press, 2011.
4. H. K. Dass, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand Private Ltd, 2014.