



KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE

Opp : Yerragattu Gutta, Hasanparthy (Mandal), WARANGAL - 506 015, Telangana, INDIA.

काकतीय प्रौद्योगिकी एवं विज्ञान संस्थान, वरंगल - ५०६ ०१५ तेलंगाना, भारत

కాకతీయ సాంకేతిక విజ్ఞాన శాస్త్ర విద్యాలయం, వరంగల్ - ५०६ ०१५ తెలంగాణ, భారతదేశము

(An Autonomous Institute under Kakatiya University, Warangal)

(Approved by AICTE, New Delhi; Recognised by UGC under 2(f) & 12(B); Sponsored by EKASILA EDUCATION SOCIETY)

DEPARTMENT OF INFORMATION TECHNOLOGY

B.TECH. CURRICULUM

ACADEMIC YEAR : 2024-25

DEPARTMENT OF INFORMATION TECHNOLOGY

Undergraduate Rules and Regulations-2024 (URR24)
In accordance with the National Education Policy 2020
w.e.f AY 2024-25

Regulations Governing the
Choice Based Credit System with
Multiple Entry and Multiple Exit Options
with
Competency-Focused Outcome Based Curriculum (CF-OBC)



KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL - 506 015, TELANGANA

(UGC Autonomous Institute Under Kakatiya University, Warangal)

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History:

| PROGRAM | DESCRIPTION | |
|---|---|--|
| | INTAKE | NBA ACCREDITATION |
| UG in B.Tech. Information Technology | <ul style="list-style-type: none"> Started with 40 seats in 1999-2000 Intake increased to 60 in 2001-2002 Intake increased to 120 in 2020-2021 | <ul style="list-style-type: none"> First time Tire-II accreditation: 2016-2019 Tire-I accreditation: 2019-2022 Tire -I Reaccreditation: 2022-2025 |

INSTITUTE VISION AND MISSION

INSTITUTE VISION

To make our students technologically superior and ethically strong by providing quality education with the help of our dedicated faculty & staff and thus improve the quality of human life

INSTITUTE MISSION

- M1 ■ **To provide latest technical knowledge, analytical & practical skills, managerial competence and interactive abilities to students, so that their employability is enhanced**
- M2 ■ **To provide strong human resource base to cater to the changing needs of the industry and commerce**
- M3 ■ **To inculcate a sense of brotherhood and National Integrity**

DEPARTMENT OF INFORMATION TECHNOLOGY : VISION AND MISSION

VISION

To become a Center of Excellence in the Information Technology discipline with effective teaching and strong research environment that makes our students globally competitive with strong ethical values and leadership abilities.

MISSION

- M1: To impart technical knowledge to the students to turn out proficient and well groomed engineers.
- M2: Motivate students to improve skills by attending training programs and internships that leads to develop innovative projects in emerging technologies.
- M3: To train our students for higher education, leadership in profession and adopt quality research.

PROGRAM EDUCATIONAL OBJECTIVES

Within first few years after graduation , the information technology graduates will be able to...

PEO1: Technical Competence

analyze, formulate and solve engineering problems by using sound theory and practices knowledge of Information Technology

PEO2: Successful Career

develop Information Technology solutions with the changing needs of the society for the career-related activities

PEO3: Soft Skills and Life-long Learning

utilize the knowledge of Information Technology to pursue higher education and research

PEO TO MISSION MAPPING

| | M1 | M2 | M3 |
|------|----|----|----|
| PEO1 | 3 | 2 | 2 |
| PEO2 | 3 | 3 | 2 |
| PEO3 | 2 | 3 | 3 |

| PEO Statements | Mission Statements | Mapping Level | Justification |
|----------------|--------------------|---------------|--|
| PEO1 | M1 | 3 | The curriculum is well designed to impart in-depth knowledge in theory and lab courses for the students to excel in the Information Technology discipline. |
| | M2 | 2 | Students are encouraged to attend training programmes organized by the Institute and to carry out internships in various organizations. Department conducts various technical events like seminars, workshops on latest technologies for the students periodically. |
| | M3 | 2 | Guidance is provided to the students to appear for entrance examinations to pursue their higher studies. Faculty advises the students to do projects relevant to research and societal needs by referring papers published in high quality journals like, IEEE, ACM, Elsevier, Springer etc. |

| | | | |
|------|----|---|--|
| PEO2 | M1 | 3 | Choice based curriculum is introduced to the students to concentrate more on practical and elective courses which prepare them in developing optimized algorithms and efficient application software. |
| | M2 | 3 | Attending training and internship programmes, students acquire the knowledge in developing real world applications. |
| | M3 | 2 | Department organizes seminars to the students to acquire knowledge on current technologies which help them to develop innovative research projects. Students are also encouraged to publish papers in reputed journals and conferences. |
| PEO3 | M1 | 2 | Curriculum is revised periodically which makes the students to get the knowledge about emerging technologies required by the industry. |
| | M2 | 3 | Participation in various technical events like paper presentations, coding contest and attending guest lectures delivered by eminent persons from industry, students acquire the knowledge about the changing needs of society which drives them to implement innovative projects. Faculty enrich their knowledge by attending faculty development programmes on current technologies and impart the knowledge to the students. |
| | M3 | 3 | Faculty discuss the concepts and current research areas in relevant subjects during teaching learning process. It helps the students to decide the area for their higher studies and develop projects based on research and societal needs. |

PROGRAM SPECIFIC OBJECTIVES

| | |
|--------------|--|
| PSO1: | apply analytical and experimental problem-solving skills in the Information Technology discipline |
| PSO2: | make use of programming specific knowledge to investigate new and emerging technologies leading to innovations and to begin immediate professional practice in the field of Information Technology |

PO/PSO TO PEO MAPPING

| PO's | | PEO1 | PEO2 | PEO3 |
|------|---|------|------|------|
| PO1 | Engineering Knowledge | 3 | 2 | 2 |
| PO2 | Problem Analysis | 3 | 2 | 2 |
| PO3 | Design/Development of solutions | 3 | 2 | 3 |
| PO4 | Conduct investigations of complex problems | 2 | 2 | 2 |
| PO5 | Modern tool usage | 2 | 2 | 2 |
| PO6 | The engineer and society | 1 | 2 | 3 |
| PO7 | Environment and sustainability | 1 | 1 | 1 |
| PO8 | Ethics | 2 | 2 | 2 |
| PO9 | Individual and Teamwork | 2 | 2 | 2 |
| PO10 | Communication | 2 | 2 | 2 |
| PO11 | Project management and finance | 1 | 2 | 3 |
| PO12 | Lifelong Learning | 3 | 2 | 2 |
| PSO1 | Apply analytical and experimental problem-solving skills in the Information Technology discipline | 3 | 2 | 2 |
| PSO2 | Make use of programme specific knowledge to investigate new and emerging technologies leading to innovations and begin immediate professional practice in the field of Information Technology | 3 | 3 | 2 |

DESIGN OF CURRICULUM

Salient Features

- The URR24 regulations are inline with the National Education Policy 2020 (NEP2020) and the AICTE model curriculum to provide multidisciplinary holistic education to produce well-rounded engineering graduates.
- Multiple Entry Multiple Exit (MEME) option.
- Multidisciplinary four year UG programme with award of following degrees
 - B. Tech
 - B. Tech with “Minor”
 - B. Tech “Honours”
 - B. Tech “Honours with Research”
- 170+ Credit Liberal Engineering Education.
- A strong program core of 18 courses and 5 baskets of program electives to ensure the breadth and depth in a chosen domain of studies. Program electives are arranged either to grow in a specified vertical or have diversified exposure.
- Full semester industry internship to the interested students.
- Aggressive model of “Learning-by-doing” in the form of PRACTICUM.
- Activity Based Learning (ABL) about Life, Literature and Culture is embedded in to the curriculum in four semesters, ensuring all dimensional holistic growth of the learner. These four activity based mini courses are offered as two sequels namely Social Empowerment Activities (SEA) and Self Accomplishment Activities (SAA).
- These regulations follow holistic approach of education, ensure strong science, mathematics foundation and program core, develop expertise in domain vertical though sequel of electives, ensure significant exposure of additional discipline through “Minor” programme, challenge good learners through “Honours” programme and the research oriented students through “Honours with Research” programme.
- Along with Major and Minor disciplinary courses, students are expected to learn Multidisciplinary Open Elective Courses (MOPEC), Skill Enhancement Courses (SEC), Ability Enhancement Courses (AEC), Value Added Courses (VAC), Activity Based Learning (AL) and Experiential Learning (EL) towards multidisciplinary holistic education and for increased employability.
- These regulations provide Competency-Focused Outcome Based Curriculum (CF-OBC) for skill development, multidisciplinary learning, wider access, inclusiveness and entrepreneurship.
- In our CF-OBC, each course has an additional component of “Contents for self-study”, which is carefully designed to ensure additional hours of learners engagement. The learner thus is nurtured towards the “Self-Learning” and “lifelong learning” which are essential attributes of a 21st Century learner. The same is incorporated in the scheme of instructions in the form of (i) Outside the class work (self-study) hours, (ii) total engagement hours for every course.
- In summary, these regulations are expected to develop technical competencies through courses from programme core, programme electives, engineering science and basic science; and also develop generic competencies, soft skills, social, physical, mental and

spiritual personality through carefully articulated courses from MOPEC baskets, liberal learning and humanities sequels. Thus, offer a unique “T-Shaped” liberal “Pi-Model” of Engineering Education

The Curriculum consists of the following components of study:

| | | | |
|--------------|--|----------------|---------------------------------|
| BSC | Basic Science Course | ABL-SAA | Self- Accomplishment Activities |
| HSMC | Humanities and Social Sciences including Management Course | ABL-SEA | Social Empowerment Activities |
| ESC | Engineering Science Course | VAC | Value Added Course |
| PCC | Program Core Course | AEC | Ability Enhancement Course |
| PEC | Program Elective Course | ELC | Experiential Learning Course |
| MOPEC | Multidisciplinary Open Elective Course | SEC | Skill Enhancement Course |

Multidisciplinary Open Electives Courses (MOPEC)

The Curriculum provides three slots of open electives with fourteen baskets. This is planned to give exposure to interdisciplinary and cross disciplinary domains. The courses in these baskets are planned both at department and institute level. Students can choose any combination of these courses (not floated by the parent department) to get familiar with other domains of learning.

Practicum

The curriculum provides ample opportunities for experiential learning (learning-by-doing) to impart important skills like problem solving, critical thinking and communication. Under experiential learning the PRACTICUM is a semester long project work included in I to IV semesters, having a weightage of 1 credit in each semester. Under PRACTICUM, the students are expected to implement a micro level project (at a level of course project) solving a practical problem or a project based on the combination of different theory or lab courses studied in a corresponding semester. The experiential learning is continued in the form of a Seminar in fifth semester, a mini project in sixth semester, major project in seventh & eight semesters and mandatory 6-8 week internship during summer breaks.

A batch of students (according to Roll Numbers) will be allotted to each of the course handling teachers of the corresponding semester. The teacher will be assigning a micro level project to each student. At the end of the semester the student will demonstrate a prototype / working model / system / process and submit a four to six page report. Course teacher is expected to evaluate the allotted batch of students and submit grades to the HoD. There will not be ESE for PRACTICUM. The batch of students will be allotted to a course handling teacher on the basis of series of Roll Numbers, similar to the allotment done for tutorial matrix.

Example: The project work under PRACTICUM for the course Machine Learning may be

1. *Data collection*
2. *Data PreProcessing*
3. *Application of Supervised Learning algorithms*
4. *Application of Un-Supervised Learning algorithms*
5. *Visualization*
6. *Analysis of Performance metrics*

The URR24 focuses on CF-OBC with program depth component in terms of Program Core Courses (PCCs) and Program Elective Courses (PECs)

Program Core Courses (PCC)

The curriculum offers eighteen core courses referred to as Program Core. Several academic models from reputed institutions in the country and outside the country are studied in articulating this Program Core, to make curriculum globally competitive. The courses are augmented with laboratory components as per the need.

Program Electives Courses (PEC)

The curriculum offers five baskets of Program Electives, each basket having identified courses corresponding to the programme specializations called verticals. This enables learners to grow in a domain-specialization or domain-vertical. The student can opt courses in sequel (PEC-1 to PEC-4) in any of the specific vertical or across the verticals.

Activity-Based Learning (ABL) about Life, Literature and Culture

Activity based learning (ABL) is blended with the curriculum for ensuring holistic growth of the learner. These activity based mini courses are offered as two sequels namely “SEA” (Social Empowerment Activities) and “SAA” (Self Accomplishment Activities).

According to Dr. K. M. Munshi, “Education will fail ignominiously in its objective if it manufactures only a robot and called him an economic man stressing the adjective economic and forgetting the substantive man. A university cannot afford to ignore the cultural aspects of education whatever studies it specializes in. Science is a means, not an end. Whereas culture is an end in itself. Even though you may ultimately become a scientist, a doctor, or an engineer, you must, while in college, absorb fundamental values which will make you a man of culture...”

The NEP-2020 quotes, “Higher education must develop good, well-rounded and creative individuals, with intellectual curiosity, spirit of service and a strong ethical compass”. Moving towards a more liberal undergraduate education is one of the most important feature of the NEP2020 .
“The needs of the 21st century require, that liberal broad-based multidisciplinary education become the basis for all higher education. This will help develop well-rounded individuals that possess critical 21st century capacities in fields across arts, humanities, sciences, social sciences, and professional, technical, and vocational crafts, an ethic of social engagement, and rigorous specialization in a chosen field or fields. The approach across all undergraduate programs, including those in professional, technical, and vocational disciplines would be leading to holistic education, in the long run.

Imaginative and flexible curricular structures will enable creative combinations of disciplines for students to study, thus demolishing currently prevalent rigid boundaries and creating new possibilities for lifelong learning. The notion of ‘knowledge of many arts’- i.e. what is called ‘liberal arts’ in modern times – must be brought back to Indian education, as it is exactly the kind of education that will be required for the 21st century.”

To ensure holistic development of the learner, an attempt has been made in this curriculum to blend engineering education appropriately with arts, humanities, crafts, ethics of personal and social engagement. Activity based liberal learning courses covering life, literature, and culture are added. Every learner is expected to take one such course in first four semesters. We strongly believe that these four liberal learning modules will expose the learners to holistic education as envisaged in NEP2020.

(END OF THE SALIENT FEATURES OF URR24)

Undergraduate Rules and Regulations-2024 (URR24)

In accordance with the National Education Policy 2020, w.e.f AY 2024-25

1. Title:

URR24 Regulations governing the Choice Based Credit System (CBCS) with Multiple Entry and Multiple Exit (MEME) options with Competency-Focused Outcome Based Curriculum (CF-OBC)

2. Scope:

These regulations are applicable to the undergraduate programmes being offered by the Institute

3. Duration of Programmes:

The undergraduate degree should be of four years duration, with multiple entry and multiple exist (MEME) options. The maximum duration for a student for completing the degree requirement is as per NEP2020/UGC/AICTE guidelines. Four years multidisciplinary undergraduate programme allows the opportunity to experience the full range of holistic and multidisciplinary education with a focus on major and minor subjects as per the student's preference. The four-year programme may also lead to a degree with Research, if the student completes a rigorous research project in the major area(s) of study. The undergraduate programmes shall extend over four academic years (eight semesters).

With multiple entry and multiple exit options, the students can exit after the completion of one academic year (two semesters) with the UG certificate in IT; UG Diploma in IT after the study of two academic years (four semesters); and B. Voc in IT degree after the completion of three academic years (six semesters). The successful completion of four years undergraduate programme would lead to B.Tech in IT degree with optional Minor/Honours/ Honours with Research.

4. Credit Requirements:

As per the guidelines released by UGC under **National Higher Education Qualification Framework (NHEQF)**, for Multiple Entry and Multiple Exit (MEME) in Academic Programmes offered in Higher Educational Institutions, the students shall complete the courses equivalent to minimum credit requirements as shown in the table given below for the award of UG certificate, UG diploma, Bachelor degree, Postgraduate diploma and Master's degree:

| Qualification Type and Credit Requirements | | |
|---|---|---|
| NHEQF Levels | Exit with | Credit Requirements |
| 4.5 | Undergraduate Certificate (in the field of learning/discipline) for those who exit after the first year (two semesters) of the undergraduate programme. (Programme duration: first year or two semesters of the undergraduate programme) | 36-40 |
| 5 | Undergraduate Diploma (in the field of learning/discipline) for those who exit after two years (four semesters) of the undergraduate programme. (Programme duration: First two years or four semesters of the undergraduate programme) | 72-80 |
| 5.5 | Bachelor's Degree (Programme duration: Three years or six semesters). | 108-120 |
| 6 | Bachelor's Degree (Honours/ Research) (Programme duration: Four years or eight semesters). | 144-160 |
| 6.5 | Post-Graduate Diploma for those who exit after the successful completion of the first year or two semesters of the two-year Master's degree programme. (Programme duration: One year or two semesters of the Post-Graduate programme) | 36-40 |
| 7 | Master's Degree (Programme duration: Two years or four semesters after obtaining four year Bachelor's degree). | 72-80 |
| 7 | Master's Degree (Programme duration: One year or two semesters after obtaining a four-year Bachelor's degree (Honours/Research)). | 36-40 |
| 8 | Doctoral Degree | Minimum prescribed credits for course work and a thesis with published work |

* Details of course-wise credits are described in the later part of the Regulations.

5. Commencement:

These Regulations in accordance with National Education Policy 2020 shall come into force from Academic Year 2024-25 onwards. These regulations shall be implemented from the academic year as mentioned below.

| NHEQF Level | Programme | From Academic Year |
|--------------------------------|--|---------------------------|
| Undergraduate Programme | | |
| Level 4.5 | Undergraduate Certificate (One year or two semesters) | 2024-25 |
| Level 5 | Undergraduate Diploma (Two years or four semesters) | 2025-26 |
| Level 5.5 | Bachelor's Degree (Three years or six semesters) | 2026-27 |
| Level 6 | Bachelor's Degree with Honours/ Research (Four years or eight semesters) | 2027-28 |

6. Eligibility Criteria:

- (i) **Level 4.5:** The students who have successfully completed Grade 12 / Intermediate with MPC or its equivalent course shall be eligible for admission to the first year degree programme
- (ii) **Level 5 :** The students who have successfully completed Level 4.5 of the undergraduate programme at this Institute or any other HEIs registered on Academic Bank of Credits Portal
- (iii) **Level 5.5 :** The students who have successfully completed Level 5 of the undergraduate programme at this Institute or any other HEIs registered on Academic Bank of Credits Portal
- (iv) **Level 6 :** The students who have successfully completed Level 5.5 (bachelor degree of three years or six semesters) of undergraduate programme at this Institute or any other HEIs registered on Academic Bank of Credits Portal

7. Academic Bank of Credits (ABC):

The Academic Bank of Credits (ABC), a National-level facility promotes the flexibility of curriculum framework and interdisciplinary/ multidisciplinary academic mobility of students across the higher educational institutes (HEIs) in the country with appropriate “credit transfer” mechanism. It is mechanism to facilitate the students to choose their own learning path to attain a Certificate / Diploma / Degree, working on the principle of multiple entry and exit as well as anytime, anywhere, and any level of learning. ABC will enable the integration of multiple disciplines of higher learning leading to the desired learning outcomes including increased creativity, innovation, higher order thinking skills and critical analysis. ABC will provide significant autonomy to the students by providing an extensive choice of courses for a programme of study, flexibility in curriculum, novel and engaging course options across a number of higher education disciplines / institutions.

7.1 Operationalization of ABC:

Institute shall appoint institutional nodal officer for ABC as per UGC directives. The nodal officer shall be responsible for proper operationalization of ABC within the college and with the university.

The ABC related operations shall be as follows:

- (i) The MEME option for student is facilitated at the undergraduate and postgraduate levels.
- (ii) It would facilitate credit accumulation through the facility created by the ABC scheme in the “Academic Bank Account” opened for students across the country to transfer and consolidate the credits earned by them by undergoing courses in any of the eligible HEIs. The eligibility of HEIs to offer courses shall be as per UGC (Establishment and Operationalization of ABC scheme in Higher Education) Regulations 2021 dated 28.7.2021 and changes therein notified by the UGC from time to time.
- (iii) The ABC allows credit redemption through the process of commuting the accrued credits in the Academic Bank Account maintained in the ABC for the purpose of fulfilling the credits requirements for the award of certificate/ diploma/ PG diploma/ degree by the authorized HEIs

- (iv) Upon collecting a certificate, diploma, PG diploma or degree, all the credits earned till then, in respect of that certificate, diploma, PG diploma or degree shall stand debited and redeemed from the account concerned.
- (v) HEIs offering programmes with the MEME system need to register in the ABC to enable acceptance of multidisciplinary courses, credit transfer, and credit acceptance.
- (vi) The validity of credits earned will be for a maximum period of seven years or as prescribed by the UGC
- (vii) The procedure for depositing credits earned, its shelf life, redemption of credits, would be as per UGC (Establishment and Operationalization of ABC scheme in Higher Education) Regulations 2021 dated 28.7.2021 and changes therein notified by the UGC from time to time

7.2 Monitoring, Support and Quality by Universities and ABC:

- (i) It shall be the responsibility of Registered HEIs, to monitor the development and operationalization of the ABC programme at the university level and at the level of their affiliated colleges
- (ii) Registered HEIs shall offer teachers training, staff training, mentoring, academic and administrative audit and other measures for improving the quality of performance of the ABC facility and promotion of holistic and multidisciplinary education with the support of ABC
- (iii) The quality assurance of the implementation of ABC at the level of the registered university shall be looked by the Director, Examinations and Evaluation of the Institute of the officer nominated by him different from ABC nodal officer, under the directives and guidance of Controller of Examinations of the Institute
- (iv) The Institute shall upload, annually, on its website, a report of its activities related to the Academic Bank of Credits, as well as of measures taken by it for Quality Assurance, Quality Sustenance and Quality Enhancements
- (v) The Grievance Redressal Committee constituted by the examination section shall be responsible for addressing the Grievance and appeals related to ABC

8. Building Competencies through Pedagogy:

Effective learning requires appropriate competency focused outcome based curriculum (CF-OBC), an apt pedagogy, continuous formative assessment and adequate student support. The intention is to contextualize curriculum through meaningful pedagogical practices, which determine learning experiences directly influencing learning outcomes expected competencies. ICT will be used in creating learning environment that connects learners with content, peers and instructors all through the learning process respecting pace of learners. The faculty shall follow innovative learner centric pedagogical approaches:

- (i) Classroom process must encourage rigorous thinking, reading and writing, debate, discussion, peer learning and self-learning
- (ii) The emphasis is on critical thinking and challenge to current subject orthodoxy and develop innovative solutions. Curricular content must be presented in ways that invite questioning and not as a body of ready knowledge to be assimilated or

reproduced. Faculty should be facilitators of questioning and not authorities on knowledge.

- (iii) Classroom teaching should focus on the 'how' of things i.e. the application of theory and ideas. All courses including social sciences and humanities shall have design project and practicums to enable students get relevant hands-on experiences
- (iv) Learning must be situated in the Indian context to ensure that there is no sense of alienation from their context, country and culture
- (v) Classroom processes must address issues of inclusion and diversity since students are likely to be from diverse cultural, linguistic, socio-economic and intellectual backgrounds
- (vi) Cooperative and peer supported activities shall be part of empowering students to take charge of their own learning
- (vii) Faculty shall have the freedom to identify and use the pedagogical approach that is best suited to a particular course and student
- (viii) Pedagogy PBL (Problem/Project Based Learning) shall be brought into practice as part of curriculum. Experiential learning in the form of practicum, seminar, mini-project, major project and internship with a specified number of credits is made mandatory
- (ix) The course faculty shall provide the "Contents for self-study", and motivate the learners to engage in outside the class work learning (self-learning). The learner thus is nurtured towards the "Self-Learning" and "Lifelong learning" which are essential attributes of a 21st Century learner
- (x) Blended Learning (BL) mode shall be used to help learners develop 21st century skills. BL should be carefully implemented and should not be replacing classroom time as a privilege
- (xi) The UGC regulations, 2021 on Credit Framework for Online Learning Courses through SWAYAM, facilitates an institution to allow up to 40 percent of the total courses being offered in a particular programme in a semester through massive open online courses (MOOCs) offered by the SWAYAM / NPTEL and other e-learning platforms. Students shall be encouraged to complete equivalent courses through SWAYAM / NPTEL and other e-learning platforms, approved by the BoS chair and Dean AA, towards obtaining required credits where ever necessary.

9. Skill Enhancement, Ability Enhancement, Value Added Courses through e-learning:

Students shall be encouraged to obtain the required credits related to the skill enhancement courses (SECs), ability enhancement courses (AECs) and value added courses (VAC) through MOOCS platforms such as:

- (i) SWAYAM
- (ii) IIM-B
- (iii) University LMS
- (iv) CEC
- (v) NPTEL
- (vi) IGNOU
- (vii) Infosys Spring Board
- (viii) Future Skills Prime (Digital skilling ecosystem developed by Govt. Of India and NASSCOM)
- (ix) Wadhavani Foundation

- (x) Tata Strive
- (xi) Any other platform approved by the BoS chair and Dean AA

After completing such courses, students have to submit the certificate to the concerned department and then after verification of the certificate the respective department will communicate the credits earned to the Dean, Academic Affairs for approval and onward transmission to examination section of the institute to deposit the credits in Academic Bank of Credits (ABC).

10. CONFORMANCE TO NEP2020

MULTIPLE EXIT OPTIONS

| Sl. No. | Exit Description | ExitPoint | Degree/Certificate offered | Goal |
|---------|------------------|----------------------------------|----------------------------|---|
| 1. | First Exit | After completion of First year. | UG Certificate in IT | The student should be employable as Technical Assistant (IT) in any industry/organization. |
| 2. | Second Exit | After completion of Second year. | UG Diploma in IT | The student should be employable as Technician (IT) in any industry/organization. |
| 3. | Third Exit | After completion of Third year. | B. Voc. in IT | The student should be employable as Technical Supervisor (IT) in any industry/organization. |
| 4. | Normal Exit | After completion of Fourth year. | B.Tech in IT | The student should be employable as an Engineer (IT) in any relevant industry/organization. |

10.2 MULTIPLE ENTRY OPTIONS

| Sl. No. | Entry Descriptions | Entry Point | Eligibility |
|---------|----------------------|---------------------------|---|
| 1. | Normal (First) Entry | I - Sem. of the program | As per the TGSCHE guidelines & through Common Entrance Examination TGEAPCET |
| 2. | Second Entry | III - Sem. of the program | The successful completion of first year with UG certificate in IT from our institute. |
| 3. | Third Entry | V- Sem.of the program | The successful completion of UG Diploma in IT from our institute. |
| 4. | Fourth Entry | VII - Sem. of the program | The successful completion of B. Voc. in IT from our institute. |

- (i) **No. of maximum exits:** As per NEP2020/UGC/AICTE guidelines on MEME
- (ii) **No. of maximum entry:** As per NEP2020/UGC/AICTE guidelines on MEME
- (iii) **Maximum gap between exit and entry:** As per NEP2020/UGC/AICTE guidelines on MEME

(iv) **Academic Bank of Credits shall be maintained**

11. Options for Degree Certificate

(i). Learners who earn a minimum of total 172 credits will be **awarded “B.Tech” degree which confirms to NEP2020 requirements of multidisciplinary holistic education.**

(ii). Fast Learners will have the following options to earn *B. Tech degree with Honours/Minor.*

a) B.Tech with “Minor” degree (with additional 18 credits): 172+18 Credits

Students opting for Minor degree in identified cutting-edge technologies offered by other departments, have to successfully complete four theory courses (each of 4 credits) and two lab courses (each of 1 credit) during the semester break. One theory & One lab course have to be completed during 5th and 6th semesters. During 7th and 8th semesters one theory course to be completed. All four theory courses will have to be completed through MOOCs and lab courses will be offered by respective department offering the Minor Degree.

b) B.Tech with “Honours” degree (with additional 18 credits): 172+18 Credits

Students opting for Honours degree have to successfully complete four theory courses (each of 4 credits) and two lab courses (each of 1 credit) as per the specified list of subjects by their own department. One theory & One lab course have to be completed during 5th and 6th semesters. During 7th and 8th semesters one theory course to be completed. All four theory courses will have to be completed through MOOCs and lab courses will be offered by respective department offering the Honours Degree.

c) B.Tech - “Honours with Research” degree (with additional 18 credits by research): 172+18 credits

Students are expected to complete 2-months research internship in summer after 2nd year (5 credits), 3rd year (5 credits) and work towards individual research based project during 4th year. They have to complete one course on “Research Methodology” through MOOCs or can complete a one week workshop on “Research Methodology”, during 7th semester (4 credits) and finally publish a research paper in a journal indexed by SCI/SCOPUS/WEB OF SCIENCE (4 credits).

11.1 Summary of requirements for earning additional credits leading to “Minor”, “Honours” and “Honours with Research” degrees:

| Semester | B. Tech with “Minor” | B. Tech with “Honours” | B. Tech “Honours with Research” |
|--|---|---|--|
| I | - | - | - |
| II | - | - | - |
| III | - | - | - |
| IV | - | - | - |
| Summer break after 2 nd year | - | - | 2-Months Research Internship -I (5 credits) |
| V | 1 theory (4 credits) + 1 lab (1 credit) | 1 theory (4 credits) + 1 lab (1 credit) | - |
| VI | 1 theory (4 credits) + 1 lab (1 credit) | 1 theory (4 credits) + 1 lab (1 credit) | - |
| Summer break after 3 rd year | - | - | 2-Months Research Internship -II (5 credits) |
| VII | 1 theory (4 credits) | 1 theory (4 credits) | “Research Methodology” Theory Course (4 Credits) |
| VIII | 1 theory (4 credits) | 1 theory (4 credits) | One research publication in Journal indexed by SCI / SCOPUS / Web of Science (4 Credits) |
| Total additional credits to be earned | 18 | 18 | 18 |

11.2 Credit requirements for four different options of the B. Tech Degree

| | I | II | III | IV | V | VI | VII | VIII | Total |
|---------------------------------------|----|----|-----|----|-------|-------|--------------|-------|---------|
| B. Tech. | 20 | 23 | 24 | 24 | 23 | 22 | 21 | 15 | 172 |
| B. Tech. with Minor | 20 | 23 | 24 | 24 | 23+5* | 22+5* | 21+4* | 15+4* | 172+18* |
| B. Tech. with Honours | 20 | 23 | 24 | 24 | 23+5* | 22+5* | 21+4* | 15+4* | 172+18* |
| B. Tech. Honours with Research | 20 | 23 | 24 | 24 | 23+5* | 22 | 21+5* +4* | 15+4* | 172+18* |

*Optional additional Credits leading to Minor/Honours/Honours with Research as applicable

11.3 Options for earning of "Additional Points" for Honours certification

| S. No. | Activity | Points earned | | Maximum Limit |
|--------|--|---|--------|---------------|
| 1 | Success in the GATE Exam | Percentile | Points | 8 Points |
| | | Above 98 | 8 | |
| | | Above 95 | 6 | |
| | | Above 90 | 4 | |
| | | Qualified | 2 | |
| 2 | Research Publication indexed by SCI / SCOPUS / Web of Science* | SCI Journal: 8 Points | | 8 Points |
| | | SCOPUS / Web of Science Journal: 4 Points | | |
| | | Patent: 4 Points | | |
| 3 | Winning Prestigious Technical Competition at National Level# | Rank | Points | 6 Points |
| | | 1 | 4 | |
| | | 2 | 3 | |
| | | 3 | 2 | |
| 4 | Completion of PG level MOOCs | Percentile | Points | 6 Points |
| | | Above 95 | 6 | |
| | | Above 90 | 5 | |
| | | Above 80 | 4 | |

Note: As the activities mentioned in the above Table of 11.3 are aimed at an additional professional dimension to the professional personality of the learners, each Point earned is given 1 credit equivalency. Thus, Honours registered students are allowed to accumulate a maximum of 8 additional points through these activities equivalent to two courses (8 credits) of Honours curriculum requirement.

***In identified journals only. Journal to be approved by the BoS chair and Dean AA.**

#In events approved by the BoS chair and Dean AA.

12. Distribution of Courses:

(i) Humanities and Social Sciences including Management Courses (HSMC)

| Sl. No. | Course Type | Course Code | Course Name | Semester | Credits |
|---------|-------------|-------------|--|----------|---------|
| 1. | HSM 01 | U24MH105 | English Communication and Report Writing | I | 2 |
| 2. | HSM 02 | U24MH508 | Technical English | V | 1 |
| 3. | HSM 03 | U24MB605 | Management Course Basket | V | 3 |
| | | | | Total: | 6 |

(ii) Basic Science Courses (BSC)

| Sl. No. | Course Type | Course Code | Course Name | Semester | Credits |
|---------|-------------|-------------|---|----------|---------|
| 1 | BSC 01 | U24MH101 | Differential Calculus and Ordinary Differential Equations | I | 3 |
| 2 | BSC 02 | U24CY102B | Engineering Chemistry | I | 4 |
| 3 | BSC 03 | U24MH201 | Matrix Theory and Vector Calculus | II | 3 |
| 4 | BSC 04 | U24PY202B | Engineering Physics | II | 4 |
| 5 | BSC 05 | U24MH301D | Discrete Mathematics and Probability, Statistics | III | 3 |
| | | | | Total: | 17 |

(iii) Engineering Science Courses (ESC)

| SL. No. | Course Type | Course Code | Course Name | Semester | Credits |
|---------|-------------|-------------|------------------------------------|----------|---------|
| 1. | ESC 01 | U24IT103 | Digital Logic Design | I | 3 |
| 2. | ESC 02 | U24ME107 | Engineering Graphics through CAD | I | 1 |
| 3 | ESC 03 | U24EE205B | Basic Electrical Engineering | II | 4 |
| 4 | ESC 04 | U24IT403 | Artificial Intelligence | IV | 3 |
| 5 | ESC 05 | U24IT504 | Introduction to Internet of Things | V | 4 |
| 6 | ESC 06 | U24IT602 | Data Science | VI | 3 |
| | | | | Total: | 18 |

(iv) Program Core Courses (PCC)

| Sr. No. | Course Type | Course Code | Course Name | Semester | Credits |
|---------|-------------|-------------|--|----------|---------|
| 1 | PCC 01 | U24IT104 | Programming for Problem Solving with C | I | 4 |
| 2 | PCC 02 | U24IT203 | Computer Architecture and Organization | II | 3 |
| 3 | PCC 03 | U24IT204 | Data Structures through C | II | 4 |
| 4 | PCC 04 | U24IT302 | Advanced Data Structures | III | 4 |
| 5 | PCC 05 | U24IT303 | Software Engineering | III | 3 |
| 6 | PCC 06 | U24IT304 | Database Management System | III | 4 |
| 7 | PCC 07 | U24IT305 | Object Oriented Programming through Java | III | 4 |
| 8 | PCC 08 | U24IT401 | Design and Analysis of Algorithms | IV | 4 |
| 9 | PCC 09 | U24IT402 | Python Programming | IV | 4 |
| 10 | PCC 10 | U24IT404 | Operating Systems | IV | 4 |
| 11 | PCC 11 | U24IT405 | Computer Networks | IV | 3 |
| 12 | PCC 12 | U24IT502 | Machine Learning | V | 4 |
| 13 | PCC 13 | U24IT503 | Information Security | V | 3 |
| 14 | PCC 14 | U24IT603 | Cloud Computing | VI | 4 |
| 15 | PCC 15 | U24IT604 | Full Stack Development using JAVA | VI | 4 |

| | | | | | |
|----|--------|----------|--|--------|----|
| 16 | PCC 16 | U24IT703 | DevOps Essentials | VII | 4 |
| 17 | PCC 17 | U24IT704 | Big Data Analytics | VII | 3 |
| 18 | PCC 18 | U24IT705 | Software Testing and Quality Assurance | VII | 3 |
| | | | | Total: | 66 |

(v) Program Elective Courses (PEC)

| SL. No. | Course Type | Course Code | Course Name | Semester | Credits |
|---------|-------------|-------------|--|----------|---------|
| 1. | PEC 01 | U24IT601A | Block Chain Technologies | VI | 3 |
| | | U24IT601B | Generative Artificial Intelligence | | |
| | | U24IT601C | Advanced Computer Networks | | |
| | | U24IT601D | Parallel Programming | | |
| | | U24IT601E | Applications of IoT | | |
| 2. | PEC 02 | U24IT702A | Distributed Computing and Cloud Security | VII | 3 |
| | | U24IT702B | Computer Vision & Image Processing | | |
| | | U24IT702C | Mobile Computing | | |
| | | U24IT702D | High Performance Computing Architecture | | |
| | | U24IT702E | Industrial IoT | | |
| 3. | PEC 03 | U24IT802A | Ethical Hacking | VIII | 3 |
| | | U24IT802B | Natural Language Processing | | |
| | | U24IT802C | Adhoc Sensor Networks | | |
| | | U24IT802D | Fog & Edge Computing | | |
| | | U24IT802E | Privacy and Security in IoT | | |
| 4. | PEC 04 | U24IT803A | Computer Forensics | VIII | 3 |
| | | U24IT803B | Deep Learning | | |
| | | U24IT803C | Wireless Networks | | |
| | | U24IT803D | Augmented Reality & Virtual Reality | | |
| | | U24IT803E | IoT Architectures and Protocols | | |
| | | | | Total: | 12 |

(vi) Experiential Learning Courses (ELC)

| Sr. No. | Course Type | Course Code | Course Name | Semester | Credits |
|---------|-------------|-------------|--|----------|---------|
| 1. | ELC01 | U24EL108 | Practicum-1 | I | 1 |
| 2. | ELC02 | U24EL209 | Practicum-2 | II | 1 |
| 3. | ELC03 | U24EL308 | Practicum-3 | III | 1 |
| 4. | ELC04 | U24EL408 | Practicum-4 | IV | 1 |
| 5. | ELC05 | U24IT509 | Seminar | V | 1 |
| 6. | ELC06 | U24IT608 | Mini Project | VI | 1 |
| 7. | ELC07 | U24IT706 | Internship Evaluation | VII | 1 |
| 8. | ELC08 | U24IT707 | Major Project Phase-I / Industrial Internship - I | VII | 4 |
| 9. | ELC09 | U24IT804 | Major Project Phase-II / Industrial Internship - II | VIII | 6 |
| | | | | Total: | 17 |

(vii) Indian Knowledge System Course (IKSC)

| Sr. No. | Course Type | Course Code | Course Name | Semester | Credits |
|---------|-------------|-------------|---|-----------------------------|---------|
| 1. | IKSC 01 | U24IK100 | AICTE Mandated Student Induction Programme (Universal Human Values - I) | Student Induction Programme | 0 |
| 2. | IKSC 02 | U24IK506A | Essence of Indian Traditional Knowledge | V | 2 |
| 3. | IKSC 03 | U24IK606B | Universal Human Values -II | VI | 2 |
| Total: | | | | | 4 |

(viii) Multidisciplinary Open Electives Courses (MOPEC)

| Sr. No. | Course Type | Course Code | Course Name | Semester | Credits |
|---------|-------------|-------------|---------------------|----------|---------|
| 1. | MOPEC 01 | U24OEX01ITX | MOPEC Elective -I | V | 3 |
| 2. | MOPEC 02 | U24OEX01ITX | MOPEC Elective -II | VII | 3 |
| 3. | MOPEC 03 | U24OEX01ITX | MOPEC Elective -III | VIII | 3 |
| Total: | | | | | 9 |

(ix) Value Added Courses (VAC)

| SL. No. | Course Type | Course Code | Course Name | Semester | Credits |
|---------|-------------|----------------|---|----------|---------|
| 1. | VAC 01 | U24VA106 | Sports & Yoga | I | - |
| 2. | VAC 02 | U24VA109XXXXX | SEA - I / SAA-I | I | 1 |
| 3. | VAC 03 | U24CY206 | Environmental Studies | II | - |
| 4. | VAC 04 | U24VA210 XXXXX | SEA-2 / SAA -2 | II | 1 |
| 5. | VAC 05 | U24VA306B | Soft & Interpersonal Skills | III | 2 |
| 6. | VAC 06 | U24VA309 XXXXX | SEA-3 / SAA -3 | III | 1 |
| 7. | VAC 07 | U24VA406A | Quantitative Aptitude and Logical Reasoning | IV | 2 |
| 8. | VAC 08 | U24VA409 XXXXX | SEA - 4 / SAA - 4 | IV | 1 |
| Total: | | | | | 8 |

(x) Skill Enhancement Courses (SEC)

| Sr. No. | Course Type | Course Code | Course Name | Semester | Credits |
|---------|-------------|-------------|---|----------|---------|
| 1. | SEC 01 | U24SE208 | Programming Skill Development (PSD) Lab - 1 | II | 1 |
| 2. | SEC 02 | U24SE307 | Programming Skill Development (PSD) Lab - 2 | III | 1 |
| 3. | SEC 03 | U24SE407 | Programming Skill Development (PSD) Lab - 3 | IV | 1 |
| 4. | SEC 04 | U24SE507 | Programming Skill Development (PSD) Lab - 4 | V | 1 |
| 5. | SEC 05 | U24SE607 | Programming Skill Development (PSD) Lab - 5 | VI | 1 |
| Total: | | | | | 5 |

(xi) Ability Enhancement Courses (AEC)

| Sl. No. | Course Type | Course Code | Course Name | Semester | Credits |
|---------|-------------|-------------|----------------------|----------|---------|
| 1 | AEC 01 | U24AE110 | Expert Talk Series-1 | I | 1 |
| 2 | AEC 02 | U24AE207 | Idea Lab Makerspace | II | 1 |
| 3 | AEC 03 | U24AE211 | Expert Talk Series-2 | II | 1 |
| 4 | AEC 04 | U24AE310 | Expert Talk Series-3 | III | 1 |
| 5 | AEC 05 | U24AE410 | Expert Talk Series-4 | IV | 1 |
| 6 | AEC 06 | U24AE510 | Expert Talk Series-5 | V | 1 |
| 7 | AEC 07 | U24AE609 | Expert Talk Series-6 | VI | 1 |
| Total: | | | | | 7 |

(xii) Startups and Entrepreneurship Courses (STE)

| Sr. No. | Course Type | Course Code | Course Name | Semester | Credits |
|---------|-------------|-------------|-------------|----------|---------|
| 1. | STE | U24ST505 | S&E Basket | V | 3 |

(xiii) Activity Based Learning (ABL) @ Value Added Courses:

Activity Based Learning (ABL) @ Value Added Courses

- Students are required to earn 4 credits through the first four semesters (2 credits from **Social Empowerment Activities - SEA** and 2 credits from **Self Accomplishment Activities - SAA**)
- If a student is not able to attend/ fulfill performance requirements, he/she shall be dropped from the course and will have to repeat by enrolling in the forthcoming semesters.
- The Student Activity Centre (SAC) and Centre for Innovation Incubation Research and Entrepreneurship (C-i2RE) shall act as nodal units for activities listed under SEA/SAA.

Social Empowerment Activities - SEA

- These activities are designed to uplift and empower a group or community. The emphasis is on collective benefit, social change, and improving the conditions or capabilities of a community or specific group within society.
- These are categorized under four groups namely
 1. **Swachh Bharat** (Clean India)

The aim of activities under Swachh Bharat is to promote cleanliness, hygiene and sanitation across India.
 2. **Shikshit Bharat** (Educated India)

The aim of activities under Shikshit Bharat is to ensure inclusive and equitable quality education for all, promoting lifelong learning opportunities.

3. **Samruddha Bharat** (Prosperous India)

The aim of activities under Samrudha Bharat is to promote economic growth, self-reliance, and prosperity for all citizens.

4. **Surakshit Bharat** (Safe India)

The aim of activities under Surakshit Bharat is to ensure the safety, security, and well-being of all citizens.

Self-Accomplishment Activities - SAA

- These activities are centered on individual growth, personal development, and self-improvement. The emphasis is on enhancing one's own skills, knowledge, and well-being.

- These are categorized under four groups namely

1. **Socho Bharat** (Think India)

The aim of activities under Socho Bharat is to foster critical thinking, innovation, and intellectual development among citizens.

2. **Sanskarit Bharat** (Cultured India)

The aim of activities under Sanskarit Bharat is to preserve, promote, and celebrate India's rich cultural heritage, traditional values, and ethical practices by nurturing morals, fostering social harmony and creating awareness and appreciation of India's rich history.

3. **Saksham Bharat** (Empowered India)

The aim of activities under Saksham Bharat is to empower individuals and communities with the skills, resources, and opportunities needed to achieve self-reliance and economic independence by fostering physical fitness, discipline, teamwork leadership and mental resilience.

4. **Sunder Bharat** (Beautiful India)

The aim of activities under Sunder Bharat is to enhance the aesthetic and environmental beauty of India, making it a visually pleasing and environmentally sustainable country by emphasizing the importance of culture and heritage.

Table: SEA

| Group | Guiding club/ center | Code of activity (U24VAYYY)* | Title of activity |
|--------------------------------------|--------------------------|------------------------------|--|
| SEA Group-1: Swachh Bharat | NSS | SE101 | Clean India – Green India (River/Beach/Mohalla/School/Campus/Govt offices Cleaning) |
| | | SE102 | Waste Management/Waste Segregation Surveys |
| | | SE103 | Village Empowerment / NSS camp in village for a week |
| | | SE104 | Healthy habits-happy schools/Medical camps in schools / peer health |
| | | SE105 | Lifesaving skills / school clinics / First Aid training for a week |
| | | SE106 | Sustainable living / Surveys and Estimation for roof tops |
| | | SE110 | Any other activity approved by Dean Academic Affairs |
| SEA Group-2: Shikshit Bharat | Humanity Club | SE201 | Peer mentoring / Mentoring of School Children |
| | | SE202 | Rural digital revolution / Digital Literacy for yielders & Participation in “Teach-for-India” movement |
| | | SE203 | Empowering learners –schools / Value addition for deprived schools |
| | | SE204 | Peer Mentoring / Mentoring junior (first year) students at KITSW |
| | | SE205 | Learning by Teaching / Teaching Assistantship at KITSW/Teaching AIDE |
| | | SE206 | Enriching Education/Development of learning material for schools/ITIs |
| | | SE210 | Any other activity approved by Dean Academic Affairs |
| SEA Group-3: Samruddha Bharat | C-i²RE | SE301 | Innovation, Business Model & Entrepreneurship |
| | | SE302 | Product Development and Prototyping |
| | | SE303 | Design Thinking/ Critical Thinking & Problem Solving |
| | | SE304 | Fundraising and Proposal Writing in Entrepreneurship |
| | | SE305 | Digital Marketing & Branding |
| | | SE306 | Identify a Social Problem & Work on the Solution using AICTE-IDEA LAB |
| | | SE307 | Meet with Entrepreneurs and Understand Business Models |
| | | SE308 | Entrepreneurial Case Study Analysis |

| | | | |
|--------------------------------------|------------|--------------|--|
| | | SE310 | Any other activity approved by Dean Academic Affairs |
| SEA Group-4: Surakshit Bharat | NCC | SE401 | NCC participation/National Integrity |
| | | SE402 | Basics of fire safety/Community safety |
| | | SE403 | Disaster Management |
| | | SE404 | Environmental health & sustainability |
| | | SE405 | Road safety |
| | | SE406 | Pollution control |
| | | SE410 | Any other activity approved by Dean Academic Affairs |

Code of each activity shall be: U24VAYYY + activity code of SEA/SAA

Example: U24VAYYYSE101 (for the activity Clean India – Green India (River / Beach /Mohalla /School/ Campus/ Govt offices Cleaning) under SEA Group1 Swacch Bharath)

Table: SAA

| Group | Guiding club/ center | Code of activity (U24VAYYY)* | Title of activity |
|--------------------------------------|----------------------|------------------------------|--|
| SAA Group-1: Socho Bharat | Literary Club | SA101 | Study of Green & White Revolutions in India |
| | | SA102 | Study of any 2 Government Missions or National Policies |
| | | SA103 | Study of India's top 2 problems |
| | | SA104 | Study of World's top 2 problems |
| | | SA105 | Study of one department of the Central/ State Government |
| | | SA106 | Study of one of the identified Books on leadership or innovation |
| | | SA110 | Any other activity approved by Dean Academic Affairs |
| SAA Group-2: Sanskarit Bharat | Team - UHV | SA201 | Values and Ethos of KITSW |
| | | SA202 | Philosophy of religion (any) |
| | | SA203 | Study of Life Management / Kindle Life / Life Empowerment and Enriching Program or any other book cited. |
| | | SA204 | Study of any of GREAT sons of INDIA (Ex. Gandhi, Ambedkar, Phule, Savarkar, Sardar Patel, Nehru, Shivaji, JRD Tata etc) |
| | | SA205 | Harmony in FAMILY & SOCIETY |
| | | SA206 | Harmony in NATURE |
| | | SA210 | Any other activity approved by Dean Academic Affairs |
| SAA Group-3: Saksham | Sports Club | SA301 | Physical Fitness, Self-defence for Women, Target based Physical Exercise for example- Running (Test 5 kms in a stretch), |

| | | | |
|-----------------------------------|-----------------------|--|---|
| Bharat | | | Swimming (Test 1 km in a stretch), Walking (Test 20 kms in a stretch), Trekking (7days), Cycling |
| | | SA302 | Sports - Representation of Institute at University level/Inter college level and above in ANY sport |
| | | SA303 | Pran-vidya (Yoga & Pranayama), Jeevan-vidya (work-life balance) |
| | Technical club | SA304 | Participation in National Tech Fest, AICTE-Hackathon, industry floated global and National competitions, Robocon, BAHA etc |
| | | SA305 | Ambassador for events, Student member of regional level committees of Hyderabad section, Organizing committee member in National/Regional/Section level activities for technical societies like ISTE/IEEE/IETE/CSI/SAE etc. |
| | | SA306 | Present research papers at National and international conferences |
| SA310 | | Any other activity approved by Dean Academic Affairs | |
| SAA Group-4: Sunder Bharat | MDF | SA401 | Institute representation in prestigious cultural fests/competitions |
| | | SA402 | Dance (Bharatanatyam /Kathak /Lavani /Western Dance). <i>Only for beginners</i> |
| | | SA403 | Music composition / Learning musical instrument (Any type). <i>Only for beginners.</i> |
| | | SA404 | Sculptures (focusing on themes of unity, peace and environmental conservation)/ /Seeing through Painting |
| | PMC | SA405 | Film Appreciation/Dramatics |
| | | SA406 | Making short film/Photography |
| | | SA410 | Any other activity approved by Dean Academic Affairs |

Code of each activity shall be: U24VAYYY + activity code of SEA/SAA

Example: U24VAYYYSA101 (for the activity Study of Green & White Revolutions in India under SAA Group1 Socho Bharat)

13. SUMMARY OF CURRICULUM COMPONENTS

| S.NO. | CATEGORY | COURSE COMPONENT | TOTAL COURSES | TOTAL CREDITS | CURRICULUM CONTENT (%OF CREDITS) |
|--------------|----------|---|---------------|---------------|----------------------------------|
| 1 | HSMC | Humanity and Social Sciences including Management Courses | 3 | 6 | 3.49 |
| 2 | BSC | Basic Science Courses | 5 | 17 | 9.88 |
| 3 | ESC | Engineering Science Courses | 6 | 18 | 10.46 |
| 4 | PCC | Program Core Courses | 18 | 66 | 38.37 |
| 5 | PEC | Program Elective Courses | 4 | 12 | 6.98 |
| 6 | MOPEC | Multidisciplinary Open Elective Courses | 3 | 9 | 5.23 |
| 7 | ELC | Experiential Learning Courses | 9 | 17 | 9.88 |
| 9 | IKSC | Indian Knowledge System Courses | 3 | 4 | 2.33 |
| 10 | VAC | Value Added Courses | 8 | 8 | 4.65 |
| 11 | SEC | Skill Enhancement Courses | 5 | 5 | 2.91 |
| 12 | AEC | Ability Enhancement Courses | 7 | 7 | 4.07 |
| 13 | STE | Startups and Entrepreneurship Courses | 1 | 3 | 1.74 |
| Total | | | 72 | 172 | 100 |

14. SEMESTER WISE COURSE / CREDIT DISTRIBUTION

| Semester | Number of Courses / Number of Credits (Course Category wise) | | | | | | | | | | | | TOTAL |
|--------------------------------|--|--------------------|-------------------|--------------------|-------------------|--------------------|-------------------|------------------|-------------------|------------------|------------------|------------------|--------------------|
| | BSC | ESC | HSMC | PCC | MOPEC | PEC | SEC | VAC | ELC | AEC | IKSC | STE | |
| I | 2/7 | 2/4 | 1/2 | 1/4 | | | | 2/1 | 1/1 | 1/1 | 1/0 | | 11/20 |
| II | 2/7 | 1/4 | | 2/7 | | | 1/1 | 2/1 | 1/1 | 2/2 | | | 11/23 |
| III | 1/3 | | | 4/15 | | | 1/1 | 2/3 | 1/1 | 1/1 | | | 10/24 |
| IV | | 1/3 | | 4/15 | | | 1/1 | 2/3 | 1/1 | 1/1 | | | 10/24 |
| V | | 1/4 | 2/4 | 2/7 | 1/3 | | 1/1 | | 1/1 | 1/1 | 1/2 | | 10/23 |
| VI | | 1/3 | | 2/8 | | 1/3 | 1/1 | | 1/1 | 1/1 | 1/2 | 1/3 | 9/22 |
| VII | | | | 3/10 | 1/3 | 1/3 | | | 2/5 | | | | 7/21 |
| VIII | | | | | 1/3 | 2/6 | | | 1/6 | | | | 4/15 |
| Total | 5/17 | 6/18 | 3/6 | 18/66 | 3/9 | 4/12 | 5/5 | 8/8 | 9*/17 | 7/7 | 3/4 | 1/3 | 72/172 |
| % Weightage of Course Category | 9.88% (17/172) | 10.46% (18/172) | 3.48 % (6/172) | 38.37% (66/172) | 5.23% (12/172) | 6.97 % (12/172) | 2.90 % (5/172) | 4.65% (8/172) | 9.88% (17/172) | 4.06% (7/172) | 2.32% (4/172) | 1.74% (3/172) | 100 % (172/172) |

* Seminar - 1C, Mini Project - 1C, Internship Evaluation-1C, Major Project : 4+6=10C

B. Tech (IT) -CURRICULUM (KITSW-URR24)

SEMESTER-WISE CURRICULUM WITH SCHEME OF INSTRUCTIONS

Abbreviations

| | | | |
|---|-----------------|---|---|
| L | Lecture Hours | O | Outside the Class Work (Self Study) Hours |
| T | Tutorial Hours | E | Total Engagement in Hours |
| P | Practical Hours | C | Credits Assigned |

I SEMESTER

| Sl. No. | Category | Course Code | Course Title | Lectures / week | | | | | Credits |
|---|----------|-------------------|--|-----------------|----------|----------|-----------|-----------|-----------|
| | | | | L | T | P | O | E | |
| - | IKSC | U24IK100 | AICTE Mandated Student Induction Programme (Universal Human Values - I) | | | | | - | |
| 1 | BSC | U24MH101 | Differential Calculus and Ordinary Differential Equations | 2 | 1 | - | 6 | 9 | 3 |
| 2 | BSC | U24CY102B | Engineering Chemistry <i>(Common to CSM, CSD, CSN, CSO & IT)</i> | 2 | 1 | 2 | 5 | 10 | 4 |
| 3 | ESC | U24IT103 | Digital Logic Design | 2 | 1 | - | 4 | 7 | 3 |
| 4 | PCC | U24IT104 | Programming for Problem Solving with C | 2 | 1 | 2 | 5 | 10 | 4 |
| 5 | HSM | U24MH105 | English Communication and Report Writing | 2 | - | - | 3 | 5 | 2 |
| 6 | VAC | U24VA106 | Sports & Yoga | - | - | 2 | 2 | 4 | - |
| 7 | ESC | U24ME107 | Engineering Graphics through CAD | - | - | 2 | 2 | 4 | 1 |
| 8 | ELC | U24EL108 | Practicum - 1 | - | - | - | 4 | 4 | 1 |
| 9 | VAC | U24VA109 XXXXX | SEA - I/ SAA-1 | - | - | - | 2 | 2 | 1 |
| 10 | AEC | U24AE110 | Expert Talk Series-1 | - | - | - | 1 | 1 | 1 |
| Total: | | | | 10 | 4 | 8 | 34 | 56 | 20 |
| Summer/ Inter-sem Bridge Courses (Approved by BoS and Dean,AA): 1 week to 10 days: 1 credit to each Bridge course under additional learning (will be printed on grade sheet) | | | | | | | | | |

| Pool - III (Chemistry) | | |
|------------------------|-------------|---|
| S. No. | Course Code | Course Title |
| 1. | U24CY102A | Engineering Chemistry <i>(for Mechanical Engineering)</i> |
| 2. | U24CY102B | Engineering Chemistry <i>(Common to CSM, CSD, CSN, CSO & IT)</i> |

II SEMESTER

| Sl. No. | Category | Course Code | Course Title | Lectures / week | | | | | Credits |
|---|----------|-------------------|---|-----------------|----------|-----------|-----------|-----------|-----------|
| | | | | L | T | P | O | E | C |
| 1 | BSC | U24MH201 | Matrix Theory and Vector Calculus | 2 | 1 | - | 6 | 9 | 3 |
| 2 | BSC | U24PY202B | Engineering Physics (Common to CSM, CSD, CSN, CSO & IT) | 2 | 1 | 2 | 5 | 10 | 4 |
| 3 | PCC | U24IT203 | Computer Architecture and Organization | 2 | 1 | - | 4 | 7 | 3 |
| 4 | PCC | U24IT204 | Data Structures through C | 2 | 1 | 2 | 5 | 10 | 4 |
| 5 | ESC | U24EE205B | Basic Electrical Engineering (Common to CSM, CSD, CSN, CSO & IT) | 2 | 1 | 2 | 5 | 10 | 4 |
| 6 | VAC | U24CH206 | Environmental Studies | 2 | - | - | 2 | 4 | - |
| 7 | AEC | U24AE207 | Idea Lab Makerspace | - | - | 2 | 2 | 4 | 1 |
| 8 | SEC | U24SE208 | Programming Skill Development Lab - 1 | - | - | 2 | 2 | 4 | 1 |
| 9 | ELC | U24EL209 | Practicum-2 | - | - | - | 4 | 4 | 1 |
| 10 | VAC | U24VA210 XXXXX | SEA-2/ SAA -2 | - | - | - | 2 | 2 | 1 |
| 11 | AEC | U24AE211 | Expert Talk Series-2 | - | - | - | 1 | 1 | 1 |
| Total: | | | | 12 | 5 | 10 | 38 | 65 | 23 |
| Summer/ Inter-sem Bridge Courses (Approved by BoS and Dean,AA): 1 week to 10 days: 1 credit to each Bridge course under additional learning (will be printed on grade sheet) | | | | | | | | | |

| Pool - I (Physics) | | |
|--------------------|-------------|--|
| S. No. | Course Code | Course Title |
| 1. | U24PY202A | Engineering Physics (for Mechanical Engineering) |
| 2. | U24PY202B | Engineering Physics (Common to CSM, CSD, CSN, CSO & IT) |

| Pool - II (Basic Electrical & Electronics Engineering) | | |
|--|-------------|--|
| S. No. | Course Code | Course Title |
| 1. | U24EE205A | Basic Electrical and Electronics Engineering (for Mechanical Engineering) |
| 2. | U24EE205B | Basic Electrical Engineering (Common to CSM, CSD, CSN, CSO & IT) |

Courses for exit:

Successful completion of two subjects (6-Credits) during 2-months internship at the institute
OR
Successful completion of two suitable skill based courses (external) to qualify for Certification

A. After First Year: (UG Certificate in IT)

(i) The candidate should pass any two of the following additional courses (ITI Level) during the 2-Months internship at institute

| Exit Option to Qualify UG Certificate in IT : Any Two (02) Courses during the 2 - Months internship | | | | | | | | | |
|--|----------|-------------|--|---|---|---|---|---|---|
| S. No. | Category | Course Code | Course Title | L | T | P | O | E | C |
| 1 | PCC | U24IT212X | PC Software | 2 | - | 2 | - | 4 | 3 |
| 2 | PCC | U24IT213X | Digital Marketing | 2 | - | 2 | - | 4 | 3 |
| 3 | PCC | U24IT214X | Web Designing | 2 | - | 2 | - | 4 | 3 |
| 4 | PCC | U24IT215X | Hardware and Networking | 2 | - | 2 | - | 4 | 3 |
| 5 | PCC | U24IT216X | Any other course approved by BoS Chair and Dean AA | | | | | | |

(OR)

(ii) Any two suitable skill based courses to qualify for Certification.

| Exit Option to Qualify UG Certificate in IT : Any Two (02) Skill based Courses -: | | | | | | | | | |
|--|----------|-------------|---|---|---|---|---|---|---|
| S. No. | Category | Course Code | Course Title | L | T | P | O | E | C |
| 1 | SEC | U24SE212XIT | UNIX/LINUX Programming https://www.udemy.com/course/complete-linux-training-course-to-get-your-dream-it-job/?couponCode=ST3MT72524 | - | - | 6 | - | 6 | 3 |
| 2 | SEC | U24SE213XIT | Java Programming https://learn.oracle.com/ols/learning-path/java-fundamentals/55593/55578 | - | - | 6 | - | 6 | 3 |
| 3 | SEC | U24SE214XIT | Advanced Data Structures https://www.udemy.com/course/data-structures-and-algorithms-deep-dive-using-java/?couponCode=ST3MT72524 | - | - | 6 | - | 6 | 3 |
| 4 | SEC | U24SE215XIT | SQL and PL/SQL Programming https://www.udemy.com/course/the-ultimate-mysql-bootcamp-go-from-sql-beginner-to-expert/?couponCode=ST3MT72524 | - | - | 6 | - | 6 | 3 |
| 5 | SEC | U24SE216XIT | Any other skill based course approved by BoS Chair and Dean, AA | - | - | 6 | - | 6 | 3 |

III SEMESTER

| Sl. No. | Category | Course Code | Course Title | Lectures / week | | | | | Credits |
|--|----------|-------------------|--|-----------------|----------|----------|-----------|-----------|-----------|
| | | | | L | T | P | O | E | C |
| 1 | BSC | U24MH301D | Discrete Mathematics and Probability, Statistics | 2 | 1 | - | 6 | 9 | 3 |
| 2 | PCC | U24IT302 | Advanced Data Structures | 2 | 1 | 2 | 5 | 10 | 4 |
| 3 | PCC | U24IT303 | Software Engineering | 2 | 1 | - | 4 | 7 | 3 |
| 4 | PCC | U24IT304 | Database Management Systems | 2 | 1 | 2 | 5 | 10 | 4 |
| 5 | PCC | U24IT305 | Object Oriented Programming through Java | 2 | 1 | 2 | 5 | 10 | 4 |
| 6 | VAC | U24VA306B | Soft and Interpersonal Skills | 2 | - | - | 2 | 4 | 2 |
| 7 | SEC | U24SE307 | Programming Skill Development Lab - 2 | - | - | 2 | 2 | 4 | 1 |
| 8 | ELC | U24EL308 | Practicum-3 | - | - | - | 4 | 4 | 1 |
| 9 | VAC | U24VA309 XXXXX | SEA-3/ SAA -3 | - | - | - | 2 | 2 | 1 |
| 10 | AEC | U24AE310 | Expert Talk Series-3 | - | - | - | 1 | 1 | 1 |
| Total: | | | | 12 | 5 | 8 | 36 | 61 | 24 |
| Summer/ Inter-sem Bridge Courses (Approved by BoS and Dean,AA): 1 week to 10 days: 1 credit to each Bridge course under additional learning (will be printed on grade sheet) | | | | | | | | | |

| Branch Specific Mathematics (Pool-4) | | |
|--------------------------------------|-------------|--|
| S. No. | Course Code | Course Title |
| 1. | U24MH301A | Numerical and Statistical Methods <i>(for Civil Engineering)</i> |
| 2. | U24MH301B | Applied Mathematics <i>(for Mechanical Engineering)</i> |
| 3. | U24MH301C | Applied Mathematics <i>(Common to ECI, EEE & ECE)</i> |
| 4. | U24MH301D | Discrete Mathematics and Probability Statistics <i>(Common to CSE, CSN, CSO & IT)</i> |
| 5. | U24MH301E | Essential Mathematics and Statistics for Machine learning <i>(for CSM)</i> |
| 6. | U24MH301F | Essential Mathematics and Statistics for Data science <i>(for CSD)</i> |

IV SEMESTER

| Sl. No. | Category | Course Code | Course Title | Lectures / week | | | | | Credits |
|--|----------|-------------------|---|-----------------|----------|----------|-----------|-----------|-----------|
| | | | | L | T | P | O | E | C |
| 1 | PCC | U24IT401 | Design and Analysis of Algorithms | 2 | 1 | 2 | 5 | 10 | 4 |
| 2 | PCC | U24IT402 | Python Programming | 2 | 1 | 2 | 5 | 10 | 4 |
| 3 | ESC | U24IT403 | Artificial Intelligence | 2 | 1 | - | 4 | 7 | 3 |
| 4 | PCC | U24IT404 | Operating Systems | 2 | 1 | 2 | 5 | 10 | 4 |
| 5 | PCC | U24IT405 | Computer Networks | 2 | 1 | - | 4 | 7 | 3 |
| 6 | VAC | U24VA406A | Quantitative Aptitude and Logical Reasoning | 2 | - | - | 2 | 4 | 2 |
| 7 | SEC | U24SE407 | Programming Skill Development Lab - 03 | - | - | 2 | 2 | 4 | 1 |
| 8 | ELC | U24EL408 | Practicum-4 | - | - | - | 4 | 4 | 1 |
| 9 | VAC | U24VA409 XXXXX | SEA - 4/ SAA - 4 | - | - | - | 2 | 2 | 1 |
| 10 | AEC | U24AE410 | Expert Talk Series-4 | - | - | - | 1 | 1 | 1 |
| 11 | VAC* | U24CY411* | Environmental Science* | 2* | 1* | - | 2* | 5* | 3* |
| Total: | | | | 12 | 5 | 8 | 34 | 59 | 24 |
| Summer/ Inter-sem Bridge Courses (Approved by BoS and Dean,AA): 1 week to 10 days: 1 credit to each Bridge course under additional learning (will be printed on grade sheet) | | | | | | | | | |

**For Lateral Entry Students Only*

Courses for exit:

Successful completion of two subjects (6-Credits) during 2-months internship at the institute
OR

Successful completion of two suitable skill based courses (external) to qualify for Certification

B. After Second Year: (UG Diploma in IT)

(i) The candidate should pass any two of the following additional courses (Diploma Level) during the 2-Months internship at institute

| Exit Option to Qualify UG Diploma in IT : Any Two (02) Courses during the 2 - Months internship | | | | | | | | | |
|--|----------|-------------|---|---|---|---|---|---|---|
| S. No. | Category | Course Code | Course Title | L | T | P | O | E | C |
| 1 | PCC | U24IT412X | Introduction to Web Programming | 2 | - | 2 | - | 4 | 3 |
| 2 | PCC | U24IT413X | Internet of Things | 2 | - | 2 | - | 4 | 3 |
| 3 | PCC | U24IT414X | Cloud Computing | 2 | - | 2 | - | 4 | 3 |
| 4 | PCC | U24IT415X | Java Full Stack Development | 2 | - | 2 | - | 4 | 3 |
| 5 | PCC | U24IT415X | Any other course approved by BoS Chair and Dean, AA | 2 | - | 2 | - | 4 | 3 |

(OR)

(ii) Any two suitable skill based courses to qualify for Diploma.

| Exit Option to Qualify UG Diploma in IT : Any Two (02) Skill based Courses -: | | | | | | | | | |
|--|----------|-------------|--|---|---|---|---|---|---|
| S. No. | Category | Course Code | Course Title | L | T | P | O | E | C |
| 1 | SEC | U24SE412XIT | Programming for Web Design https://onlinecourses.swayam2.ac.in/nou24_cs12/preview | - | - | 6 | - | 6 | 3 |
| 2 | SEC | U24SE413XIT | Internet of Things using Aurdino/Raspberry Pi https://onlinecourses.swayam2.ac.in/ntr24_ed44/preview | - | - | 6 | - | 6 | 3 |
| 3 | SEC | U24SE414XIT | Cloud Computing using AWS/Google Cloud https://www.coursera.org/specializations/cloud-computing | - | - | 6 | - | 6 | 3 |
| 4 | SEC | U24SE415XIT | Full Stack using JAVA / .NET https://www.coursera.org/specializations/java-fullstack | - | - | 6 | - | 6 | 3 |
| 5 | SEC | U24SE416XIT | Any other skill based course approved by BoS Chair and Dean, AA | - | - | 6 | - | 6 | 3 |

B. Tech Honours with Research:

Students opting for B. Tech Honours with Research, shall undergo a 2-Month Mandatory Research Internship-I (5 Credits) at respective department during the summer vacation after IV Semester.

V SEMESTER

| Sl. No. | Category | Course Code | Course Title | Lectures / week | | | | | Credits |
|--|----------|-------------|---------------------------------------|-----------------|----------|----------|-----------|-----------|-----------|
| | | | | L | T | P | O | E | |
| 1 | MOPEC | U24OE501YYX | MOPEC Elective -I# | 2 | 1 | - | 3 | 6 | 3 |
| 2 | PCC | U24IT502 | Machine Learning | 2 | 1 | 2 | 5 | 10 | 4 |
| 3 | PCC | U24IT503 | Information Security | 2 | 1 | - | 4 | 7 | 3 |
| 4 | ESC | U24IT504 | Introduction to Internet of Things | 2 | 1 | 2 | 5 | 10 | 4 |
| 5 | HSMC | U24MB505X | Management Course Basket | 2 | 1 | - | 2 | 5 | 3 |
| 6 | IKSC | U24IK506B | Universal Human Values - II | 2 | - | - | 2 | 4 | 2 |
| 7 | SEC | U24SE507 | Programming Skill Development Lab - 4 | - | - | 2 | 2 | 4 | 1 |
| 8 | HSMC | U24MH508 | Technical English | - | - | 2 | 2 | 4 | 1 |
| 9 | ELC | U24IT509 | Seminar | - | - | - | 2 | 2 | 1 |
| 10 | AEC | U24AE510 | Expert Talk Series-5 | - | - | - | 1 | 1 | 1 |
| Total: | | | | 12 | 5 | 8 | 28 | 53 | 23 |
| Additional Learning [@] :Maximum credits allowed for Honours/Minor | | | | - | - | - | - | - | 5 |
| Total credits for Honours/Minor students: | | | | - | - | - | - | - | 28 |
| Summer/ Inter-sem Bridge Courses (Approved by BoS and Dean,AA): 1 week to 10 days: 1 credit to each Bridge course under additional learning (will be printed on grade sheet) | | | | - | - | - | - | - | - |

#MULTIDISCIPLINARY OPEN ELECTIVES: Student has to select one course as multidisciplinary open elective from any of the MOPEC Basket of courses offered by other departments.

[@]List of courses for additional learning through MOOCs towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula

| Management Courses Basket | | |
|---------------------------|-----------------------|--|
| S. No. | Course Code | Course Title |
| 1. | U24MB505A / U24MB605A | Management Economics and Accountancy |
| 2. | U24MB505B / U24MB605B | Industrial Psychology |
| 3. | U24MB505C / U24MB605C | E-Commerce and Digital Marketing |
| 4. | U24MB505D / U24MB605D | Organizational Behaviour |
| 5. | U24MB505E / U24MB605Z | Any other course approved by BoS Chair and Dean AA |

| Sl. No. | Category | Course Code | Course Title | Lectures / week | | | | | Credits |
|--|----------|-------------|--|-----------------|----------|----------|-----------|-----------|-----------|
| | | | | L | T | P | O | E | C |
| 1 | PEC | U24IT601X | Program Elective -I/ MOOCs-I | 2 | 1 | - | 4 | 7 | 3 |
| 2 | ESC | U24IT602 | Data Science | 2 | 1 | - | 4 | 7 | 3 |
| 3 | PCC | U24IT603 | Cloud Computing | 2 | 1 | 2 | 4 | 9 | 4 |
| 4 | PCC | U24IT604 | Full Stack Development using JAVA | 2 | 1 | 2 | 5 | 10 | 4 |
| 5 | STE | U24ST605X | Startups & Entrepreneurship Basket | 2 | 1 | - | 2 | 5 | 3 |
| 6 | IKSC | U24IK606A | Essense of Indian Traditional Knowledge | 2 | - | - | 2 | 4 | 2 |
| 7 | SEC | U24SE607 | Programming Skill Development Lab - 5 | - | - | 2 | 2 | 4 | 1 |
| 8 | ELC | U24IT608 | Mini Project | - | - | 2 | 2 | 4 | 1 |
| 9 | AEC | U24AE609 | Expert Talk Series-6 | - | - | - | 1 | 1 | 1 |
| Total: | | | | 12 | 5 | 8 | 26 | 51 | 22 |
| Additional Learning[@]:Maximum credits allowed for Honours/Minor | | | | - | - | - | - | - | 5 |
| Total credits for Honours/Minor students: | | | | - | - | - | - | - | 27 |
| Summer/ Inter-sem Bridge Courses (Approved by BoS and Dean,AA): 1 week to 10 days: 1 credit to each Bridge course under additional learning (will be printed on grade sheet) | | | | | | | | | |

[@]List of courses for additional learning through MOOCs towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula

B. Tech Honours with Research:

Students opting for B. Tech Honours with Research, shall undergo a 2-Month Mandatory Research Internship-II (5 Credits) at respective department during the summer vacation after VI Semester.

| Startups & Entrepreneurship Basket | | |
|------------------------------------|-----------------------|--|
| S. No. | Course Code | Course Title |
| 1. | U24ST505A / U24ST605A | Design Thinking |
| 2. | U24ST505B / U24ST605B | Innovative Product Design and Development |
| 3. | U24ST505C / U24ST605C | Entrepreneurship |
| 4. | U24ST505D / U24ST605D | Design Studio |
| 5. | U24ST505Z / U24ST605E | Any other course approved by BoS Chair and Dean AA |

Courses for exit:

Successful completion of two subjects (6-Credits) during 2-months internship at the institute
OR
Successful completion of two suitable skill based courses (external) to qualify for Certification

C. After Third Year: (B. Tech. Voc. in IT)

(i) The candidate should pass any two of the following additional courses (Degree Level) during the 2-Months internship at institute

| Exit Option to Qualify B. Voc in IT: Any Two (02) Courses during the 2 - Months internship | | | | | | | | | |
|---|----------|-------------|--|---|---|---|---|---|---|
| S. No. | Category | Course Code | Course Title | L | T | P | O | E | C |
| 1 | PCC | U24IT610X | Big Data Analytics | 2 | - | 2 | - | 4 | 3 |
| 2 | PCC | U24IT611X | Software Testing | 2 | - | 2 | - | 4 | 3 |
| 3 | PCC | U24IT612X | Fundamentals of DevOps | 2 | - | 2 | - | 4 | 3 |
| 4 | PCC | U24IT613X | Cyber Security | 2 | - | 2 | - | 4 | 3 |
| 5 | PCC | U24IT614X | Any other course approved by BoS Chair and Dean AA | 2 | - | 2 | - | 4 | 3 |

(OR)

(ii) Any two suitable skill based courses to qualify for B. Voc. in IT Degree.

| Exit Option to Qualify B. Voc. in IT: Any Two (02) Skill based Courses -: | | | | | | | | | |
|--|----------|-------------|--|---|---|---|---|---|---|
| S. No. | Category | Course Code | Course Title | L | T | P | O | E | C |
| 1 | SEC | U24SE610XIT | Deep Learning using Python https://www.simplilearn.com/tutorial/s/deep-learning-tutorial/deep-learning-with-python | - | - | 6 | - | 6 | 3 |
| 2 | SEC | U24SE611XIT | Cyber Security Tools https://onlinecourses.swayam2.ac.in/nou19_cs08/preview | - | - | 6 | - | 6 | 3 |
| 3 | SEC | U24SE612XIT | Automated Testing Tools https://www.udemy.com/course/automated-software-testing-with-python/?couponCode=ST3MT72524 | - | - | 6 | - | 6 | 3 |
| 4 | SEC | U24SE613XIT | DevOps https://www.udemy.com/course/devops-with-docker-kubernetes-and-azure-devops/?couponCode=ST3MT72524 | - | - | 6 | - | 6 | 3 |
| 5 | SEC | U24SE614XIT | Any other skill based course approved by BoS Chair and Dean AA | - | - | 6 | - | 6 | 3 |

VII SEMESTER

| Sl. No. | Category | Course Code | Course Title | Lectures / week | | | | | Credits |
|--|----------|-------------|---|-----------------|----------|-----------|-----------|-----------|-----------|
| | | | | L | T | P | O | E | C |
| 1 | MOPEC | U24OE701YYX | MOPEC Elective -II | 2 | 1 | - | 3 | 6 | 3 |
| 2 | PEC | U24IT702X | Program Elective - II/ MOOCs-II | 2 | 1 | - | 4 | 7 | 3 |
| 3 | PCC | U24IT703 | DevOps Essentials | 2 | 1 | 2 | 4 | 9 | 4 |
| 4 | PCC | U24IT704 | Big Data Analytics | 2 | 1 | - | 4 | 7 | 3 |
| 5 | PCC | U24IT705 | Software Testing and Quality Assurance | 2 | 1 | - | 4 | 7 | 3 |
| 6 | ELC | U24IT706 | Internship Evaluation* | - | - | 2 | - | 2 | 1 |
| 7 | ELC | U24IT707 | Major Project, Phase-1/ Industrial Internship - 1 | - | - | 8 | 6 | 12 | 4 |
| Total: | | | | 10 | 5 | 12 | 25 | 52 | 21 |
| Additional Learning[@]:Maximum credits allowed for Honours/Minor | | | | - | - | - | - | - | 4 |
| Total credits for Honours/Minor students: | | | | - | - | - | - | - | 24 |

#MULTIDISCIPLINARY OPEN ELECTIVES: Student has to select one course as multidisciplinary open elective from any of the MOPEC Basket of courses offered by other departments.

@ List of courses for additional learning through MOOCs towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula

B. Tech Honours with Research

Students opting for B. Tech Honours with Research, shall complete Research Methodology Course (4 Credits) through MOOCs (OR) a workshop / FDP of not less than one week on "Research Methodologies" (4 Credits).

Internship Evaluation for the students opting B. Tech Honours with Research, will be done on the 2-Month Research Internship-II.

VIII SEMESTER

| Sl. No. | Category | Course Code | Course Title | Lectures / week | | | | | Credits |
|--|----------|-------------|--|-----------------|----------|-----------|-----------|-----------|-----------|
| | | | | L | T | P | O | E | C |
| 1 | MOPEC | U24OE801YYX | MOPEC Elective -III | 2 | 1 | - | 3 | 6 | 3 |
| 2 | PEC | U24IT802X | Program Elective - III/ MOOCs-IV | 2 | 1 | - | 4 | 7 | 3 |
| 3 | PEC | U24IT803X | Program Elective - IV/ MOOCs-V | 2 | 1 | - | 4 | 7 | 3 |
| 4 | ELC | U24IT804 | Major Project Phase - 2/ Industrial Internship - 2 | - | - | 12 | 4 | 16 | 6 |
| Total: | | | | 6 | 3 | 12 | 15 | 36 | 15 |
| Additional Learning [@] : Maximum credits allowed for Honours/Minor | | | | - | - | - | - | - | 4 |
| Total credits for Honours/Minor students: | | | | - | - | - | - | - | 19 |

#MULTIDISCIPLINARY OPEN ELECTIVES: Student has to select one course as multidisciplinary open elective from any of the MOPEC Basket of courses offered by other departments.

@ List of courses for additional learning through MOOCs towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula

B. Tech Honours with Research

Students opting for B. Tech Honours with Research, shall Publish a research paper in reputed journal indexed by SCI/ SCOPUS/Web of Science (4 Credits).

SUMMARY

| SEMESTER | I | II | III | IV | V | VI | VII | VIII | TOTAL |
|----------|----|----|-----|----|----|----|-----|------|-------|
| CREDITS | 20 | 23 | 24 | 24 | 23 | 22 | 21 | 15 | 172 |

MULTIDISCIPLINARY OPEN ELECTIVE COURSES (MOPEC) BASKETS:

There are three slots for MOPEC Courses (5th, 7th & 8th semesters). Students can opt any three courses (one course per semester under MOPEC slot) from the available 14 MOPEC Baskets.

Students those who opt open elective courses will be thinking to get introduced to the courses other than their program courses to start rooting their professional goals in their breadth component of study to explore the jobs in different fields. Hence the department shall carefully offer courses under the MOPEC Basket which create interest and impart basic knowledge and skills across the domains. For example the CS/IT MOPEC basket shall consist of courses like Introduction to AI&ML, Intro to web programming, Intro to Computer Networking, Intro to Operating Systems, etc.

Course code to be followed for all MOPEC courses:

| U | 2 | 4 | O | E | X | 0 | 1 | C | E | A |
|------------------|---|---|----------------|---|---------------------------------------|--|---|----------------------------|---|--------------|
| URR24 Curriculum | | | MOPEC Elective | | Semester in which MOPEC opted (5/7/8) | 1 st Subject in that Semester | | MOPECs offered by CE Dept. | | Serial Order |

(I) CIVIL ENGINEERING: CE-MOPEC BASKET

The following Courses will be offered by Civil Engineering Department under MOPEC basket to the students of other branches:

| V/VII/VIII SEMESTER | | |
|----------------------------|-------------|--|
| 1 | U24OEX01CEA | Engineering Mechanics |
| 2 | U24OEX01CEB | Strength of Materials |
| 3 | U24OEX01CEC | Fluid Mechanics |
| 4 | U24OEX01CED | Advanced Surveying |
| 5 | U24OEX01CEE | Energy Efficient Buildings |
| 6 | U24OEX01CEF | Net Zero Buildings |
| 7 | U24OEX01CEG | Forensic Engineering |
| 8 | U24OEX01CEH | Smart and Resilient Buildings |
| 9 | U24OEX01CEI | Infrastructure Engineering & Management |
| 10 | U24OEX01CEJ | Disaster Response & Preparedness |
| 11 | U24OEX01CEK | Introduction to Sustainable Development |
| 12 | U24OEX01CEL | Lifeline Services & Disasters |
| 13 | U24OEX01CEZ | Any other course approved by BoS Chair and Dean AA |

(II) MECHANICAL ENGINEERING: ME-MOPEC BASKET

The following Courses will be offered by Mechanical Engineering Department under MOPEC basket to the students of other branches:

| V/VII/VIII SEMESTER | | |
|----------------------------|--------------|--|
| 1 | U24OEX01MEA | 3D Printing Technologies |
| 2 | U24OE X01MEB | Joy of Mechanical Engineering |
| 3 | U24OE X01MEC | Introduction to Engineering Design |
| 4 | U24OE X01MED | Research Methodology |
| 5 | U24OE X01MEE | Thermal Science & Engineering |
| 6 | U24OEX01MEF | Automotive Pollution & Control |
| 7 | U24OEX01MEG | Applications of AI/ML in Mechanical Engineering |
| 8 | U24OEX01MEH | Computer Integrated Manufacturing |
| 9 | U24OEX01MEI | Elements of Automobile Engineering |
| 10 | U24OEX01MEJ | Finite Element Methods for Engineers |
| 11 | U24OEX01MEK | Design of Heat transfer equipment |
| 12 | U24OEX01MEL | Alternate Fuels |
| 13 | U24OEX01MEM | Digital Manufacturing |
| 14 | U24OEX01MEN | Industrial Engineering |
| 15 | U24OEX01MEO | Robotics Engineering |
| 16 | U24OEX01MEP | Composite Materials |
| 17 | U24OEX01MEQ | Jet Propulsion and Rocketry |
| 18 | U24OEX01MER | Cooling of Electronic Devices and circuits |
| 19 | U24OEX01MEZ | Any other course approved by BoS Chair and Dean AA |

(III) ECE: EC -MOPEC BASKET

The following Courses will be offered by ECE Department under MOPEC basket to the students of other branches:

| V/VII/VIII SEMESTER | | |
|----------------------------|-------------|--|
| 1 | U24OEX01ECA | Analog and Digital Electronics |
| 2 | U24OEX01ECB | Digital Electronics |
| 3 | U24OEX01ECC | Signals and Systems |
| 4 | U24OEX01ECD | Computer Architecture and Organization |
| 5 | U24OEX01ECE | Embedded System Design |
| 6 | U24OEX01ECF | Microprocessor and Microcontrollers |
| 7 | U24OEX01ECG | Linear Integrated Circuits |
| 8 | U24OEX01ECH | Digital Image Processing |
| 8 | U24OEX01ECI | Principles of Communication Systems |
| 10 | U24OEX01ECJ | Digital Signal Processing and Applications |
| 11 | U24OEX01ECK | Basic VLSI Design |
| 12 | U24OEX01ECL | Radar Engineering |
| 13 | U24OEX01ECM | Optical Communications and Networks |
| 14 | U24OEX01ECN | Wireless and Mobile Communications |
| 15 | U24OEX01ECO | Satellite Communications |
| 16 | U24OEX01ECP | Wireless Sensor Networks |
| 17 | U24OEX01ECQ | Microwave Communications |
| 18 | U24OEX01ECR | Introduction to Nanotechnology |
| 19 | U24OEX01ELZ | Any other course approved by BoS Chair and Dean AA |

(IV) ECI: CI-MOPEC BASKET

The following Courses will be offered by ECI Departments under MOPEC basket to the students of other branches:

| V/VII/VIII SEMESTER | | |
|----------------------------|-------------|--|
| 1 | U24OEX01CIA | Fundamentals of Instrumentation |
| 2 | U24OEX01CIB | Switching Theory and Logic Design |
| 3 | U24OEX01CIC | Signals and Systems |
| 4 | U24OEX01CID | Digital Signal Processing and Applications |
| 5 | U24OEX01CIE | Sensors and Actuators |
| 6 | U24OEX01CIF | Fundamentals of VLSI |
| 7 | U24OEX01CIG | LabVIEW Programming |
| 8 | U24OEX01CIH | PLC and DCS |
| 8 | U24OEX01CII | Microcontrollers and Applications |
| 10 | U24OEX01CIJ | Internet of Things |
| 11 | U24OEX01CIK | Non - Destructive Testing |
| 12 | U24OEX01CIZ | Any other course approved by BoS Chair and Dean AA |

(V) CSE: CS-MOPEC BASKET

The following Courses will be offered by CSE Department under MOPEC basket to the students of other branches:

| V/VII/VIII SEMESTER | | |
|----------------------------|-------------|--|
| 1 | U24OEX01CSA | Operating Systems |
| 2 | U24OEX01CSB | Design and Analysis of Algorithms |
| 3 | U24OEX01CSC | Software Engineering |
| 4 | U24OEX01CSD | Compiler Design |
| 5 | U24OEX01CSE | Data Mining |
| 6 | U24OEX01CSF | Cryptography & Network Security |
| 7 | U24OEX01CSG | High Performance Computing |
| 8 | U24OEX01CSH | Software Quality Assurance & Testing |
| 9 | U24OEX01CSZ | Any other course approved by BoS Chair and Dean AA |

(VI) IT: IT-MOPEC BASKET

The following Courses will be offered by IT Department under MOPEC basket to the students of other branches:

| V/VII/VIII SEMESTER | | |
|----------------------------|-------------|--|
| 1 | U24OEX01ITA | Computer Networks for IT |
| 2 | U24OEX01ITB | Ethical Hacking |
| 3 | U24OEX01ITC | Programming with C++ |
| 4 | U24OEX01ITD | Web Design Technologies |
| 5 | U24OEX01ITE | Software Project Management |
| 6 | U24OEX01ITF | Java Full Stack Development |
| 7 | U24OEX01ITG | DevOps |
| 8 | U24OEX01ITH | .NET Programming |
| 9 | U24OEX01ITI | Software Testing and Quality Assurance |
| 10 | U24OEX01ITZ | Any other course approved by BoS Chair and Dean AA |

(VII) EEE: EE-MOPEC BASKET

The following Courses will be offered by EEE Department under MOPEC basket to the students of other branches:

| V/VII/VIII SEMESTER | | |
|----------------------------|-------------|--|
| 1 | U24OEX01EEA | Linear Control Systems |
| 2 | U24OEX01EEB | Introduction to Electric Vehicles |
| 3 | U24OEX01EEC | Renewable Energy Systems |
| 4 | U24OEX01EED | Smart Electric Grid |
| 5 | U24OEX01EEE | Generation & Utilisation of Electric Energy |
| 6 | U24OEX01EEF | Energy Auditing |
| 7 | U24OEX01EEG | Network Analysis and Synthesis |
| 8 | U24OEX01EEH | Power Electronics |
| 9 | U24OEX01EEZ | Any other course approved by BoS Chair and Dean AA |

(VIII) CSE (DATA SCIENCE): DS-MOPEC BASKET

The following Courses will be offered by CSE(D) Department under MOPEC basket to the students of other branches:

| V/VII/VIII SEMESTER | | |
|----------------------------|-------------|--|
| 1 | U24OEX01DSA | Exploratory Data Analysis with R Programming |
| 2 | U24OEX01DSB | Predictive Analytics and Data Mining |
| 3 | U24OEX01DSC | Big data Analytics |
| 4 | U24OEX01DSD | Machine Learning |
| 5 | U24OEX01DSE | Deep Learning |
| 6 | U24OEX01DSF | Data Visualization |
| 7 | U24OEX01DSG | Social and Information Network Analysis |
| 8 | U24OEX01DSH | Web Scraping with Python |
| 9 | U24OEX01DSI | Introduction to MLOps |
| 10 | U24OEX01DSZ | Any other course approved by BoS Chair and Dean AA |

(IX) CSE (AM&ML) : AI MOPEC BASKET

The following Courses will be offered by the CSE (AM&ML) Department under MOPEC basket to the students of other branches:

| V/VII/VIII SEMESTER | | |
|----------------------------|-------------|--|
| 1 | U24OEX01AIA | Artificial Intelligence |
| 2 | U24OEX01AIB | Machine Learning |
| 3 | U24OEX01AIC | Deep Learning |
| 4 | U24OEX01AID | Computer Vision and Image Processing |
| 5 | U24OEX01AIE | Natural Language Processing |
| 6 | U24OEX01AIF | Exploratory Data Analysis with Python |
| 7 | U24OEX01AIG | Robotic Process Automation |
| 8 | U24OEX01AIH | Prompt Engineering for Generative AI |
| 9 | U24OEX01AII | MLOps Architecture for LLMs |
| 10 | U24OEX01AIZ | Any other course approved by BoS Chair and Dean AA |

(X) CSE (NETWORKS): CN-MOPEC BASKET

The following Courses will be offered by CSE(N) Department under MOPEC basket to the students of other branches:

| V/VII/VIII SEMESTER | | |
|----------------------------|-------------|--|
| 1 | U24OEX01CNA | Computer Networks |
| 2 | U24OEX01CNB | Cloud Computing |
| 3 | U24OEX01CNC | Block Chain Technologies |
| 4 | U24OEX01CND | Internetworks and Virtualization |
| 5 | U24OEX01CNE | Network Automation |
| 6 | U24OEX01CNF | Platforms and System Security |
| 7 | U24OEX01CNG | Data Centre Networking |
| 8 | U24OEX01CNH | Fundamentals of Cyber Security & Tools |
| 9 | U24OEX01CNI | SDN for real networks |
| 10 | U24OEX01CNZ | Any other course approved by BoS Chair and Dean AA |

(XI) CSE (IOT) : IN-MOPEC BASKET

The following Courses will be offered by CSE (IOT) Department under MOPEC basket to the students of other branches:

| V/VII/VIII SEMESTER | | |
|----------------------------|-------------|--|
| 1 | U24OEX01INA | Programming with IoT boards |
| 2 | U24OEX01INB | Python for IoT |
| 3 | U24OEX01INC | IoT Architecture and Protocols |
| 4 | U24OEX01IND | Artificial IoT |
| 5 | U24OEX01INE | IoT frameworks |
| 6 | U24OEX01INF | IIoT |
| 7 | U24OEX01ING | Cyber Physical Systems |
| 8 | U24OEX01INH | Privacy & Security for IoT |
| 9 | U24OEX01INI | Edge and fog computing |
| 10 | U24OEX01INZ | Any other course approved by BoS Chair and Dean AA |

(XII) MATHEMATICS: MT-MOPEC BASKET

The following Courses will be offered by M&H Department under MOPEC basket to the students of all branches:

| V/VII/VIII SEMESTER | | |
|----------------------------|-------------|---|
| 1 | U24OEX01MTA | Operations Research |
| 2 | U24OEX01MTB | Computational Number Theory |
| 3 | U24OEX01MTC | Integral Equations & Integral Transforms |
| 4 | U24OEX01MTD | Fuzzy Set Theory and Its Applications |
| 5 | U24OEX01MTE | Complex Analysis and Applications |
| 6 | U24OEX01MTF | Discrete Mathematics and Graph Theory |
| 7 | U24OEX01MTA | Partial Differential Equations and Applications |
| 8 | U24OEX01MTB | Probability Theory and Stochastic Processes |
| 9 | U24OEX01MTC | Descriptive Statistics with R software |
| 10 | U24OEX01MTD | Numerical Linear Algebra |
| 11 | U24OEX01MTE | Applied Linear Algebra in AI and ML |

| | | |
|----|-------------|--|
| 12 | U24OEX01MTF | Matrix Computation and Applications |
| 13 | U24OEX01MTA | Reliability Theory |
| 14 | U24OEX01MTB | Numerical Methods for Partial Differential Equations |
| 15 | U24OEX01MTZ | Any other course approved by BoS Chair and Dean AA |

(XIII) ENGLISH : EN-MOPEC BASKET

The following Courses will be offered by M&H Department under MOPEC basket to the students of all branches:

| V/VII/VIII SEMESTER | | |
|----------------------------|-------------|--|
| 1 | U24OEX01ENA | Creative Writing |
| 2 | U24OEX01ENB | Public Speaking |
| 3 | U24OEX01ENC | Conversational English |
| 4 | U24OEX01END | Exam Skills |
| 5 | U24OEX01ENE | English for Competitive Examinations |
| 6 | U24OEX01ENF | Comprehensive Reading |
| 7 | U24OEX01ENG | Corporate Writing |
| 8 | U24OEX01ENH | Scientific English |
| 9 | U24OEX01ENI | Foundation for IELTS/TOEFL |
| 10 | U24OEX01ENJ | Narrative Skills |
| 11 | U24OEX01ENK | Professional Writing |
| 12 | U24OEX01ENL | English Language Enhancement |
| 13 | U24OEX01ENZ | Any other course approved by BoS Chair and Dean AA |

(XIV) PHYSICS: PY-MOPEC BASKET

The following Courses will be offered by PS Department under MOPEC basket to the students of all branches:

| V/VII/VIII SEMESTER | | |
|----------------------------|-------------|---|
| 1 | U24OEX01PYA | Science and Technology of Non-Conventional Energy |
| 2 | U24OEX01PYB | Laser Systems for Industrial and Engineering Applications |
| 3 | U24OEX01PYC | Optical Fiber Communication |
| 4 | U24OEX01PYD | Nanomaterials |
| 5 | U24OEX01PYE | Fundamentals of Electromagnetism |
| 6 | U24OEX01PYF | Solid State Physics |
| 7 | U24OEX01PYG | Modern Materials |
| 8 | U24OEX01PYH | Experimental Physics |
| 9 | U24OEX01PYI | Thermodynamics |
| 10 | U24OEX01PYZ | Any other course approved by BoS Chair and Dean AA |

(XV) CHEMISTRY : CY-MOPEC BASKET

The following Courses will be offered by PS Department under MOPEC basket to the students of all branches:

| V/VII/VIII SEMESTER | | |
|----------------------------|-------------|-----------------------------------|
| 1 | U24OEX01CYA | Nano Bio-Technology |
| 2 | U24OEX01CYB | Computational Chemistry |
| 3 | U24OEX01CYC | Biosensors and Applications |
| 4 | U24OEX01CYD | Fundamentals of Quantum Chemistry |
| 5 | U24OEX01CYE | Stereochemistry |
| 6 | U24OEX01CYF | Advanced Polymer Chemistry |

| | | |
|----|-------------|--|
| 7 | U24OEX01CYG | Principles and Applications of NMR Spectroscopy |
| 8 | U24OEX01CYH | Organic Reaction Mechanisms |
| 9 | U24OEX01CYI | Basic Organic Chemistry |
| 10 | U24OEX01CHZ | Any other course approved by BoS Chair and Dean AA |

(XVI) COMMERCE & MANAGEMENT : CM-MOPEC BASKET

The following Courses will be offered by MBA Department under MOPEC basket to the students of all branches:

| V/VII/VIII SEMESTER | | |
|----------------------------|-------------|--|
| 1 | U24OEX01CMA | Principles of Accountancy |
| 2 | U24OEX01CMB | Finance for Engineers |
| 3 | U24OEX01CMC | Management Principles |
| 4 | U24OEX01CMD | Organizational Behavior |
| 5 | U24OEX01CME | Project Management |
| 6 | U24OEX01CMF | Operations Management |
| 7 | U24OEX01CMG | Consumer Psychology |
| 8 | U24OEX01CMH | Principles of Marketing Management |
| 9 | U24OEX01CMZ | Any other course approved by BoS Chair and Dean AA |

(XVII) LIBERAL ARTS* : LI-MOPEC BASKET

Students opting Liberal Art courses under MOPEC shall complete the courses through SWAYAM/ NPTEL or any other MOOCs platform:

| V/VII/VIII SEMESTER | | |
|----------------------------|-------------|--|
| 1 | U24OEX01LIA | Indian Language-I |
| 2 | U24OEX01LIB | Indian Language-II |
| 3 | U24OEX01LIC | Psychology for Well-Being |
| 4 | U24OEX01LID | Foreign Language-I |
| 5 | U24OEX01LIE | Foreign Language-II |
| 6 | U24OEX01LIF | Introduction to Indian Art -An Aprreciation |
| 7 | U24OEX01LIG | Drama Appreciation |
| 8 | U24OEX01LIH | Cultural Studies |
| 9 | U24OEX01LII | Film Appreciation |
| 10 | U24OEX01LIJ | Ethics in Engineering Practice |
| 11 | U24OEX01LIZ | Any other course approved by BoS Chair and Dean AA |

* Through MOOCs only

(XVIII) ARTS*: AR-MOPEC BASKET

Students opting Arts courses under MOPEC shall complete the courses through SWAYAM/ NPTEL or any other MOOCs platform:

| V/VII/VIII SEMESTER | | |
|----------------------------|-------------|-----------------------|
| 1 | U24OEX01ARA | Anthropolgy |
| 2 | U24OEX01ARB | Ancient India |
| 3 | U24OEX01ARC | Constitution of INDIA |
| 4 | U24OEX01ARD | Medieval India |
| 5 | U24OEX01ARE | Geography |
| 6 | U24OEX01ARF | Modern India |

| | | |
|---|-------------|--|
| 7 | U24OEX01ARG | Indian Polity |
| 8 | U24OEX01ARH | Indian Economy |
| 9 | U24OEX01ARZ | Any other course approved by BoS Chair and Dean AA |

* Through MOOCs only

(XIX) LAW*: LW-MOPEC BASKET

Students opting Laws courses under MOPEC shall complete the courses through SWAYAM / NPTEL or any other MOOCs platform:

| V/VII/VIII SEMESTER | | |
|----------------------------|-------------|--|
| 1 | U24OEX01LWA | Law for Engineers |
| 2 | U24OEX01LWB | Environmental Law |
| 3 | U24OEX01LWC | Labour Law |
| 4 | U24OEX01LWD | IPR and Patent Law |
| 5 | U24OEX01LWE | Industrial Law |
| 6 | U24OEX01LWF | Company Law |
| 7 | U24OEX01LWG | Administrative Law |
| 8 | U24OEX01LWH | Alternative Dispute Resolution |
| 9 | U24OEX01LWZ | Any other course approved by BoS Chair and Dean AA |

(XX) I²RE : IE-MOPEC BASKET

Students opting I²RE courses under MOPEC shall complete the courses through SWAYAM / NPTEL or any other MOOCs platform:

| V/VII/VIII SEMESTER | | |
|----------------------------|-------------|--|
| 1 | U24OEX01IEA | Understanding Incubation & Entrepreneurship |
| 2 | U24OEX01IEB | Innovation, Business Models & Entrepreneurship |
| 3 | U24OEX01IEC | Innovation & Startup Policy |
| 4 | U24OEX01IED | Entrepreneurship & IP Strategies |
| 5 | U24OEX01IEE | Digital Marketing Strategies |
| 6 | U24OEX01IEF | Leadership, Innovation and Entrepreneurship |
| 7 | U24OEX01IEG | Economics of Innovation |
| 8 | U24OEX01IEH | Strategic Management |
| 9 | U24OEX01IEI | Social Innovation in Industry 4.0 |
| 10 | U24OEX01IEJ | Design, Technology & Innovation |
| 11 | U24OEX01IEZ | Any other course approved by BoS Chair and Dean AA |



KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE

Opp : Yerragattu Gutta, Hasanparthy (Mandal), WARANGAL - 506 015, Telangana, INDIA.

काकतीय प्रौद्योगिकी एवं विज्ञान संस्थान, वरंगल - ५०६ ०१५ तेलंगाना, भारत

కాకతీయ సాంకేతిక విజ్ఞాన శాస్త్ర విద్యాలయం, వరంగల్ - ౫౦౬ ౦౧౫ తెలంగాణ, భారతదేశము

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DEPARTMENT OF INFORMATION TECHNOLOGY

PROGRAM ELECTIVE COURSES (PEC)

There are four slots allotted to Program Elective Courses (PECs).

Each major specialization of the B. Tech Programme is treated as a vertical.

PROGRAM ELECTIVE COURSES - VERTICALS

| VERTICAL/ PE | PE1 | PE2 | PE3 | PE4 |
|--|--|--|---|---|
| VERTICAL 1: Cyber Security | U24IT601A: Block Chain Technologies | U24IT702A: Distributed Computing and Cloud Security | U24IT802A: Ethical Hacking | U24IT803A: Computer Forensics |
| | (OR) | | | |
| | <i>Equivalent MOOC approved by BoS Chair and Dean AA</i> | | | |
| VERTICAL 2: Artificial Intelligence & Machine Learning | U24IT601B: Generative Artificial Intelligence | U24IT702B: Computer Vision & Image Processing | U24IT802B: Natural Language Processing | U24IT803B: Deep Learning |
| | (OR) | | | |
| | <i>Equivalent MOOC approved by BoS Chair and Dean AA</i> | | | |
| VERTICAL 3: Computer Networks | U24IT601C: Advanced Computer Networks | U24IT702C: Mobile Computing | U24IT802C: Adhoc Sensor Networks | U24IT803C: Wireless Networks |
| | (OR) | | | |
| | <i>Equivalent MOOC approved by BoS Chair and Dean AA</i> | | | |
| VERTICAL 4: High Performance Computing | U24IT601D: Parallel Programming | U24IT702D: High Performance Computing Architecture | U24IT802D: Fog & Edge Computing | U24IT803D: Augmented Reality & Virtual Reality |
| | (OR) | | | |
| | <i>Equivalent MOOC approved by BoS Chair and Dean AA</i> | | | |
| VERTICAL 5: Internet of Things | U24IT601E: Applications of IoT | U24IT702E: Industrial IoT | U24IT802E: Privacy and Security in IoT | U24IT803E: IoT Architectures and Protocols |
| | (OR) | | | |
| | <i>Equivalent MOOC approved by BoS Chair and Dean AA</i> | | | |

1st Semester Syllabus



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DEPARTMENT OF INFORMATION TECHNOLOGY

B. Tech (IT) -CURRICULUM & SYLLABUS (KITSW-URR24)

Abbreviations

| | | | |
|---|-----------------|---|---|
| L | Lecture Hours | O | Outside the Class Work (Self Study) Hours |
| T | Tutorial Hours | E | Total Engagement in Hours |
| P | Practical Hours | C | Credit Assigned |

I SEMESTER

| Sl. No. | Category | Course Code | Course Title | Lectures / week | | | | | Credits |
|---|----------|-------------------|--|-----------------|----------|----------|-----------|-----------|-----------|
| | | | | L | T | P | O | E | |
| - | IKSC | U24IK100 | AICTE Mandated Student Induction Programme (Universal Human Values - I) | | | | | - | |
| 1 | BSC | U24MH101 | Differential Calculus and Ordinary Differential Equations | 2 | 1 | - | 6 | 9 | 3 |
| 2 | BSC | U24CY102B | Engineering Chemistry (Common to CSM, CSD, CSN, CSO & IT) | 2 | 1 | 2 | 5 | 10 | 4 |
| 3 | ESC | U24IT103 | Digital Logic Design | 2 | 1 | - | 4 | 7 | 3 |
| 4 | PCC | U24IT104 | Programming for Problem Solving with C | 2 | 1 | 2 | 5 | 10 | 4 |
| 5 | HSMC | U24MH105 | English Communication and Report Writing | 2 | - | - | 3 | 5 | 2 |
| 6 | VAC | U24VA106 | Sports & Yoga | - | - | 2 | 2 | 4 | - |
| 7 | ESC | U24ME107 | Engineering Graphics through CAD | - | - | 2 | 2 | 4 | 1 |
| 8 | ELC | U24EL108 | Practicum - 1 | - | - | - | 4 | 4 | 1 |
| 9 | VAC | U24VA109 XXXXX | SEA - I/ SAA-1 | - | - | - | 2 | 2 | 1 |
| 10 | AEC | U24AE110 | Expert Talk Series-1 | - | - | - | 1 | 1 | 1 |
| Total: | | | | 10 | 4 | 8 | 34 | 56 | 20 |
| Summer/ Inter-sem Bridge Courses (Approved by BoS and Dean,AA): 1 week to 10 days: 1 credit to each Bridge course under additional learning (will be printed on grade sheet) | | | | | | | | | |

DIFFERENTIAL CALCULUS AND ORDINARY DIFFERENTIAL EQUATIONS

| | | | |
|---|------------------|---------------------------------------|-------------|
| Class: B.Tech. I -Semester | | Branch: Common to all branches | |
| Course Code: | U24MH101 | Credits: | 3 |
| Hours/Week (L-T-P-O-E): | 2-1-0-6-9 | CIE: | 60 % |
| Total Number of Teaching Hours: | 36 Hrs | ESE: | 40 % |
| Course Learning Objectives (LOs): | | | |
| <i>This course will develop students' knowledge in /on...</i> | | | |
| LO1: convergence of an infinite series and differential calculus | | | |
| LO2: partial differentiation and its applications | | | |
| LO3: differential equations of first order and first degree along with certain applications | | | |
| LO4: higher order linear differential equations and applications | | | |
| UNIT-I | | 9 Hrs | |
| Infinite Series: Sequences, Series, General properties of series, Series of positive terms, Comparison tests-Limit form, Integral test, D'Alembert's Ratio test, Cauchy's root test | | | |
| Differential Calculus and its applications: Fundamental theorems-Rolle's theorem (Geometrical interpretation), Lagrange's mean value theorem (Geometrical interpretation), Cauchy's mean value theorem, Taylor's theorem (Generalized mean value theorem), Expansions of functions- Maclaurin's series, Taylor's series, Maxima and Minima-Conditions, Practical problems (rectangle, right circular cylinder, cone) | | | |
| Self-Learning Topics (SLTs): <i>Review of basic concepts of limit, continuity and differentiability [Reference 1: topic (3.1,3.2,3.5,4.1)]</i> | | | |
| <i>Alternating series [(Text 1: topic 9.12, Solved problems: 9.16,9.17, Practice problems: exercise 9.7(1, 7)]</i> | | | |
| <i>Additional problems on fundamental theorems [(Text 1: topic 4.3, Solved problems: 4.13(i),4.14,4.17, Practice problems: exercise 4.4 (1(i),1(ii), 3(ii), 10(i), 10(ii))]</i> | | | |
| <i>Additional problems on Maclaurin's series [(Text 1: topic 4.4, Solved problems: 4.20, Practice problems: exercise 4.5 (3, 5)]</i> | | | |
| UNIT-II | | 9 Hrs | |
| Partial differentiation and its applications: Functions of two or more variables, Partial derivatives, Total derivative, Change of variables, Jacobians, Functional relationship, Geometrical Interpretation-Tangent plane and Normal to a surface, Taylor's theorem for function of two variables (without proof), Errors and approximations, Total differential, Maxima and minima of functions of two variables, Lagrange's method of undetermined multipliers, Differentiation under the integral sign | | | |
| Self-Learning Topics (SLTs): | | | |
| <i>Leibnitz rule of Differentiation under the integral sign for variable limits [(Text 1: topic 5.13(2)), Solved problems: 5.54, Practice problems: exercise 5.11 (1)]</i> | | | |
| <i>Additional problems on maxima and minima of function of two variables [(Text 1: topic 5.11 (1), Solved problems: 5.42, 5.43, Practice problems: exercise 5.10 (1(i),1(ii),1(iii))].</i> | | | |
| <i>Additional problems on Lagrange's methods of undetermined multipliers [(Text 1: topic (5.12), Solved problems: 5.45, 5.48, Practice problems: exercise 5.10 (3(i) ,3(ii))]</i> | | | |

| UNIT-III | 9 Hrs |
|--|-------|
| <p>Differential equations of first order (DE): Reorientation of differential equation of first order and first degree (Formation a differential equation, variables separable method, homogeneous equations, Linear equations), Exact differential equations, Equations reducible to exact equations,</p> <p>Applications of differential equations of first order: Orthogonal trajectories - Orthogonal trajectories of the family of curves $f(x, y, c)=0$, Physical applications-Motion of a boat across a stream, Resisted motion, Velocity of escape from the earth, Simple electric circuits - RL series circuit, Newton's law of cooling, Rate of decay of Radio-active materials, Rate of growth of population</p> <p>Self-Learning Topics (SLTs): Review of DEs of first order (Text 1: topic 11.1, 11.2, 11.3, 11.4,11.5) Solutions of Non-exact DEs by Inspection Method [(Text 1: topic 11.12(1), Solved Problems: 11.30, Practice problems: exercise 11.8 (1,3))] Additional problems on Non-exact DEs [(Text 1: topic 11.12(2,3,4,5), Solved problems: 11.33,11.35,11.36, Practice problems: exercise 11.8 (9,15))] Orthogonal Trajectories of family of curves in polar coordinates [(Text 1: topic 12.3(3), Solved problems :12.7,12.8 , Practice problems: exercise 12.2(9,10))]</p> | |
| UNIT-IV | 9 Hrs |
| <p>Linear differential equations: Linear differential equations with constant coefficients, Rules for finding complementary function, Inverse operator, Rules for finding the particular integral ($Q=e^{ax}$, $\sin(ax+b)$ or $\cos(ax+b)$, x^m and $e^{ax}V(x)$), Method of variation of parameters, Linear dependence of solutions</p> <p>Applications of linear differential equations: Simple harmonic motion, Simple pendulum, Oscillations of spring, Oscillatory electrical circuit-LCR circuit, Electro-mechanical analog</p> <p>Self-Learning Topics (SLTs): Finding the particular integral of $Q(x) = X^m V(x)$ $X^m V(x)$ [(Text 1: topic 13.7, Solved problems: 13.16,13.17,13.19, Practice problems: exercise 13.2 (21,22))]. Additional problems on method of variation of parameters [(Text 1: topic 13.8(1), Solved problems: 13.25, 13.26, Practice problems: exercise 13.3(1,5))] Cauchy's homogeneous linear differential equation [(Text 1: topic 13.9(1), Solved problems: 13.31,13.34, Practice problems: exercise 13.4(3,6,9))]</p> | |
| <p>Course Learning Outcomes (COs): After completion of this course, the students should be able to,</p> <p>CO1: examine the convergence of a series and interpret mean value theorems.</p> <p>CO2: apply partial differentiation to functions of several variables in solving various engineering problems.</p> <p>CO3: apply appropriate methods of differential equations of first order and first degree to solve real life engineering problems.</p> <p>CO4: analyze the solutions of higher order linear differential equation with constant coefficients</p> | |

Textbook(s):

1. Grewal, B.S., *Higher Engineering Mathematics*, Khanna Publishers, Delhi, 44th edition, 2017

Reference Book(s):

1. Shanti Narayan, Dr. Mittal P.K, *Differential Calculus*, S. Chand & Co., New Delhi, 1st edition, Reprint 2014
2. Kreyszig E, *Advanced Engineering Mathematics*, Inc, U.K, John Wiley & sons, 10th edition, 2020
3. S.S. Sastry, *Engineering Mathematics, Vol.II*, Prentice Hall of India, 3rd edition, 2014.

Web and Video link(s):

1. <https://youtu.be/4EYko9rdF7g?si=WUu12> NPTEL Video Lecture on Infinite series by Prof. S.K.Ray, Professor of Mathematics, IITK Kanpur.
2. https://youtu.be/0apMXhWG_W8?si=M-abw2Gq3buX5HLM NPTEL Video Lecture on Fundamental mean value theorems by Prof. Jithendra Kumar, Professor of Mathematics, IITK Kharagpur.
3. <https://youtu.be/6r5jft8xrXM?si=ryLXYVJr4-iUkdIV>; NPTEL Video Lecture on Exact Differential Equations, Prof. Jithendra Kumar, Professor of Mathematics, IIT Kharagpur.
4. https://youtu.be/kbGhrqV9AOM?si=yGyK_V7kJKGa3OaR NPTEL Video Lecture on Orthogonal Trajectories of family of curves by Prof. Aditya Sharma, Professor of Physics, IISE Bhopal.
5. <https://youtu.be/btOCUmJkrrg?si=zq3nB00kplm7b5se>; NPTEL Video Lecture on Higher Order Linear Differential Equations, Prof. Jithendra Kumar, Professor of Mathematics, IIT Kharagpur.

| Course Articulation Matrix (CAM): | | U24MH101 - DIFFERENTIAL CALCULUS AND ORDINARY DIFFERENTIAL EQUATIONS | | | | | | | | | | | | | |
|-----------------------------------|------------|--|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
| CO1 | U24MH101.1 | 2 | 2 | 1 | 1 | - | - | - | 1 | - | 1 | - | 1 | 1 | - |
| CO2 | U24MH101.2 | 2 | 2 | 1 | 1 | - | - | - | 1 | - | 1 | - | 1 | 1 | - |
| CO3 | U24MH101.3 | 2 | 2 | 1 | 1 | - | - | - | 1 | - | 1 | - | 1 | 1 | - |
| CO4 | U24MH101.4 | 2 | 2 | 1 | 1 | - | - | - | 1 | - | 1 | - | 1 | 1 | - |
| U24MH101 | | 2 | 2 | 1 | 1 | - | - | - | 1 | - | 1 | - | 1 | 1 | - |
| 3 - HIGH, 2 - MEDIUM, 1 - LOW | | | | | | | | | | | | | | | |

ENGINEERING CHEMISTRY

(Common to CSM, CSD, CSN, CSO & IT)

| | | | |
|--|--------------|--|--------|
| Class: B.Tech. I Semester | | Branches: CSM, CSD, CSN, CSO & IT | |
| Course Code | : U24CY102B | Credits | : 4 |
| Hours/Week (L-T-P-O-E) | : 2-1-2-5-10 | CIE | : 60 % |
| Total Number of Teaching Hours | : 60 Hrs | ESE | : 40 % |
| Course Learning Objectives (LOs) : | | | |
| <i>This course will develop students' knowledge in /on...</i> | | | |
| LO1: electrochemical energy systems, batteries and fuel cells | | | |
| LO2: water analysis and corrosion with its preventive methods | | | |
| LO3: engineering materials and spectroscopic techniques of chemical analysis | | | |
| LO4: polymers, principles of green chemistry and their applications | | | |
| THEORY COMPONENT | | | |
| UNIT-I | | 9 Hrs | |
| <p>Electrochemical Technology and Engineering: Introduction, Specific conductance, Equivalent conductance, Effect of dilution; Conductometric titrations-Acid base titrations-Strong acid vs strong base, Strong acid vs weak base, Weak acid vs strong base, Weak acid vs weak base, Advantages of conductometric titrations; Galvanic cell, Electrodepotential, Electrochemical series, Nernst equation; Potentiometric titrations-Acidbase titrations and advantages of potentiometric titrations</p> <p>Batteries: Classification, Lead-acid battery, Li-ion battery</p> <p>Fuel cells: Hydrogen-oxygen fuel cell</p> <p><i>Self Learning Topics (SLTs):</i> Types of conductors (Text 1: Jain & Jain: chapter 5 topic 1), Ohms law (Text 1: Jain & Jain: chapter 5 topic 5)</p> | | | |
| UNIT-II | | 9 Hrs | |
| <p>Applied Chemistry:</p> <p>Water Technology: Introduction, Hardness of water, Estimation of hardness of water by complexometry, Alkalinity, Determination of alkalinity, Numerical problems. Determination of dissolved oxygen (DO), Biochemical oxygen demand (BOD), Chemical oxygen demand (COD), Softening methods-Ion exchange method, Desalination processes, Reverse osmosis; Quality parameters of potable water (BIS and WHO)</p> <p>Corrosion: Introduction, Dry corrosion, Pilling-Bedworth rule, Wet corrosion; Factors effecting corrosion-Purity of the metal, Relative areas of anodic and cathodic parts, Nature of surface film, Humidity, pH and Temperature; Prevention methods of corrosion-Cathodic protection- Impressed current cathodic protection, Sacrificial anodic protection</p> <p><i>Self Learning Topics (SLTs):</i> Units of hardness (Text 1: Jain & Jain chapter 1 topic 5), Introduction to corrosion (Text 1: Jain & Jain: chapter 7 topic 1)</p> | | | |
| UNIT-III | | 9 Hrs | |
| <p>Engineering Materials: Nanomaterials-Introduction, Synthesis of nanomaterials-Top down and bottom-up approaches, Synthesis by sol-gel method; Nanoscale materials-Fullerenes, Carbon nanotubes and Graphene, Properties and applications, Biosensors</p> | | | |

Spectroscopy: Introduction to spectroscopy, Microwave spectroscopy-Principle, Selection rules, Applications; Infra-red spectroscopy-Principle, Selection rules, Applications; UV Spectroscopy-Lambert-Beer's law and its applications

Self Learning Topics (SLTs): Introduction to nanotechnology (Text 1: Jain & Jain:chapter 37 topic 1), Electromagnetic spectrum (Text 1: Jain & Jain; chapter 35 topic 1)

UNIT-IV

9 Hrs

Polymers: Introduction, Monomer, Polymer, Types of polymerization reactions-Addition and condensation; Preparation, Properties and Applications-Polythene, Polyvinyl cyanide, Polyvinyl chloride, Bakelite, Nylon 6:6; Thermosetting resins and thermoplastic resins; Conducting polymers and their applications

Green Chemistry: Principles of green chemistry, Synthesis of adipic acid by traditional pathway and green pathway; Green methods in electronic production, Impact of electronic waste on environment and public health

Self Learning Topics (SLTs): Mechanism of addition polymerization (Text 1: Jain & Jain: chapter 3, topic 6); Alternative solvents for green synthesis ((Text 2: Jain & Jain: chapter 36, topic 5)

LABORATORY COMPONENT

List of Experiments

1. Estimation of hydroxide ion by acidimetry using standard sodium carbonate solution
2. Estimation of alkalinity of water sample containing (i) carbonate; (ii) carbonate & bicarbonate in ground water
3. Estimation of alkalinity of water sample containing (i) bicarbonate; (ii) carbonate & hydroxide in potable water
4. Determination of hardness of water by complexometric method
5. Determination of dissolved oxygen in a sample of water
6. Standardization of sodium hydroxide (NaOH) by conductometry using standard hydrochloric acid (HCl)
7. Standardization of acetic acid (CH₃COOH) by conductometry using standard sodium hydroxide (NaOH)
8. Standardization of strong acid hydrochloric acid (HCl) by potentiometry using standard sodium hydroxide (NaOH)
9. Colorimetric analysis-verification of Lambert-Beer's law
10. Estimation of ferrous (Fe²⁺) ion in the given solution using potassium permanganate
11. Preparation of nanoparticles of cadmium sulphide (CdS)
12. Synthesis of polymer (phenol- formaldehyde)

Text Book(s):

1. Jain and Jain, *Engineering Chemistry*, Dhanpat Rai Publishing Company, 17th edition, 2019 (Chapters 1, 3, 5, 6, 7, 35, 36, 37)
2. Dornfeld, D.A., *Green manufacturing: fundamentals and applications*, Springer Science & Business Media, 2012 (Chapters 5, 8, 9)

Reference Book(s):

1. J.C.Kuriacose and J.Rajaram, *Chemistry in Engineering and Technology* (vol.I), Tata McGraw Hills Education Pvt. Ltd., 2010
2. Shashi Chawla, *Text book of Engineering Chemistry*, Dhanpat Rai Publishers, 3rd edition, 2003
3. S.S. Dara, S.S. Umare, *A Text book of Engineering Chemistry*, S.Chand & Company Ltd., 12th edition, 2010

Web and Video link(s):

<https://elearn.nptel.ac.in/shop/iit-workshops/completed/battery-cell-technology-materials-and-industrial-applications/?v=c86ee0d9d7ed> NPTEL Video Lecture on Battery technology by Dr. Kothandaraman, Professor of Chemistry, IIT Madras & Dr. Raghunathan, Professor of Chemical engineering, IIT Madras

Laboratory Manual (for laboratory component):

1. *Engineering Chemistry Laboratory Manual and Record Book*, Department of PS, KITSW

Course Learning Outcomes (COs)

After completion of this course, the students should be able to...

(based on cognitive skills acquired from theory component)

CO1: apply the concepts of electrochemical energy systems for batteries and fuel cells

CO2: interpret suitable techniques of water analysis and corrosion treatment of solid materials

CO3: apprise manufacturing of engineering materials and spectroscopic techniques of chemical analysis

CO4: apprise the synthesis, applications of engineering materials and principles of green chemistry

(based on psychomotor skills acquired from laboratory component)

CO5: determine water quality parameters-alkalinity, hardness

CO6: make use of analytical instruments for chemical analysis

CO7: determine metals present in their ores

CO8: design the synthesis of nanomaterial and polymer

| Course Articulation Matrix (CAM): | | U24CY102B - ENGINEERING CHEMISTRY (Common to CSM, CSD, CSN, CSO & IT) | | | | | | | | | | | | | |
|-----------------------------------|-------------|--|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
| CO1 | U24CY102B.1 | 2 | - | - | - | 1 | 1 | 1 | 1 | - | 1 | - | 1 | - | - |
| CO2 | U24CY102B.2 | 2 | - | - | - | 1 | 1 | 1 | 1 | - | 1 | - | 1 | - | - |
| CO3 | U24CY102B.3 | 2 | - | - | - | 1 | 1 | - | 1 | - | 1 | - | 1 | - | - |
| CO4 | U24CY102B.4 | 2 | - | - | - | 1 | 2 | 2 | 1 | - | 1 | - | 1 | - | - |
| CO5 | U24CY102B.5 | 2 | 1 | - | - | - | 1 | - | 1 | - | 1 | - | 1 | - | - |
| CO6 | U24CY102B.6 | 2 | 1 | - | - | 2 | 1 | - | 1 | - | 1 | - | 1 | - | - |
| CO7 | U24CY102B.7 | 2 | 1 | - | - | - | 1 | - | 1 | - | 1 | - | 1 | - | - |
| CO8 | U24CY102B.8 | 2 | 1 | - | - | - | 1 | - | 1 | - | 1 | - | 1 | - | - |
| U24CY102B | | 2.00 | 1.00 | - | - | 1.20 | 1.12 | 1.33 | 1.00 | - | 1.00 | - | 1.00 | - | - |
| 3 - HIGH, 2 - MEDIUM, 1 - LOW | | | | | | | | | | | | | | | |

DIGITAL LOGIC DESIGN

| | | | |
|--|------------------|-------------------|--------------|
| Class: B.Tech. I -Semester | | Branch: IT | |
| Course Code : | U24IT103 | Credits : | 3 |
| Hours/Week (L-T-P-O-E) : | 2-1-0-4-7 | CIE : | 60 % |
| Total Number of Teaching Hours : | 36 Hrs | ESE : | 40 % |
| Course Learning Objectives (LOs): | | | |
| <i>This course will develop students' knowledge in /on...</i> | | | |
| LO1: number systems & binary codes, binary arithmetic | | | |
| LO2: boolean algebra and logic gates, gate level minimization | | | |
| LO3: combinational circuits design, logic gates & adders and subtractors | | | |
| LO4: sequential circuits design, flip flops, registers and counters | | | |
| UNIT-I | | | 9 Hrs |
| <p>Number Systems and Codes: Review of number systems, Number-Base conversions, Octal and Hexadecimal numbers, Complements of numbers, Signed binary numbers, Binary codes, Binary weighted and non-weighted codes, Error detecting and error correcting codes, Binary Arithmetic: Addition, Subtraction, Multiplication-Long hand multiplication, Booth multiplication, Fast multiplication, Division-Restoring integer division, Non-Restoring integer division</p> <p><i>Self Learning Topics (SLTs): Binary storage and registers (Text1: topics 1.8), Arithmetic operations on floating-point numbers (Text2: topic 9.7.1), Practice Problems (Text1: Prob 1.3, Prob 1.7, Prob 1.9 to 1.21)</i></p> | | | |
| UNIT-II | | | 9 Hrs |
| <p>Boolean Algebra and Logic Gates: Basic definitions, Axiomatic definition of boolean algebra, Basic theorems and properties of boolean algebra, Boolean functions, Canonical and standard forms, Other logic operations, Digital logic gates</p> <p>Gate Level Minimization: The map method, Four-variable K-Map, Minimization using K-Map, Quine Mc'Clusky method</p> <p><i>Self Learning Topics (SLTs): Basic theorems and properties of boolean algebra (Text1: topic 2.4), Practice Problems (Text1: Prob 2.1 to 2.4, Prob 2.13, Prob 2.19 to 2.22, Prob 3.1 to 3.7)</i></p> | | | |
| UNIT-III | | | 9 Hrs |
| <p>Design of Combinational Circuits: Combinational circuits, Analysis procedure, Design procedure, Binary adder-subtractor, Decimal adder, Magnitude comparator, Decoders, Encoders, Multiplexer, Realization of switching functions using multiplexers and decoders</p> <p><i>Self Learning Topics (SLTs): Design of code converters (Reference1: topic 7.12), Expansion of decoders (Reference1: topic 7.16), BCD to 7-Segment Decoders (Reference1: topic 7.17), Expansion of MUXs (Reference1: topic 7.22)</i></p> | | | |
| UNIT-IV | | | 9 Hrs |
| <p>Sequential Circuits: Sequential circuits, Storage elements-Latches, Flip-Flops: SR flip flop, JK flip flop, D flip flop, T flip flop and Master-slave flip flop, Analysis of clocked sequential circuits, Registers, Shift registers, Ripple counters, Synchronous counters, Ring counter, Johnson counter</p> <p><i>Self Learning Topics (SLTs): Conversion of flip flops (Reference1: topic 8.8)</i></p> | | | |

Course Learning Outcomes (COs)

After completion of this course, the students should be able to,

- CO1:** solve number base conversion problems and perform binary arithmetic
CO2: apply minimization techniques to minimize boolean algebraic expression
CO3: construct combinational circuits using logic gates and adders & subtractors
CO4: build the sequential circuits using flip flops and logic gates

Text Book(s):

1. Morris Mano M and Michael Ciletti D., *Digital Design with an Introduction to the Verilog HDL*, Pearson, England, 5th edition, 2013 (Chapters 1,2,3,4,5,6)
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, *Computer Organization and Embedded Systems*, McGraw-Hill Education, New York, 6th edition, 2012 (Chapter 9)

Reference Book(s):

1. Anand Kumar A., *Switching Theory & Logic Design*, Prentice Hall of India, New Delhi, 1st edition, 2014
2. Kharate G.K., *Digital Electronics*, Oxford University Press, Hyderabad, India, 1st edition, 2012
3. Jain R.P., *Modern Digital Electronics*, Tata McGraw-Hill, India, 4th edition, 2010
4. Samuel. C. Lee and Sonde B.S, *Digital Circuits & Logic Design*, Prentice Hall of India, New Delhi, 1st edition, 1976

Web and Video link(s):

1. https://onlinecourses.nptel.ac.in/noc24_ee147/course; NPTEL Video Lecture on Digital Circuits by Prof. Santanu Chattopadhyay, Professor of E&ECE, IIT Kharagpur
2. https://onlinecourses.nptel.ac.in/noc21_ee10/preview; NPTEL Video Lecture on Digital Electronic Circuits by Prof. Goutham Saha, Professor of E&ECE, IIT Kharagpur

| Course Articulation Matrix (CAM): | | U24IT103 - DIGITAL LOGIC DESIGN | | | | | | | | | | | | | |
|-----------------------------------|------------|---------------------------------|----|-----|-----|----|----|----|----|----|----|----|----|-----|-----|
| CO | | PO | PO | PO | PO | PO | PO | PO | PO | PO | PO | PO | PO | PSO | PSO |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| CO1 | U24IT103.1 | 2 | 2 | 1 | - | - | - | - | 1 | - | 1 | - | 1 | 1 | - |
| CO2 | U24IT103.2 | 2 | 2 | 1 | - | - | - | - | 1 | - | 1 | - | 1 | 1 | - |
| CO3 | U24IT103.3 | 2 | 2 | 2 | 1 | - | - | - | 1 | - | 1 | - | 1 | 1 | - |
| CO4 | U24IT103.4 | 2 | 2 | 2 | 2 | - | - | - | 1 | - | 1 | - | 1 | 1 | - |
| U24IT103 | | 2 | 2 | 1.5 | 1.5 | - | - | - | 1 | - | 1 | - | 1 | 1 | - |
| 3 - HIGH, 2 - MEDIUM, 1 - LOW | | | | | | | | | | | | | | | |

PROGRAMMING FOR PROBLEM SOLVING WITH C

| | | | |
|---------------------------------------|--------------|-------------------|--------|
| Class: B.Tech. I -Semester | | Branch: IT | |
| Course Code | : U24IT104 | Credits | : 4 |
| Hours/Week (L-T-P-O-E) | : 2-1-2-5-10 | CIE | : 60 % |
| Total Number of Teaching Hours | : 60 Hrs | ESE | : 40 % |

Course Learning Objectives (LOs) :

This course will develop students' knowledge in /on...

LO1: algorithms, flow charts and develop programs with basic constructs

LO2: control structures and array operations

LO3: string operations and modular programming concepts with functions and recursion

LO4: structures, unions, pointers and files in C programming

THEORY COMPONENT

UNIT-I

9 Hrs

Introduction to Programming: Art of programming through algorithms and flowcharts

Overview of C: History of C, Importance of C, Basic structure of C programs

Constants, Variables and Data Types: Character set, C tokens, Declaration of variables, Defining symbolic constants

Managing Input and Output Operations: Reading a character, Writing a character, Formatted input, Formatted output

Operators and Expressions: Arithmetic, Relational, Increment, Decrement, Conditional, Logical, Bit-wise, Special operators, Arithmetic expressions, Evaluation of expressions, Operator precedence and associativity

***Self Learning Topics (SLTs):** Components of a computer, concept of hardware and software (Text1: chapter 1), Executing a C program (Text1: chapter 2), Type conversions in expression (Text1: chapter 4) Solved problems (Text1: chapter 2 to chapter 5), Review questions, debugging exercises, programming exercises, interview questions (Text1: chapter 2 to chapter 5)*

UNIT-II

9 Hrs

Decision Making and Branching: Simple if statement, if-else statement, Nesting of if-else statements, else if ladder, switch statement, Conditional operator, goto statement

Decision Making and Looping: while statement, do-while statement, for statement, Nested loops, Jumps in loops

Arrays: One-dimensional arrays, Declaration of one-dimensional arrays, Initialization of one-dimensional arrays, Linear search, Two-dimensional arrays, Initializing two dimensional arrays, Multi-dimensional arrays

***Self Learning Topics (SLTs):** Concise test expressions (Text1: chapter 7) Dynamic arrays (Text1: chapter 8), Solved problems (Text1: chapter 6 to chapter 8), Review questions, debugging exercises, programming exercises, interview questions (Text1: chapter 6 to chapter 8)*

UNIT-III

9 Hrs

Character Arrays and Strings: Declaring and initializing string variable, Reading strings from terminal, Writing strings to screen, String handling functions, Table of strings

Modular Programming with User Defined Functions: Need for user-defined functions, Elements of user-defined functions, Definition of functions, Return values and their types, Function calls, Function declaration, Category of functions, Recursion, The scope, visibility and lifetime of variables (storage classes)

Self Learning Topics (SLTs): Arithmetic operations on characters, comparison of strings (Text1: chapter 9), Nesting of functions, (Text1: chapter 10), Solved problems (Text1: chapter 9 & chapter 10), Review questions, debugging exercises, programming exercises, interview questions (Text1: chapter 9 & chapter 10).

UNIT-IV

9 Hrs

Structures and Unions: Defining a structure, Declaring and initializing structure variables, Accessing structure members, Array of structures, Structures within structures, Unions

Pointers: Understanding pointers, Declaring and initializing pointer variables, Pointer expressions, Pointers and arrays, Pointers and character strings, Pointers to functions, Pointers and structures

File Management in C: Defining and opening a file, Closing a file, Input and output operations on sequential text files

Self Learning Topics (SLTs): Operations on individual members (Text1: chapter 11), Chain of pointers, array of pointers (Text1: chapter 12), Random access to files, Command line arguments (Text1: chapter 13). Solved problems (Text1: chapter 11 to chapter 13), Review questions, debugging exercises, programming exercises, interview questions (Text1: chapter 11 to chapter 13).

LABORATORY COMPONENT

List of Experiments

1. Programs using input output functions, operators (arithmetic, relational and conditional)
2. Programs using operators (bit-wise, logical, increment and decrement)
3. Programs using conditional control structures: if, if-else, nested if
4. Programs using else if ladder, switch and goto statements
5. Programs using loop control structures: while
6. Programs using loop control structures: do-while and for
7. Programs on one dimensional array and two-dimensional arrays
8. Programs on String operations and string handling functions
9. Programs on different types of functions, parameter passing using call-by-value & call-by-address, recursion and storage classes
10. Programs using structures, unions, pointers to arrays and pointers to strings
11. Programs using array of pointers and pointers to structures
12. Programs on File operations and file handling functions for sequential text files

Text Book:

1. Balagurusamy.E, *Programming in ANSI C*, McGraw Hill, 8th edition, 2022

Reference Book(s):

1. Paul Deitel, Harvey Deitel, *C How to Program: With Case Studies Introducing Applications Programming and Systems Programming*, Pearson Education Limited, 9th edition, 2022
2. Brian W. Kernighan and Dennis Ritchie, *The C Programming Language*, Pearson Education India, 2nd edition, 2015
3. Reema Thareja, *Programming in C*, Oxford University Press, 3rd edition, 2023
4. Yashavant Kanetkar, *Let Us C*, BPB Publications, 19th edition, 2022
5. A.K.Sharma, *Computer Fundamentals and Programming in C*, Universities Press, 2nd edition, 2018

Web and Video link(s):

1. <https://nptel.ac.in/courses/106105171> NPTEL Video Lecture on Problem Solving through Programming in C by Prof. Anupam Basu, Professor of CSE, IIT Kharagpur.
2. <https://nptel.ac.in/courses/106104128> NPTEL Video Lecture on Introduction to Programming in C by Prof. Satyadev Nandakumar, Professor of CSE, IIT Kanpur

Laboratory Manual (for laboratory component):

1. *Programming for Problem Solving with C Laboratory Manual and Record Book*, Department of IT, KITSW.

Course Learning Outcomes (COs):

After completion of this course, the students should be able to,

(based on cognitive skills acquired from theory component)

CO1: enumerate programming development steps, design an algorithm and draw a flow chart for a given application

CO2: apply logical skills for problem solving using control structures and arrays

CO3: develop string operations and modular programming with functions

CO4: analyse and implement structures, unions, pointers and files in C programming

(based on psychomotor skills acquired from laboratory component)

CO5: develop programs using operators and decision making statements

CO6: apply loops and arrays to develop a program of an application

CO7: implement string operations and develop modular programs using user-defined functions, recursion, and storage classes.

CO8: develop programs using structures, unions, pointers and files

| Course Articulation Matrix (CAM): | | U24IT104: PROGRAMMING FOR PROBLEM SOLVING WITH C | | | | | | | | | | | | | |
|-----------------------------------|------------|--|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
| CO1 | U24IT104.1 | 2 | 1 | 1 | 1 | - | - | - | 1 | - | 1 | - | 2 | 1 | 2 |
| CO2 | U24IT104.2 | 2 | 2 | 2 | 1 | - | - | - | 1 | - | 1 | - | 2 | 2 | 2 |
| CO3 | U24IT104.3 | 2 | 2 | 3 | 1 | - | - | - | 1 | - | 1 | - | 2 | 2 | 2 |
| CO4 | U24IT104.4 | 2 | 2 | 3 | 2 | - | - | - | 1 | - | 1 | - | 2 | 2 | 2 |
| CO5 | U24IT104.5 | 1 | 1 | 1 | 1 | 1 | - | - | 1 | 1 | 1 | - | 2 | 1 | 2 |
| CO6 | U24IT104.6 | 1 | 2 | 2 | 2 | 1 | - | - | 1 | 1 | 1 | - | 2 | 2 | 2 |
| CO7 | U24IT104.7 | 1 | 2 | 3 | 2 | 1 | - | - | 1 | 1 | 1 | - | 2 | 2 | 2 |
| CO8 | U24IT104.8 | 1 | 2 | 3 | 2 | 1 | - | - | 1 | 1 | 1 | - | 2 | 2 | 2 |
| U24IT104 | | 1.5 | 1.75 | 2.25 | 1.5 | 1 | - | - | 1 | 1 | 1 | - | 1 | 1.75 | 2 |

ENGLISH COMMUNICATION AND REPORT WRITING

| | | | |
|---|--------------------|---------------------------------------|---------------|
| Class: B.Tech. I-Semester | | Branch: Common to all branches | |
| Course Code | : U24MH105 | Credits | : 2 |
| Hours/Week(L-T-P-O-E) | : 2-0-0-3-5 | CIE | : 60 % |
| Total Number of Teaching Hours | : 36 Hrs | ESE | : 40 % |
| Course Learning Objectives (LOs): | | | |
| <i>This course will develop students' knowledge in/on...</i> | | | |
| LO1: basic grammar principles, reading speed, forming new words, making coherent paragraphs and also promoting ethical values for meaningful life. | | | |
| LO2: speaking or writing correct sentences, writing effective letters and improving their self-worth. | | | |
| LO3: critical reading ability, writing conclusive reports and additionally inculcating positive thinking. | | | |
| LO4: a bridging varieties of lengthy texts and maintaining emotional balance. | | | |
| UNIT-I | | | 9Hrs |
| GRAMMAR | | | |
| <ul style="list-style-type: none"> • Tenses-Structures-usage-examples-exercises for practice • Sentence Correction-Correct use of Tenses, Verb forms, Punctuation. | | | |
| VOCABULARY | | | |
| <ul style="list-style-type: none"> • Word formation: Prefixes-Suffixes-Sentence Formation with newly formed words | | | |
| READING SKILL | | | |
| <ul style="list-style-type: none"> • Definition-Sub skills of Reading-Emphasis on Skimming-Purpose-How to skim through the text-Examples, Exercises for practice | | | |
| WRITING PRACTICES | | | |
| <ul style="list-style-type: none"> • Paragraph Writing-Definition-Organizing Principles of paragraphs-Making a paragraph through hints/graphs and pictures-Coherence-Linking Devices-Systematic Development of Ideas • Paraphrasing-Précising lengthy expressions for clarity and brevity | | | |
| LIFE SKILLS: | | | |
| <ul style="list-style-type: none"> • Ethical Values and Humanity • The Last Leaf: A Short Story by O.Henry | | | |
| Self Learning Topics (SLTs): | | | |
| <i>Articles - (Text2, Unit-II),English Vocabulary (Text2, Unit-I, Unit-II, Unit-III) Verb Forms(Refer1, Topic: 31),Tenses(Refer1, Topics: 16,17,18,19) Reported Speech (Reference book 2, Exercises for Practice, Topics : 161-167)</i> | | | |
| UNIT-II | | | 9 Hrs |
| GRAMMAR | | | |
| <ul style="list-style-type: none"> • Tenses-Revision-Exercises for practice • Subject-Verb Agreement • Reported Speech-Transformation • Sentence Correction-Emphasis Concord ,Report Speech, Sentence Structures | | | |

VOCABULARY

- Synonyms-Antonyms-Single Word Substitutes-Popular Abbreviations

READING STRATEGY

- Emphasis on Scanning the Text-Purpose-Advantages-Examples, Exercises and Practice through Teamwork

WRITING PRACTICES

- Letter Writing-Effective Letter Writing Techniques-Information Seeking Letters-Job Application Letters- Apology Letters-Explanation to Memos- E-mails-Cover Letters-Resume

LIFE SKILLS: Determination

- How I Became a Public Speaker: An essay by George Bernard Shaw

Self Learning Topics (SLTs): English Vocabulary (Text2, Unit-I, Unit-II, Unit III),Tenses(Reference book3,Topic-30, Exercises,30.1,30.2,30.3)

UNIT-III**9 Hrs****GRAMMAR**

- Tenses-Revision-Exercises for Practice
- Nouns-Prepositions-Adverbs-Adjectives
- Sentence Correction: Correct Use of tenses, nouns, prepositions, adverbs and adjectives

VOCABULARY

- Phrasal Verbs-Technical Words-Latin Words

READING STRATEGY

- Intensive Reading-purpose-Types of Comprehension Questions-Examples, Exercises and Practice through Teamwork

WRITING PRACTICES

- Report Writing-Definition-Purpose-Qualities of a Good Report-Formal and Informal Reports-Report Format-Sample Reports-Exercises
- Emphasis on Technical Reports

LIFE SKILLS:PositiveAttitude

- Be the Best of Whatever You Are: A Poem by Douglas Malloch

Self Learning Topics(SLTs):

Parts of Speech(Text1 ,Unit-I),Tenses(Refer1 , Topics-16,17,18,19) Phrasal Verbs (Reference book 3)

UNIT-IV**9 Hrs****GRAMMAR**

- Tenses-Revision-Exercises for Practice
- Clauses-Conjunctions-Transformation of Sentences
- Sentence Correction (Based on Parts of Speech)-Clauses-Tenses

VOCABULARY

- Appropriate Use of Words in Communication-Commonly Confused Words

ACTIVE READING and NOTE-MAKING

- Note-Making-Definition-Purpose-Effectiveness

WRITING PRACTICES

- Précis Writing-Definition-Purpose-Uses-Examples and Exercises-Practice through Teamwork
- Preparing Statement of Purpose (SoP)

| |
|---|
| <p>LIFE SKILLS: Emotional Balance A Poison Tree: Poem by William Blake Self-Learning Topics(SLTs): Tenses (Refer2, Topics: 152-157)</p> |
| <p>Course Learning Outcomes(COs): <i>After completion of this course, the students should be able to,</i></p> <p>CO1: apply basic grammar principles in speech and writing, read fast, form new words, make coherent paragraphs and adapt the real value of life.</p> <p>CO2: create effective letters, e-mails, reply to Memos and do the given tasks with confidence.</p> <p>CO3: analyze the given texts and write clear and unambiguous reports.</p> <p>CO4: deduct the superfluous information from lengthy text, prepare SoP (Statement of Purpose) effectively and solve critical problems in life with emotional balance.</p> |
| <p>Text Book(s):</p> <ol style="list-style-type: none"> Sanjay Kumar & Pushpa Lata, "English Language and Communication Skills for Engineers" As per the latest AICTE syllabus, Oxford University Press, 1st edition 2018 "Language and Life: A Skill's Approach" Based on the latest AICTE model curriculum Orient Black swan Private Limited 2nd Edition 2019 |
| <p>Reference Book(s):</p> <ol style="list-style-type: none"> Thomson A.J. ,Martinet A.V., "A Practical English Grammar", Oxford University Press 3rd edition, 1997 Thomson A.J. ,Martinet A.V", A Practical English Grammar", Exercise 2,Oxford University Press 3rd edition 1997 Standard Allen W., "Living English Structure", Pearson India Education Pvt. Ltd. 5th edition 2009 |
| <p>Web and Video link(s):</p> <ol style="list-style-type: none"> https://onlinecourses.nptel.ac.in/noc20_hs56/preview Technical English for Engineers by Aisha Icbal, IIT Madras https://onlinecourses.swayam2.ac.in/cec21_lg13/preview Indian Writing in English by Dr. Bindu Ann Philip, StMary's College Trissur |

| Course Articulation Matrix (CAM): | | U24MH105: ENGLISH COMMUNICATION & REPORT WRITING | | | | | | | | | | | | | |
|-----------------------------------|------------|--|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
| CO1 | U24MH105.1 | - | - | - | - | - | 1 | - | 2 | 2 | 2 | 1 | 2 | - | - |
| CO2 | U24MH105.2 | - | - | - | - | - | 1 | - | 2 | 2 | 2 | 1 | 2 | - | - |
| CO3 | U24MH105.3 | - | - | - | - | - | 1 | - | 2 | 2 | 2 | 1 | 2 | - | - |
| CO4 | U24MH105.4 | - | - | - | - | - | 1 | - | 2 | 2 | 2 | 1 | 2 | - | - |
| U24MH105 | | - | - | - | - | - | 1 | | 2 | 2 | 2 | 1 | 1 | - | - |
| 3-HIGH, 2-MEDIUM, 1-LOW | | | | | | | | | | | | | | | |

SPORTS /YOGA

| | | | |
|--|-----------|---------------------------------------|------|
| Class: B.Tech. I-Semester | | Branch: Common to all branches | |
| Course Code: | U24VA106 | Credits: | 0 |
| Hours/Week(L-T-P-O-E): | 0-0-2-2-4 | CIE : | 60 % |
| Total Number of Teaching Hours: | 48 Hrs | ESE: | 40 % |

Course Learning Objectives (LOs):

This course will enable students to...

LO1: know about Yoga and its Benefits

LO2: develop skills and techniques of various Sports & Games.

LO3: inculcate Sportsman spirit.

LO4: all round development of the students to meet the requirements of the society.

Sports and Games

List of Sports and Games

| | | |
|---------------|---------------|-----------------|
| 1 Badminton | 2 Basket Ball | 3 Chess |
| 4 Carrom | 5 Foot Ball | 6 Table Tennis |
| 7 Volley Ball | 8 Cricket | 9 Hand Ball |
| 10 Kabaddi | 11 Kho-Kho | 12 Yoga Aasanas |

Text book(s):

1. Badminton for Schools – Author -Jake Downey, Publisher - S.Chand & Company Ltd., Ram Nagar, New Delhi-110055. Length : 159 Pages.
2. Basketball Skills & Rules – Author – O.P.Sharma, Publisher – Khel Sahitya Kendra, 4264/3, Ansari Road, Darya Ganj, New Delhi-110002, Length : 166 pages.
3. Title. How to Reassess Your Chess: Chess Mastery Through Chess Imbalances. Author: [Jeremy Silman](#), Edition, 4, illustrated, reprint, Publisher : Silman-James Press, 2010, ISBN.1890085138, 9781890085131, Length : 658 pages, Subject: [Games & Activities, General](#).
4. Football Skills & Rules – O.P.Sharma, Publisher – Khel Sahitya Kendra, 4264/3, Ansari Road, Darya Ganj, New Delhi-110002, Length : 215 pages.
5. Teaching & Coaching Table Tennis – Author – Deepak Jain, Publisher – Khel Sahitya Kendra, WP-474, Ist Floor, Shiv Market, Ashok Vihar, Delhi-1100052, Length : 196 pages.
6. Volleyball for Schools, Author – Dave James, Publisher - S.Chand & Company Ltd., Ram Nagar, New Delhi-110055. Length : 125 Pages.
7. Yoga Education, Author – Dr.Tarak Nath Pramanik, Publisher – India’s First Publisher & Asia’s No.1 Stockist of Physical Education & Sports Books, 7/26, Ground Floor, Ansari Road, Daryaganj, New Delhi-110002, Length : 347 pages.
8. Indian Cricket ,1999 compiled by G.VISWANATH,53rd Edition,Pblished by Kasturi & Sons Limited ,Chennai-600002, Length : 784 pages.
9. Health And Fitness, Author – Dr.A.K.Srivastava, Sports Publication, 7/26, Ground Floor, Ansari Road, Darya Ganj, New Delhi-110002, Length : 72 pages.
10. Modern Kabaddi, Author E .Prasad Rao, Published by D.V.S New Delhi-110019.

Reference Book(s):

1. Rules and Skills of Games and Sports, Author – B.K.Chaturvedi, Publisher – Goodwill Publishing House, B-9, Rattan Jyoti, 18 Rajendra Place, New Delhi – 110008 (India)
2. Dare To Be A Champion. [Lee Chong Wei \(Brand\)](#), Genres **Biography**
3. 199 pages, Paperback, First published July 1, 2012
4. This edition, Format, 199 pages, Paperback, Published, January 1, 2012 by Bukuganda Digital & Publication, ISBN, 9789671084328, ASIN, 967108432X, Language, English.
5. *The Book of Basketball: The NBA According to the Sports Guy* is the second book by former [ESPN](#) columnist [Bill Simmons](#).^[1] Published in 2009, it covers the history of the [National Basketball Association](#) (NBA). In 2019, Simmons launched a sequel podcast series, **Book of Basketball 2.0**, which analyzes the evolution of the league since the book was published.
6. Title. How to Reassess Your Chess: Chess Mastery Through Chess Imbalances. Author: [Jeremy Silman](#), Edition, 4, illustrated, reprint, Publisher : Silman-James Press, 2010, ISBN.1890085138, 9781890085131, Length : 658 pages, Subject : [Games & Activities](#) , [General](#).
7. The Stars of Football: The World's Best Players Kindle Edition by [Rodolphe Gaudin](#) (Author) Format: Kindle Edition, [Games & Activities / Chess](#), [Games & Activities / General](#)
8. The Complete Volleyball Handbook Kindle Edition, by Bob Bertucci (Author), Makoto Katsumoto (Author), Yasumi Nakanishi (Author), Toshiaki Yoshida (Author) Format : Kindle Edition. 4.5.4.5 out of 5 stars 15 ratings.
9. Cricket skills & Rules, Author. V.Thani, khel sahitya Kendra ,4264/3, Ansari Road, Darya Ganj, New Delhi-110002. Length : 202 pages
10. Health Exercise And Fitness, Author – J.P.Muller, Sports Publication, WP-474, 1st Floor, Shiv Market, Ashok Vihar, Delhi -110052, Length : 117 Pages.
11. Yogic Science, Author – Dr.T.Thangamani, Dr.T.Godwin Vedanayagam Rajkumar, Publisher - Physical Education & Sports Books, 7/26, Ground Floor, Ansari Road, Daryaganj, New Delhi-110002, Length : 274 pages.

Web and Video link(s):

1. Badminton game Video Link : <https://www.youtube.com/watch?v=HucIqi8Lw3E&t=22s>
2. Basket Ball game Video Link : <https://www.youtube.com/watch?v=-tkE2IJoR58>
3. Chess Video Link : <https://www.youtube.com/watch?v=mDw7Igm8ePo>
4. Carrom game Video Link : <https://www.youtube.com/watch?v=z8vvJpNceeg>
5. Football game Video Link : <https://www.youtube.com/watch?v=mXjW78AgGu4>
6. Table Tennis game Video Link: <https://www.youtube.com/watch?v=bLrJGWvWI4U>
7. Volleyball game Video Link : <https://www.youtube.com/watch?v=BJJb3-O0Q1U>

8. Cricket game Video Link :
https://www.youtube.com/watch?v=87hO_Vs3-wQ
9. Handball game Video Link :
https://www.youtube.com/watch?v=VCa_0USaq8k
10. Kabaddi game Video Link :
<https://www.youtube.com/watch?v=ai1m7ARNyNI>
11. Kho-Kho game Video Link :
https://www.youtube.com/watch?v=P3_z3LKdLdg
12. Yoga Aasanas Video Link :
<https://www.youtube.com/watch?v=e0Q88DUOXjk>
<https://www.youtube.com/watch?v=JoDKbXEUrvQ>

Course Learning Outcomes(COs):

After completion of this course, the student should be able to,

CO1: demonstrate physical fitness by performing Yoga – Asanas.

CO2: demonstrate physical fitness through various games & sports events with defined bench marks.

CO3: demonstrate Sportsman spirit and ethics..

CO4: demonstrate Physical, Psychological, Social and Emotional balance.

ESE: 40 Marks

| | | Grade-P (50%) | Grade-D (60%) | Grade-C (70%) | Grade-B (80%) | Grade-A (90%) | Grade-S (100%) |
|------------------------------------|-------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| 50 mts / 30 mts (Sprint) | Women | 11sec above | 10-11 sec | 9-10 sec | 8-9 sec | 7-8 sec | 7 sec below |
| | | 5 | 6 | 7 | 8 | 9 | 10 |
| | Men | 11sec above | 10-11 sec | 9-10 sec | 8-9 sec | 7-8 sec | 7 sec below |
| | | 5 | 6 | 7 | 8 | 9 | 10 |
| Jump (Standing Broad Jump) | Women | 0.90 - 1 mts | 1.00 - 1.25 mts | 1.25 - 1.50 mts | 1.5 - 1.75 mts | 1.75 - 2 mts | 2 mts above |
| | | 5 | 6 | 7 | 8 | 9 | 10 |
| | Men | 1.50 - 1.7 mts | 1.7 - 1.9 mts | 1.90 - 2.1 mts | 2.30 - 2.1 mts | 2.5 - 2.7 mts | 2.70 mts above |
| | | 5 | 6 | 7 | 8 | 9 | 10 |
| Throw (Shot-put) | Women | 3.5- 4.0mts | 4.0- 4.5mts | 4.5.5.0mts | 5.0- 5.5mts | 5.5- 6.0mts | 6.0- 6.5mts |
| | | 5 | 6 | 7 | 8 | 9 | 10 |
| | Men | 4.0- 5.0mts | 5.0- 6.0mts | 6.0- 7.0mts | 7.0- 8.0mts | 8.0- 9.0mts | 9mts above |
| | | 5 | 6 | 7 | 8 | 9 | 10 |
| Yoga Aasanas (Surya Namaskaras) | Women | 2 repetition (12min) | 3 repetition (18min) | 4 repetition (24min) | 5 repetition (30min) | 6 repetition (36min) | 7 repetition (42min) |
| | | 5 | 6 | 7 | 8 | 9 | 10 |
| | Men | 2 repetition (12min) | 3 repetition (18min) | 4 repetition (24min) | 5 repetition (30min) | 6 repetition (36min) | 7 repetition (42min) |
| | | 5 | 6 | 7 | 8 | 9 | 10 |

CIE-60

| | | | | | | |
|--|---------|---------|---------|---------|---------|---------|
| | Grade-P | Grade-D | Grade-C | Grade-B | Grade-A | Grade-S |
| Attendance % | 40-50% | 50-60% | 60-70% | 70-80% | 80-90% | 90-100% |
| Marks | 10 | 12 | 14 | 16 | 18 | 20 |
| Performance in Regular Participation in classes : 15 | | | | | | |
| Performance in Selected Event : 25 | | | | | | |

SPORTS AND YOGA FOR ALL BRANCHES-U24VA106

| COs | POs | Justification for mapping(Students will be able to) | Level of mapping |
|--|------|---|------------------|
| CO1:demonstrate physical fitness by performing Yoga-Asanas | PO12 | Performing Yoga Aasanas and make it habituated as a life long process, so that one can improve concentration levels through better mind-body co-ordination. | 1 |
| CO2: Demonstrate physical fitness through various games & sports events with defined benchmarks. | PO9 | Engage in games and sports regularly thus promotes individual and team work. | 1 |
| CO3: demonstrate sportsman spirit and ethics. | PO8 | Exhibit Sportsman Spirit and learn ethics through various games & sports to be a worthy citizen. | 2 |
| CO4: demonstrate Physical, Psychological, Social and Emotional balance. | PO10 | Exhibit proper balance during emotions sportsman can communicate effectively with peers and can demonstrate physical, psychological, social skills effectively. | 1 |
| | PO12 | Maintain physical, psychological, Social and emotional balance and make it as a lifelong process through Games and Sports. | 1 |

| Course Articulation Matrix (CAM): | | U24VA106 Sports / Yoga for all UG Branches | | | | | | | | | | | | | |
|-----------------------------------|------------|--|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PS O1 | PSO 2 |
| CO1 | U24VA106.1 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - |
| CO2 | U24VA106.2 | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - |
| CO3 | U24VA106.3 | - | - | - | - | - | - | - | 2 | - | - | - | - | - | - |
| CO4 | U24VA106.4 | - | - | - | - | - | - | - | - | - | 1 | - | 1 | - | - |
| U24VA106 | | - | - | - | - | - | - | - | 2 | 1 | 1 | - | 1 | - | - |
| 3 - HIGH, 2 - MEDIUM, 1 - LOW | | | | | | | | | | | | | | | |

ENGINEERING GRAPHICS THROUGH CAD

| | | | |
|--|------------------|---|--------------|
| Class: B. Tech. I -Semester | | Branch: Common to all (except CE & ME) | |
| Course Code: | U24ME107 | Credits: | 1 |
| Hours/Week (L-T-P-O-E): | 0-0-2-2-4 | CIE : | 100 % |
| Total Number of Teaching Hours: | 36 Hrs | ESE : | - |

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on...

LO1: AutoCAD commands, projections of points and straight line inclined to one plane

LO2: projections of oblique planes

LO3: projections of solids and sections of solids

LO4: conversion of isometric, orthographic projections and simple circuits diagrams

LABORATORY COMPONENT

List of Experiments

1. Importance of Engineering Drawing, principles of engineering drawing, dimensioning; introduction to AutoCAD software-GUI, settings, standard toolbar, toolbars - draw, modify, dimension, properties, design centre and tool palettes
2. Introduction to orthographic projections-Vertical Plane, Horizontal plane; Views-Front view, Top view, and Side view and draw the Projection of points in different quadrants.
3. Draw the Projection of straight lines
4. Draw the Projection of planes
5. Draw the Projection of solids- Simple position(Axis perpendicular to HP or VP)
6. Draw the projections of solids inclined to both the planes
7. Draw the Sections of solids
8. Draw the Orthographic projections of given objects
9. Conversion of isometric view to orthographic projections
10. Draw the Isometric view from the given orthographic views
11. Draw the pictorial view (3D) from the given Isometric view
12. AutoCAD application in Electrical and Electronics circuits

Text Book(s):

1. Bhatt N.D., *Elementary Engineering Drawing*, Charotar Publishing House, Anand, India, 2017.
2. Kulkarni D. M., Rastogi A. P., and Sarkar A., *Engineering Graphics with AutoCAD*, PHI publisher, revised edition, July 2010.

Reference Book(s):

1. Dhananjay A Jolhe, *Engineering Drawing*, Tata Mc Graw- Hill, 2008.
2. Venugopal K. *Engineering Graphics with Auto CAD*, New Age International Publishers Ltd., Hyderabad, 2012.
3. Luzadder W.J and Duff J.M, *Fundamentals of Engineering Drawing*, Prentice-Hall of India, 1995.

Web and Video link(s):

1. https://onlinecourses.nptel.ac.in/noc20_me79/preview NPTEL video link for *Engineering drawing and computer graphics* By Prof. Rajaram Lakkaraju, IIT Kharagpur.

Laboratory Manual (for laboratory component):

1. *Engineering Graphics through CAD Laboratory Manual & Record Book*, Dept. of ME, KITSW.

Course Learning Outcomes (COs)

After completion of this course, the students should be able to,

CO1: draw projections of points and straight lines inclined to one plane with Auto CAD.

CO2: develop the projections of planes using Auto CAD

CO3: construct the projections of solids and sections of solids using Auto CAD

CO4: create orthographic and isometric projections and develop the simple electrical and electronic circuit using Auto CAD

Course Articulation Matrix (CAM): U24ME107 ENGINEERING GRAPHICS THROUGH CAD

| CO | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-------------------------------|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | U24ME107.1 | 2 | 1 | 1 | - | 2 | - | - | 1 | - | 2 | - | 1 | - | - |
| CO2 | U24ME107.2 | 2 | 1 | 1 | - | 2 | - | - | 1 | - | 2 | - | 1 | - | - |
| CO3 | U24ME107.3 | 2 | 1 | 1 | - | 2 | - | - | 1 | - | 2 | - | 1 | - | - |
| CO4 | U24ME107.4 | 2 | 1 | 1 | - | 2 | - | - | 1 | - | 2 | - | 1 | - | - |
| U24ME107 | | 2 | 1 | 1 | - | 2 | - | - | 1 | | 2 | - | 1 | - | - |
| 3 - HIGH, 2 - MEDIUM, 1 - LOW | | | | | | | | | | | | | | | |

PRACTICUM-1

| | | | |
|--|---------------------------------------|-----------------|--------------|
| Class: B.Tech. I -Semester | Branch: Common to all branches | | |
| Course Code: | U24EL108 | Credits: | 1 |
| Hours/Week (L-T-P-O-E): | 0-0-0-4-4 | CIE : | 100 % |
| Total Number of Teaching Hours: | - | ESE : | - |

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on...

LO1: literature review and identifying research gaps

LO2: implementing a project independently by applying knowledge to practice

LO3:preparing well-documented report and informative PPT

LO4: effective technical presentation and creating video pitch

Practicum is an independent project carried out by the student during the course period, under the supervision of allotted course faculty. It helps to reinforce the students' theoretical knowledge and develop their ability to apply this knowledge to the solution of practical problems. Practicums also prepare them for their MINI and MAJOR PROJECTs and for independent work in their chosen field that promotes creative abilities. Besides they provide Higher Order Cognitive Abilities (HOCAs).

- (i). Practicum is a mandatory semester project work.
- (ii). Practicum is offered as a one credit course. Student has to earn 4 credits (one in each semester from I to IV semesters)
- (iii). Allotment of Practicum topics for students:
 - **Practicum matrix:** In week (-1), the class teacher, in consultation with HoD, shall prepare the practicum matrix of the section. The practicum matrix is the allotment of group of students to the different course faculty of the section, as shown below.

| Course | U24MH101 | U24CY102B | U24IT103 | U24IT104 | U24MH105 |
|--|----------|-----------|----------|----------|----------|
| Students allotted to different courses | B24IT001 | B24IT014 | B24IT027 | B24IT040 | B24IT053 |
| | B24IT002 | B24IT015 | B24IT028 | B24IT041 | B24IT054 |
| | B24IT003 | B24IT016 | B24IT029 | B24IT042 | B24IT055 |
| | B24IT004 | B24IT017 | B24IT030 | B24IT043 | B24IT056 |
| | B24IT005 | B24IT018 | B24IT031 | B24IT044 | B24IT057 |
| | B24IT006 | B24IT019 | B24IT032 | B24IT045 | B24IT058 |
| | B24IT007 | B24IT020 | B24IT033 | B24IT046 | B24IT059 |
| | B24IT008 | B24IT021 | B24IT034 | B24IT047 | B24IT060 |
| | B24IT009 | B24IT022 | B24IT035 | B24IT048 | B24IT061 |
| | B24IT010 | B24IT023 | B24IT036 | B24IT049 | B24IT062 |
| | B24IT011 | B24IT024 | B24IT037 | B24IT050 | B24IT063 |
| | B24IT012 | B24IT025 | B24IT038 | B24IT051 | B24IT064 |
| | B24IT013 | B24IT026 | B24IT039 | B24IT052 | B24IT065 |

- In week (-1), the class teacher of a section shall collect 10-12 topics for practicum from each of the course teachers of that section.
- The class teacher, in consultation with HoD shall allot the practicum topics to the students of that section in the following format.

CIRCULAR

Allotment of Practicum topics to students

Section :

| S.No. | Roll number of the student | Practicum topic allotted | Practicum under the course | Course faculty |
|-------|----------------------------|--------------------------|----------------------------|----------------|
| | | | | |
| | | | | |

Note:

1. The students should meet immediately the allotted course faculty for practicum and start working on the practicum with the guidance of course faculty.
2. To complete the Practicum, the student shall work in laboratories under supervision of allotted course faculty, in the allotted hours in the classwork timetable and also outside the class work hours during weekdays.
3. The course faculty are advised to guide the allotted students for practicum during the semester course work.

(Signature of class teacher)

- (iv). *To complete the practicum, the student shall work in laboratories under supervision of allotted course faculty, in the allotted hours in the classwork timetable and outside the class work hours during weekdays.*
- (v). There shall be only continuous Internal Evaluation (CIE) for practicum for a maximum of 100 marks.
- (vi). The practicum course faculty shall evaluate & submit the final marks of the allotted students in week (N+1) to the respective class teacher.
- (vii). The class teacher shall collect the final marks of practicum of the students allotted to each course teacher and submit them to the CoE.
- viii). Course faculty shall follow his/her own rubrics for practicum evaluation. Focus shall be on knowledge, skills & qualities acquired by the student during the practicum course
- (ix). A sample rubrics for assessment and evaluation of practicum is as follows:

| | |
|---|------------------|
| Literature survey & Identification of research gaps | 10 marks |
| Working model / process / software package / system developed | 30 marks |
| Report writing (subjected to max of 30% plagiarism) | 20 marks |
| Oral presentation with PPT and viva-voce | 20 marks |
| Video pitch | 20 marks |
| Total | 100 marks |

Note: It is mandatory for the student to appear for oral presentation and viva-voce to qualify for course evaluation of Practicum.

- (a) **Practicum Topic:** Each student shall be allotted a topic for practicum by the course faculty member attached to him/her. Interested students can work on their own title for practicum, but with due approval from course faculty.
- (b) **Working Model:** Each student is required to develop a prototype / process / system/simulation model on the given practicum topic and demonstrate/present, during the allotted time, before the course teacher.
- (c) **Report:** Each student is required to submit a well-documented report on the allotted practicum topic as per the format specified by the course faculty. The student shall include

answers to the following questions in the report and ppt presentation.

- What was the objective of the practicum assigned?
 - What are the main responsibilities and tasks for practicum?
 - What knowledge and skills from the coursework are applied in the practicum?
 - What new knowledge and skills are acquired during the practicum?
 - In what ways, can the practicum be helpful for the professional career?
 - What gaps are identified in your practicum work?
 - What improvements or changes you suggest for addressing the identified gaps for future work?
- (d) **Anti-Plagiarism Check:** The practicum report should clear plagiarism check as per the Anti-Plagiarism policy of the institute
- (e) **Presentation:** Each student should prepare PPT with informative slides and make an effective oral presentation before the course teacher as per the schedule notified by the department
- (f) **Video Pitch:** Each student should create a pitch video, which is a video presentation on his / her Practicum. Video pitch should be no longer than 5 minutes by keeping the pitch concise and to the point, which shall also include evidence like videos & pics at the time of implementing the practicum and also key points about his / her business idea / plan (*if any*) and social impact
- (g) The student has to register for the Practicum as a supplementary examination in the following cases:
- i) he/she is absent for oral presentation and viva-voce
 - ii) he/she fails to submit the report in prescribed format
 - iii) he/she fails to fulfill the requirements of Practicum evaluation as per specified guidelines

Course Learning Outcomes (COs):

After completion of this course, the students should be able to...

CO1: synthesize literature survey, identify research gaps and define objective & scope of practicum problem

CO2: apply knowledge to design & conduct experiments, utilize modern tools for solution of practicum problem and develop working model/ process/ system

CO3: demonstrate the generic competencies in making a well-documented report portraying knowledge, skills, qualities acquired through practicum

CO4: create a video pitch on practicum and make an effective oral presentation using PPTs

| Course Articulation Matrix (CAM): | | U24EL108 PRACTICUM-1 | | | | | | | | | | | | | |
|-----------------------------------|------------|----------------------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
| CO1 | U24EL108.1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| CO2 | U24EL108.2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| CO3 | U24EL108.3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| CO4 | U24EL108.4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| U24EL108 | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |

3 - HIGH, 2 - MEDIUM, 1 - LOW

Course code U24ELXYY: X represents semester, YY represents ETA course serial number

**SOCIAL EMPOWERMENT ACTIVITY -1/ SELF ACCOMPLISHMENT ACTIVITY-1
(SEA -1/SAA-1)**

| | | | |
|--|---------------------------------------|-----------------|-------------|
| Class: B.Tech. I Semesters | Branch: Common to all branches | | |
| Course Code: | U24VA109 | Credits: | 1 |
| Hours/Week (L-T-P-O-E): | 0-0-0-2-2 | CIE: | 100% |
| Total Number of Teaching Hours: | - | ESE : | - |

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on...

LO1: holistic development through activity-based learning to gain real-life experience which effectively help individuals deal appropriately with problems/challenges

LO2: positive mindset by actively adopting optimism, acceptance, resilience, gratitude, mindfulness, and integrity and handling rejection in life

LO3: skills for effective fieldwork practice, which include ethics, observation, communication, interviewing, problem solving, time management, organisation and documentation

LO4: making a well-documented report and an effective oral presentation through PPTs portraying knowledge, skills, qualities acquired and social impact of the activity

Activity Based Liberal Learning about Life, Literature and Culture (ABLL@LLC) is introduced for building **generic competencies** in students. ABLL is aimed at all dimensional holistic growth of the learner. The holistic development includes the **physical, emotional, cognitive, spiritual and social aspects**. This is an area which opens the decision-making process, helps the student to develop creativity, an analytical mind, and builds resilience, confidence, hope, well-being and success. This will help student face the world with a greater degree of maturity, stoic and become a wholesome person in the society.

It is more than just learning from books to lead a successful life. These activity-based liberal learning courses, which help students to expand their social roles later in life, are offered under two sequels namely **SEA** (Social Empowerment Activities) and **SAA** (Self Accomplishment Activities)

These SEA/SAA courses also focus on building positive mindset: adopting optimism, acceptance, resilience, gratitude, mindfulness, and integrity in your life will help student develop and maintain a positive mindset.

- (a) Each SEA/SAA activity is treated as one credit course
- (b) Student must select one activity per semester, through first 04 semesters, from the courses listed under SEA/ SAA, before commencement of the semester.
- (c) Students are required to earn minimum 04 credits under SEA/SAA, by completing minimum 02 credits through SEA and minimum 02 credits through SAA
- (d) To complete these activities student shall work outside the class work hours, during weekends, holidays, semester breaks, etc.,
- (e) If a student is not able to attend/ fulfil performance requirements, he/she shall be dropped from the course and shall have to enrol in the forthcoming semesters.

Monitoring SEA/SAA:

- (a) **Nodal units:**The Student Activity Centre (SAC) and Centre for Innovation Incubation Research and Entrepreneurship (C-i²RE) shall act as nodal units for activities listed under SEA/SAA.
- (b) During the semester period, the student has to **acquire requisite knowledge, conduct fieldwork**, acquire skills and propose unique solutions to the real-life problems
- (c) **Knowledge Acquisition & Skilling:**
- i. Students have to identify goals, acquire and accumulate knowledge on the chosen SEA/SAA activity
 - ii. For the activities related to social awareness/issues/challenges that affect society, use the knowledge base, apply relevant skills to analyse the issue and propose unique possible solutions to the social issues/challenges. Practice to acquire necessary skills to seek new opportunities in their personal and professional life.
 - iii. For the activities related to physical fitness, music, dance, fine arts, etc., guided practice sessions under supervision of expert/guru are to be planned and executed to acquire the benchmark skills to be demonstrated.
- (d) **Fieldwork:** Fieldwork is an essential component of learning for gaining real-life experiences. In addition to knowledge acquisition & skilling, student has to take up fieldwork on the chosen activity, as part of SEA/SAA course.
- i. This student-driven Fieldwork allow students to interact with the 'real world'. It is an autonomous learning (self-learning) situation that students are more actively involved during the activity and develop a deeper understanding and develop a more positive attitude.
 - ii. Fieldwork consists of three phases: preparation, the actual activity and feedback
 - iii. **As part of fieldwork, student has to interact with at least two eminent personalities/achievers/renowned persons/inspiring and great personalities related to the activity chosen.**
 - iv. Fieldwork will benefit students for any careers where they need to work with communities of people or which involves analysis of complex processes, especially social and cultural.
 - v. Certain skills are required for effective fieldwork, which include observation, communication, interviewing, problem solving, documentation, and more
 - vi. Other skills important for fieldwork practice include the ability to act in a crisis, to plan, set priorities, mobilize resources, and implement the plan effectively. These skills used in an integrated manner help students solve their problems and to develop one's own leadership style based on the need and culture of the place.
 - vii. **Eminent personalities/achievers/renowned persons/inspiring and great personalities**

Eminent personalities/ Achievers / Renowned personalities:

- (a). **In case of socially relevant problems/ activities of SEA/SAA:** Eminent personalities/ achievers include district administrative officers, Eminent Social workers / NGOs, other inspiring and great personalities
- (b). **In case of Sports / Games and Cultural activities of SEA/SAA:** Eminent coaches/ trainers/gurus, achievers who represented/won state level/national level /international level competitions, other inspiring and great personalities.

- viii. **For appointment to interact eminent personalities:** Student is expected to follow email etiquette rules and other appropriate polite communication etiquettes for getting appointment and time for interaction
 - ix. On fieldwork, student is expected to demonstrate solid time management, organisational and note taking skills during fieldwork
 - x. **Ethics of fieldwork:** Fieldwork is an educational process with commitment to positive values. All fieldwork should be planned and conducted in a way that is ethical, responsible and safe, for people, students, visited communities, if any, and all other stakeholders. Student is expected to maintain integrity and honesty. Avoid bias and deception. Protect the rights and well-being of people involved in fieldwork. The privacy, confidentiality and respect for the eminent people interacted should be maintained and their time, inputs & guidance are to be acknowledged
 - xi. Student is expected to take care of health and Safety practices for fieldwork and travel
 - xii. Student should remember that contrary to a *field trip or company visit*, **the emphasis in fieldwork is on acquiring skills**, and not on casually presenting theory and assessing.
 - xiii. For the fieldwork, student shall go with a scientifically designed questionnaire and record the responses during interaction. These response sheets, along with geo-tagged pic of fieldwork (at the time of interaction & practise sessions, if any) shall be appended as annexures in the report to be submitted for course evaluation.
 - xiv. **Feedback:** The learnings the student made out of interaction with eminent achievers shall be presented in the report as one of the chapters.
 - During feedback, the central focus is on the elaboration of the students' experience during fieldwork. Therefore, the student should create an end product, such as a demonstration/presentation and report in which they demonstrate a link between their experiences during fieldwork and the underlying theoretical concepts and ideas.
- (e) **Demonstration / Presentation and Report:** Student after presentation/demonstration of his/her achievements/work, shall get a certificate from the concerned nodal unit and submit a report, in the prescribed format, to the faculty counsellor for award of grade.
- (f) **Flow process for completion of SEA/SAA course:**
- i. **Faculty counsellor approval:** In week (-1), in consultation with faculty counsellor, every student shall, identify minimum of 4 activities listed under SEA/SAA activities, lists their priority and fills the same in ONLINE REGISTRATION FORM FOR SEA/SAA (received in their domain mail id) to Dean, Student Affairs. Dean, Student Affairs shall release the section wise allotment of SEA/SAA courses to students along with the details of supervising faculty of nodal centre. The allotment details shall be shared to the SEA/SAA coordinator and the student through domain mail id of the student
 - ii. **Identification of goals and preparation of action plan:** In week (1), the respective faculty coordinator(s) of nodal centres shall address the students allotted to them to educate them on fixing goals, plan of action for completion and evaluation. In consultation with nodal centre, based on the workflow of the allotted activity,

every student shall identify the goals (of activity) & eminent personalities (to be visited during the field trip) and prepare action plan (oriented workflow) for attaining the identified goals.

- iii. **Field work:** Under the guidance of nodal centre, student shall complete the field work, based on the action plan, with the progress continuously monitored by the faculty counsellor and the nodal centre.
- iv. **Demonstration/ Presentation:** After completion of field work, student shall demonstrate/present his achievements (knowledge/skills gained during the activity) at the nodal centre in the presence of external experts/senior practitioners of the activity. After successful demonstration/presentation, the nodal centre shall provide a certificate of completion indicating that the student has completed the activity in the stipulated time.
- v. **Report writing:** After successful demonstration/presentation, student shall write a 2-3-page report and submit the same to the faculty counsellor. The report shall emphasize knowledge, skills and qualities acquired through the SEA/SAA activities. It shall also include the influence of these activities on enhancing confidence, positive change in life, decision making, transforming choices into desired actions/outcomes.

(g) **Assessment & Evaluation:** There shall be *only Continuous Internal Evaluation (CIE)* for SEA/SAA. The SEA/SAA activities shall be evaluated at the end of the semester through respective evaluation processes, which shall include field work, presentation/demonstration, submission of reports on the gathered data/information/ surveys, the details of which have been shown in below table. The department level SEA/SAA coordinator shall collect marks from the nodal centres and faculty counsellors, consolidate them, and submit the final grades to the examination branch, within one week of the last day of instruction. Evaluation of SEA/SAA activities shall be completed as and when students are ready, but not later than week (N+1).

The CIE for SEA/SAA is as follows:

| Assessment | Maximum marks | Marks to be awarded by |
|--|---------------|------------------------|
| Goal setting, Planning & Knowledge Acquisition | 20 | Nodal centre |
| Field work | 40 | Nodal centre |
| Demonstration/Presentation | 20 | Nodal centre |
| Report submission | 20 | Faculty counsellor |
| Total | 100 | - |

Note:

- (a) **Presentation/ Demonstration:** It is mandatory for the student to appear for demonstration and (or) oral presentation oral presentation to qualify for course evaluation. In case of presentation, student should prepare PPT with informative slides including the geo tagged photos of his/her field trips/interactions as per the schedule

notified by the nodal centre. In case of demonstration, student must take timeslot from the nodal centre and demonstrate the skills learnt/improved during the allotted timeslot.

- The necessary arrangements for demonstration shall be looked after the student in consultation with the coordinator with due permission from Head of the department.
- (b) **Report:** Each student is required to submit a well-documented report on the chosen SEA/SAA topic as per the format specified by *department level SEA/SAA coordinator*.
- (c) **Anti-Plagiarism Check:** The SEA/SAA report should clear plagiarism check as per the Anti-Plagiarism policy of the institute.
- (d) **Requirements for passing the course:** A student is deemed to have passed SEA/SAA if he/she
 - a. successfully demonstrates/presents the skills attained at the end of course as per the schedule notified by the nodal centre, **and**
 - b. scores a minimum of 40 marks in the CIE of the course
- (e) **Supplementary examination:** If a student fails in SEA/SAA activity of a particular semester, he must complete the same by enrolling it in the next higher semesters.

Course Learning Outcomes (COs):

After completion of this course, the students should be able to...

CO1: integrate the five dimensions of physical, emotional, cognitive, spiritual and social aspects in life for holistic development and demonstrate social sensibility

CO2: interact effectively through written, oral and nonverbal communication with external-world in a professional, sensitive and culturally relevant manner

CO3: analyse the issues related to social empowerment / self-accomplishment, demonstrate problem-solving skills, articulate solutions and demonstrate social sensibility

CO4: demonstrate the generic competencies in making a well-documented report and an effective oral presentation with PPTs portraying knowledge, skills, qualities acquired through fieldwork/practice sessions and social impact of the course learning

Text / Reference book(s):

For knowledge acquisition, students shall refer to textbooks and web resources relevant to the course selected. Plan for fieldwork/practice sessions in coordination with SEA/SAA coordinator

| Course Articulation Matrix (CAM): | | U24VA109- SEA-1/ SAA-1 | | | | | | | | | | | | | |
|-----------------------------------|------------|------------------------|------|------|------|------|------|------|------|------|-------|-------|-------|------|-------|
| CO | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO1 | PSO 2 |
| CO1 | U24VA109.1 | - | - | - | - | - | 2 | 2 | 2 | 2 | 2 | 2 | 2 | - | - |
| CO2 | U24VA109.2 | - | - | - | - | - | 2 | 2 | 2 | 2 | 2 | 2 | 2 | - | - |
| CO3 | U24VA109.3 | - | - | - | - | - | 2 | 2 | 2 | 2 | 2 | 2 | 2 | - | - |
| CO4 | U24VA109.4 | - | - | - | - | - | 2 | 2 | 2 | 2 | 2 | 2 | 2 | - | - |
| U24VA109 | | - | - | - | - | - | 2 | 2 | 2 | 2 | 2 | 2 | 2 | - | - |
| 3 - HIGH, 2 - MEDIUM, 1 - LOW | | | | | | | | | | | | | | | |

EXPERT TALK SERIES-1

| | | | |
|--|------------------|---------------------------------------|------------|
| Class: B.Tech. I -Semester | | Branch: Common to all branches | |
| Course Code: | U24AE110 | Credits: | 1 |
| Hours/Week (L-T-P-O-E): | 0-0-0-1-1 | CIE Marks (%): | 100 |
| Total Number of Teaching Hours: | - | ESE Marks (%): | - |

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on...

- LO1:** 21st century skills needed for industry, current industry trends, challenges and innovations
- LO2:** latest technology in practice and applying knowledge to solve real-world problems
- LO3:** smart work, soft skills, professional etiquette, networking abilities
- LO4:** making a well-documented report portraying the knowledge, skills, qualities acquired and the impact of the learning

In the 21st century, for successful career, degree alone won't suffice. Competencies are much more important.

- (a) You need to be aware of the real-world problems, industry working style, need to be confident and smart and you also need to know the tricks of the trade.
- (b) Learning from industry experts with real-world examples, is important to enhance your educational experience.
- (c) Enhanced graduate employability benefits all stakeholders. To effectively enhance employability and the immediacy of adding value to company/project, it is important that you are aware of what you are learning and its use in the workplace. The cognitive abilities viz., remember, understand, recall, and application of knowledge and other skills acquired in higher education can be maximised if you are clear on the purpose of your developed competencies and how to apply them in a range of complex situations.
- (d) Graduate employability could be enhanced through fostering lifelong learning, the development of a range of employability-related competencies and increased confidence and capacity in "reflecting on and articulating these capabilities and attributes in a range of recruitment situations".

But how would you know all this without venturing into the industry?

- (e) The answer is **Industry Expert Talk Series (ETS)**. Through ETS, we invite industry experts in different fields to deliver talks and interact with students.
- (f) Through Industry expert talks students get to know so much more that textbooks don't explain.
- (g) Students have the opportunity to learn from professionals who have achieved success in their respective fields. These speakers often share their personal experiences, case studies, and anecdotes, providing students with real-world examples and perspectives that go beyond theoretical concepts.
- (h) Our competency-focussed curriculum URR24 is designed to contribute greatly to the nurturing and development of each of these facets among students through ETS courses
- (i) ETS helps students gain improved industry engagement for an easier transition into the workplace, broader career progression opportunities and personal development.
- (j) In URR24 curriculum, Expert talk series (ETS) is offered as a course under **ability enhancement category of courses**.

- (k) Through ETS sessions, students get the chance to interact with industry regularly which helps them focus on the needs and requirements of current industry. This will not only enthuse the students with new ideas but also motivate them to understand what kind of 21st century skills are needed in industry and how they need to groom themselves.
- (l) Through ETS sessions, another benefit is that students learn the importance of soft skills like communication, presentation, email etiquettes, corporate grooming and dressing styles. Conversing with successful people is the biggest motivation and students gain in more ways than one through ETS sessions.
- (m) ETS enhances your learning in many ways for global opportunities for your career.
- (n) All in all, learning from industry experts, is a wonderful opportunity for student to getting acquainted with professional etiquette, acquiring professional knowledge, and getting to know the internal workings of an organization.
- (o) Salient features of ETS are hereunder:
- (i) ETS is offered from I semester to VI semester.
 - (ii) ETS, in any given semester, is treated as one credit course
 - (iii) Students are required to earn six credits (from I to VI semester)
 - (iv) **Head, Centre for i²RE shall be the institute level ETS coordinator**
 - (v) Under this course, a minimum of 10 expert talks shall be organized in **online/offline mode** by the parent department / Centre for i²RE.
 - (vi) Each expert talk shall be for a minimum duration of 45 minutes (*but not exceeding 90 minutes*) followed by **online quiz/test** for 10 marks (10 MCQs/FiBs; *duration: 10-15 mins*), on the contents covered in the expert talk.
 - (vii) **The Head C-i²RE shall share the marks obtained by the students in each of the quizzes / tests to the respective department ETS coordinators.**
 - (viii) Each student shall attend a minimum of 6 expert talks and attempt the corresponding quizzes/ tests conducted at the end of the talks.
 - (ix) **Report on ETS:** At the end of semester, the student shall submit a well-documented report on the acquired knowledge and skills, in the prescribed format, to the department ETS coordinator.
 - (x) **Evaluation:** There shall be only continuous Internal Evaluation (CIE) for ETS for a maximum of 100 marks
 - (xi) The department ETS coordinator shall, in coordination with institute level ETS coordinator, submit the final scores to the CoE in week (N+1).
- (p) The CIE for ETS is as follows:

Rubrics for evaluation of ETS

| | |
|--|-----------|
| Quiz score (<i>sum of best 6 quiz scores out of 10 quizzes. Each quiz evaluated for 10 marks</i>) | 60 marks |
| Attendance (<i>out of 10 quizzes</i>) | 20 marks |
| Report in prescribed format (<i>max 30% plagiarism</i>) | 20 marks |
| Total | 100 marks |

- i. **Attendance:** Maximum of 20 marks shall be awarded based on the attendance maintained by the student over a maximum of 10 lectures.

$$\text{Marks for attendance} = \frac{\text{Number of expert talks attended fully}}{10} * 20$$

ii. Supplementary Exam:

- (a) Student has to register for ETS supplementary examination if he/she scores less than 40 marks in CIE
- (b) The ETS supplementary examination shall be conducted by the parent department, in physical mode, for 100 marks (MCQs/FiBs ; duration: 2Hrs) on the content covered in ETS lectures.
- (c) Department ETS coordinator shall, in coordination with the institute level ETS coordinator, conduct the supplementary exam, and submit scores to the CoE
- (d) Exam material/resources for supplementary: Recorded videos of ETS arranged for that semester, which shall be made available on ETS webpage of institute website

Course Learning Outcomes (COs):

After completion of this course, the students should be able to...

CO1: identify real-world problems, different career paths, industry requirements, emerging job roles, business practices and exploit new opportunities by staying up-to-date with industry knowledge, trends and technology

CO2: identify what 21st century employability-related skills and professional etiquette are must in a range of recruitment situations, what skills are absent in him/her, and demonstrate skill improvement

CO3: interact with experts, exhibit confidence, demonstrate improved communication and networking abilities potentially leading to mentorship opportunities, internships, or even future job prospects

CO4: demonstrate the generic competencies in making a well-documented report portraying knowledge, skills, qualities acquired through ETS sessions and impact of the expert talks

| Course Articulation Matrix (CAM): | | U24AE110 EXPERT TALK SERIES-1 | | | | | | | | | | | | | |
|-----------------------------------|------------|-------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| CO | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO1 | PSO 2 |
| CO1 | U24AE110.1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 |
| CO2 | U24AE110.2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 |
| CO3 | U24AE110.3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 |
| CO4 | U24AE110.4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 |
| U24AE110 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 |
| 3 - HIGH, 2 - MEDIUM, 1 - LOW | | | | | | | | | | | | | | | |

Course code U24AEXYY: *X represents semester, YY represents ETA course serial number*

2nd Semester Syllabus



KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE

Opp : Yerragattu Gutta, Hasanparthy (Mandal), WARANGAL - 506 015, Telangana, INDIA.

काकतीय प्रौद्योगिकी एवं विज्ञान संस्थान, वरंगल - ५०६ ०१५ तेलंगाना, भारत

కాకతీయ సాంకేతిక విజ్ఞాన శాస్త్ర విద్యాలయం, వరంగల్ - ౫౦౬ ౦౧౫ తెలంగాణ, భారతదేశము

(An Autonomous Institute under Kakatiya University, Warangal)

(Approved by AICTE, New Delhi; Recognised by UGC under 2(f) & 12(B); Sponsored by EKASILA EDUCATION SOCIETY)

DEPARTMENT OF INFORMATION TECHNOLOGY

B. Tech (IT) -CURRICULUM & SYLLABUS (KITSW-URR24)

Abbreviations

| | | | |
|---|-----------------|---|---|
| L | Lecture Hours | O | Outside the Class Work (Self Study) Hours |
| T | Tutorial Hours | E | Total Engagement in Hours |
| P | Practical Hours | C | Credit Assigned |

II SEMESTER

| Sl. No. | Category | Course Code | Course Title | Lectures / week | | | | | Credits |
|---|----------|-------------------|---|-----------------|----------|-----------|-----------|-----------|-----------|
| | | | | L | T | P | O | E | |
| 1 | BSC | U24MH201 | Matrix Theory and Vector Calculus | 2 | 1 | - | 6 | 9 | 3 |
| 2 | BSC | U24PY202B | Engineering Physics (Common to CSM, CSD, CSN, CSO & IT) | 2 | 1 | 2 | 5 | 10 | 4 |
| 3 | PCC | U24IT203 | Computer Architecture and Organization | 2 | 1 | - | 4 | 7 | 3 |
| 4 | PCC | U24IT204 | Data Structures through C | 2 | 1 | 2 | 5 | 10 | 4 |
| 5 | ESC | U24EE205B | Basic Electrical Engineering (Common to CSM, CSD, CSN, CSO & IT) | 2 | 1 | 2 | 5 | 10 | 4 |
| 6 | VAC | U24CH206 | Environmental Studies | 2 | - | - | 2 | 4 | - |
| 7 | AEC | U24AE207 | Idea Lab Makerspace | - | - | 2 | 2 | 4 | 1 |
| 8 | SEC | U24SE208 | Programming Skill Development Lab - 1 | - | - | 2 | 2 | 4 | 1 |
| 9 | ELC | U24EL209 | Practicum-2 | - | - | - | 4 | 4 | 1 |
| 10 | VAC | U24VA210 XXXXX | SEA-2/ SAA -2 | - | - | - | 2 | 2 | 1 |
| 11 | AEC | U24AE211 | Expert Talk Series-2 | - | - | - | 1 | 1 | 1 |
| Total: | | | | 12 | 5 | 10 | 38 | 65 | 23 |
| Summer/ Inter-sem Bridge Courses (Approved by BoS and Dean,AA): 1 week to 10 days: 1 credit to each Bridge course under additional learning (will be printed on grade sheet) | | | | | | | | | |

MATRIX THEORY AND VECTOR CALCULUS

| | | | |
|--|------------------|---------------------------------------|-------------|
| Class: B.Tech. II -Semester | | Branch: Common to all branches | |
| Course Code: | U24MH201 | Credits: | 3 |
| Hours/Week (L-T-P-O-E): | 2-1-0-6-9 | CIE: | 60 % |
| Total Number of Teaching Hours: | 36 Hrs | ESE: | 40 % |

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on...

LO1: various methods of solving system of linear equations and eigen value problems

LO2: double integral, triple integral and their applications

LO3: vector differential calculus and applications

LO4: integration of vector valued functions and applications

UNIT-I

9 Hrs

Matrices:

Rank of a Matrix, Elementary transformations of a matrix, Gauss Jordan method of finding the inverse, Normal form of a matrix, Consistency of linear system of equations, System of linear homogenous equations, Eigen values, Eigen vectors, Properties of Eigen values, Cayley Hamilton's theorem, Reduction to diagonal form, Factorization method (LU Decomposition)

Applications of Eigen value problems: Stretching of an elastic membrane, Eigen value problems arising from Markov processes, Eigen value problems arising from population models, Leslie model

Self-Learning Topics (SLTs): Review of Matrices [Text 1: topics 2.1,2.2,2.3,2.4,2.5]

PAQ –Normal form [Text 1, topic 2.7(7), Solved problems: 2.26, Practice problems: exercise 2.4 (9,10)]

Additional problems on System of homogeneous and non-homogeneous equations [Text 1: topic 2.18, Solved problems: 2.52, Practice problems: exercise 2.10 (13,14)]

Additional problems on Eigen values and Eigen vectors [Text 2: topic 8.1, Solved problems: 8.1(1,2), Practice problems: exercise 8.1(4,6)]

Nature of Quadratic form [Text 1: topic 2.18, Solved problems: 2.52, Practice problems: exercise 2.10 (13,14)]

UNIT-II

9 Hrs

Multiple Integrals and Beta, Gamma functions:

Double Integrals, change of order of integration, Double Integrals in polar coordinates, Area enclosed by plane curves, Triple integrals, Volumes of solids, Calculation of Mass for a plane lamina, Beta function, Gamma function, Relation between Beta and Gamma functions (without proof).

Self-Learning Topics (SLTs): Review of integrals [Text 1: topic Appendix VII (1)]

Additional problems on change of order of integration [Text 1: topic 7.2, Solved problems: 7.4,7.6, Practice problems: exercise 7.1 (9,14)]

Centre of gravity of a plane lamina [Text 1: topic 7.10, Solved problems 7.34,7.35, Practice problems: exercise 7.6 (9,10)]

Moment of Inertia of plane lamina [Text 1: topic 7.12(1,2), Solved problems: 7.37,7.38, Practice problems: exercise 7.7 (1,4)]

Additional problems on Volume of solids [Text 1: topic 7.6, Solved problem: 7.21, Practice problems: exercise 7.4 (12,25)]

| UNIT-III | 9 Hrs |
|--|-------|
| <p>Vector Calculus and its applications: - Vector Space, Linear dependent and independent vectors, Differentiation of vectors, Curves in space, Tangent, Principal normal, Binormal, Curvature, Torsion, Velocity and acceleration, Scalar and vector point functions, Del applied to scalar point functions - Gradient, Geometrical interpretation, Directional derivative, Del applied to vector point functions -Divergence, Curl, Physical interpretation of divergence, Physical interpretation of curl, Del applied twice to point functions, Del applied to products of point functions, Decomposition of vector valued functions</p> <p>Self-Learning Topics (SLTs): Review of vectors [Text 2: topics 9.1, 9.2, 9.3] Vector identities [Text 1: topic 8.9, Solved problems: 8.22, 8.23, Practice problems: exercise 8.4 (13,14)] Additional problems on Directional derivatives [Text 1: topic 8.5(3), Solved problems: 8.13,8.14, Practice problems: exercise 8.3 (4,6,8,9)]</p> | |
| UNIT-IV | 9 Hrs |
| <p>Integration of vectors: Line integral, Surfaces-Surface integral, flux across a surface, Green's theorem in the plane (without proof), Stoke's theorem (Relation between line and surface integrals) (without proof), Volume integral, Gauss divergence theorem (Relation between surface and volume integrals) (without proof), irrotational fields, solenoidal fields</p> <p>Self-Learning Topics (SLTs): Additional problems on Green's theorem [Text 1: topic 8.13, Solved problems: 8.33,8.35, Practice problems: exercise 8.8 (1,2,4)] Additional problems on Stoke's theorem [Text 1: topics 8.14, Solved problems: 8.39, 8.40, Practice problems: exercise 8.9 (1,2)] Additional problems on Gauss Divergence theorem [Text 1: topic 8.16, Solved problems: 8.44,8.46, Practice problems: exercise 8.10 (1,2)]</p> | |
| <p>Course Learning Outcomes (COs): After completion of this course, the students should be able to...</p> <p>CO1: analyze eigen value problems using matrix theory CO2: apply basic concepts of multiple integrals in evaluating physical quantities of real-life engineering problems CO3: apply differential operators on vector and scalar point functions CO4: solve line, surface, volume integrals and correlate these with applications of Green, Stoke and Gauss divergence theorems</p> | |
| <p>Textbook(s):</p> <ol style="list-style-type: none"> 1. Grewal, B.S., <i>Higher Engineering Mathematics</i>, Khanna Publishers, Delhi, 44th edition, 2017 (Chapters 2,7,8) 2. Kreyszig E, <i>Advanced Engineering Mathematics</i>, Inc, U.K, John Wiely &sons, 10th edition, 2020 (Chapter 8(8.2)) | |

Reference Book(s):

1. Spiegel M, *Vector Analysis -Schaum's Series*, McGraw Hill, 2nd edition, 2017
2. S.S. Sastry, *Engineering Mathematics, Vol.II*, Prentice Hall of India, 3rd edition, 2014.
3. Gilbert Strang, *Introduction to Linear Algebra*, Wellesley-Cambridge Press, 5th edition
- 4.

Web and Video link(s):

1. <https://youtu.be/L4crGhtEX14?si=hyjAPgDhejOhXtYZ> : NPTEL Video Lecture on Matrix Analysis with Applications/Dr.S.K.Gupta and Dr.Sanjeev Kumar/IIT Roorkee
2. https://youtu.be/ksS_yOK1vtk?si=CNNA58OluszubPiX : NPTEL Video Lecture on Integral and Vector Calculus./Prof.Hari Shankar Mahato / IIT Kharagpur

| Course Articulation Matrix (CAM): | | U24MH201 MATRIX THEORY AND VECTOR CALCULUS | | | | | | | | | | | | | |
|-----------------------------------|------------|--|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
| CO1 | U24MH201.1 | 2 | 2 | 1 | 1 | - | - | - | 1 | - | 1 | - | 1 | 1 | - |
| CO2 | U24MH201.2 | 2 | 2 | 1 | 1 | - | - | - | 1 | - | 1 | - | 1 | 1 | - |
| CO3 | U24MH201.3 | 2 | 2 | 1 | 1 | - | - | - | 1 | - | 1 | - | 1 | 1 | - |
| CO4 | U24MH201.4 | 2 | 2 | 1 | 1 | - | - | - | 1 | - | 1 | - | 1 | 1 | - |
| U24MH201 | | 2 | 2 | 1 | 1 | - | - | - | 1 | - | 1 | - | 1 | 1 | - |
| 3 - HIGH, 2 - MEDIUM, 1 - LOW | | | | | | | | | | | | | | | |

ENGINEERING PHYSICS

(Common to CSM, CSD, CSN, CSO & IT)

| | | | |
|---|--|------------------|-------------|
| Class: B.Tech. II- Semester | Branch: Common to CSM, CSD, CSN, CSO & IT | | |
| Course Code : | U24PY202B | Credits : | 4 |
| Hours/Week (L-T-P-O-E) : | 2-1-2-5-10 | CIE : | 60 % |
| Total Number of Teaching Hours : | 60 Hrs | ESE : | 40 % |

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on...

LO1: basic principles, operation of lasers and optical fibers

LO2: fundamental laws of electrostatics and magnetostatics, properties of magnetic and superconducting materials

LO3: basic concepts of quantum mechanics and quantum computing

LO4: semiconductor materials, semiconductor diodes and bipolar junction transistors (BJTs)

THEORY COMPONENT

UNIT-I

9 Hrs

Applied Optics and Lasers: Principles of interference, Diffraction phenomena and applications (qualitative), Difference between conventional light and laser, Basic principles and characteristics of lasers, Absorption, Spontaneous and stimulated emission, Population inversion, Pumping methods, Optical resonator; Types of lasers- Ruby laser, He-Ne laser, Diode laser; Applications of lasers

Fiber Optics: Introduction, Total internal reflection, Optical fiber construction, Numerical aperture and acceptance angle, Types of optical fibers - Step index and graded index, Single and multimode, V-number; Power losses in optical fibers - Attenuation, Dispersion, Bending; Fiber optic communication system, Applications of optical fibers - Endoscopy, Fiber optic sensors (temperature and displacement)

Self Learning Topics (SLTs): *Concept of wave and basic concepts- amplitude, wavelength, frequency, phase, phase angle and general wave equation(Text1: topic 1.9), types of waves(Text1: topic 1.10), reflection laws(Text1: topic 1.11)*

UNIT-II

9 Hrs

Electrostatics and Magnetostatics: Electric charges, Coulomb's law, Electric field, Electrostatic potential, Computation of electric field and electrostatic potential due to point and line charges; Magnetic field, Magnetic flux density, Biot-Savart's law, Ampere's law, Faraday's law and Lenz's law

Magnetic and Superconducting materials: Introduction, Permeability, Magnetization, Susceptibility, Origin of magnetism, Bohr magneton, Ferro, Antiferro and ferri magnetic materials, Hysteresis, Soft and hard magnetic materials and their applications; superconductivity, Meissner effect, Transition temperature, Isotope effect, Type-I and type-II superconductors, High T_c superconductors, Applications of superconductors

Self Learning Topics (SLTs): *magnetisation, susceptibility & their relations (Text1: topic 41.2), London penetration depth (Text1: topics 42.4.7), Solved problems (Text1: Prob 42.9 to 42.14)*

| UNIT-III | 9 Hrs |
|--|-------|
| <p>Elements of Quantum Mechanics: Wave-particle duality, de-Broglie wavelength, Physical significance of wave function, Schrodinger time-dependent wave equation, Schrodinger time-independent wave equation, Particle in an infinite potential well (one dimension)</p> <p>Introduction to Quantum Computing: Observables and operators, Expectation values, Expectation values in operator notation, Dirac Bra-Ket notation, Superposition principle, Concept of Quantum bits, Classical versus Quantum computing, Quantum parallelism and Quantum entanglement, Applications of quantum computing</p> <p><i>Self Learning Topics (SLTs): Heisenberg's uncertainty principle (Text1: topics 27.2), Observables and operators (Text1: topics 27.19), Solved problems (Text1: Prob 27.13, Prob 27.17)</i></p> | |
| UNIT-IV | 9 Hrs |
| <p>Semiconductor Physics: Classification of solids based on energy band theory- Conductors, Semiconductors and insulators, Intrinsic semiconductor- carrier generation and recombination; Extrinsic semiconductors - n-type and p-type (qualitative)</p> <p>Semiconductor Diodes and Bipolar Junction Transistors (BJTs): Formation of a PN junction, Forward and reverse bias, PN junction diode, Diode current equation, Zener diode, Zener diode as voltage regulator and their V-I characteristics, Light emitting diode (LED), Transistor structure, Representation of NPN and PNP transistors, Transistor action, Transistor configurations- Common base(CB), Common emitter(CE) and Common collector(CC); Corresponding α, β, γ parameters and their relations and transistor as an amplifier</p> <p>Self Learning Topics (SLTs): <i>drift & diffusion current (Text2: topic 4.9), diode current equation (Text2: topic 4.15), Solved problems (Text2: Prob 4.17 to 4.21)</i></p> | |
| LABORATORY COMPONENT | |
| <p>List of Experiments</p> <ol style="list-style-type: none"> 1. Linear Measurements using Vernier callipers and screw gauge 2. Determination of slit width using He-Ne laser 3. Determination of wavelength of He-Ne laser using reflection and transmission diffraction grating 4. Determination of dielectric constant of materials using parallel plate capacitor 5. Magnetic hysteresis- B-H curve tracing using CRO 6. Numerical aperture and acceptance angle of an optical fiber 7. Study of V-I characteristics of PN junction diode 8. Study of V-I characteristics of LED 9. Study of common emitter characteristics of NPN transistor 10. Energy band gap of a semiconductor material 11. Determination of thickness of thin sheet using air-wedge method 12. Determination of Planck's constant | |
| <p>Textbook(s):</p> <ol style="list-style-type: none"> 1. M. Avadhanulu and Kshirsagar, TVS Arun Murthy, <i>A Text Book of Engineering Physics</i>, S. Chand & Company Ltd, 11th edition, 2018 | |

2. S Salivahanan, N Suresh Kumar, *Electronic devices and circuits*, Mc Graw Hill edition, 2017
3. Michael Nielsen and Isaac Chuang, *Quantum Computation and Quantum Information*, Cambridge University Press, 2010

Reference Book(s):

1. Neil Gershenfeld, *Physics of Information Technology*, Cambridge University Press, 1st edition, 2000
2. V. Rajendran, *Engineering Physics*, Mc Graw Hill edition, 2013
3. Eleanor Rieffel and Wolfgang Polak, *Quantum Computing: A Gentle Introduction*, The MIT Press Cambridge, Massachusetts London, England, 2011
4. R.K. Gaur and S.L.Gupta, *Engineering Physics*, Dhanpath Rai and Sons, 2013
5. David Halliday, Robert Resnick and S Krane, *Physics Volume I&II*, Wiley India Limited, 5th edition, 2014

Web and Video link(s):

1. https://onlinecourses.nptel.ac.in/noc24_ph28/preview; NPTEL video lecture on Concepts in Magnetism and Superconductivity by Prof. Arghya Taraphder IIT Kharagpur
2. https://onlinecourses.nptel.ac.in/noc24_lw07/preview; NPTEL video lecture on Introduction to Law on Electricity by Prof. Uday Shankar, IIT Kharagpur
3. https://onlinecourses.nptel.ac.in/noc24_ph45/preview; NPTEL Video Lecture on Introduction to LASER - Course by Prof. M. R. Shenoy, IIT Delhi
4. https://onlinecourses.nptel.ac.in/noc20_ee77/preview; NPTEL Video Lecture on Semiconductor Devices and Circuits By Prof. Sanjiv Sambandan, IISc Bangalore
5. <https://nptel.ac.in/courses/106106232>; NPTEL Video Lecture on Introduction to Quantum Computing: Quantum Algorithms and Qiskit by Prof. Prabha Mandayam, Prof. Anupama Ray, Prof. Sheshashayee Raghunathan, IIT Madras

Laboratory Manual (for laboratory component):

1. *Engineering Physics Laboratory Manual & Record Book*, Department of PS, KITSW
2. A.K.Katiyar, C.K.Pandey, *Engineering Physics Theory and Practical*, Wiley India Pvt. Ltd, 2nd edition, 2017

Course Learning Outcomes (COs):

After completion of this course, the students should be able to,

(based on cognitive skills acquired from theory component)

CO1: evaluate properties of lasers and optical fibre parameters

CO2: calculate the electric field, electric potential, magnetic field and flux density; determine properties of magnetic and superconducting materials

CO3: evaluate the energy values of a particle in an infinite potential well and apply the quantum principles in quantum computing

CO4: analyze V-I characteristics of semiconductor diodes and suggest their applications; determine resistances of transistor biasing circuits

(based on psychomotor skills acquired from laboratory component)

CO5: measure diameter of wire and hollow tubes using Vernier callipers and screw gauge

CO6: determine the width of a narrow slit and wavelength of laser using diffraction phenomenon and numerical aperture of an optical fiber

CO7: calculate the dielectric constant of a material and plot the hysteresis curve of ferromagnetic material

CO8: determine forward voltage and currents from V-I characteristics of semiconductor diodes; identify cut-off, saturation and active regions of NPN transistor

| Course Articulation Matrix (CAM): | | U24PY202B - ENGINEERING PHYSICS (Common to CSM, CSD, CSN, CSO & IT) | | | | | | | | | | | | | |
|-----------------------------------|-------------|--|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
| CO1 | U24PY202B.1 | 2 | 1 | - | - | - | 1 | - | 1 | 1 | 1 | - | 1 | 1 | - |
| CO2 | U24PY202B.2 | 2 | 1 | - | - | - | 1 | - | 1 | 1 | 1 | - | 1 | 1 | - |
| CO3 | U24PY202B.3 | 2 | 1 | - | - | - | 1 | - | 1 | 1 | 1 | - | 1 | 1 | - |
| CO4 | U24PY202B.4 | 2 | 1 | - | - | - | 1 | - | 1 | 1 | 1 | - | 1 | 1 | - |
| CO5 | U24PY202B.5 | 2 | 1 | - | - | 1 | 1 | - | 1 | 1 | 2 | - | 1 | 1 | - |
| CO6 | U24PY202B.6 | 2 | 1 | - | - | 1 | 1 | - | 1 | 1 | 2 | - | 1 | 1 | - |
| CO7 | U24PY202B.7 | 2 | 1 | - | - | 1 | 1 | - | 1 | 1 | 2 | - | 1 | 1 | - |
| CO8 | U24PY202B.8 | 2 | 1 | - | - | 1 | 1 | - | 1 | 1 | 2 | - | 1 | 1 | - |
| U24PY202B | | 2 | 1 | - | - | 1 | 1 | - | 1 | 1 | 1.5 | - | 1 | 1 | - |
| 3 - HIGH, 2 - MEDIUM, 1 - LOW | | | | | | | | | | | | | | | |

| COMPUTER ARCHITECTURE AND ORGANIZATION | | | |
|--|------------------|--------------------|-------------|
| Class: B.Tech. II -Semester | | Branch : IT | |
| Course Code : | U24IT203 | Credits : | 3 |
| Hours/Week (L-T-P-O-E) : | 2-1-0-4-7 | CIE : | 60 % |
| Total Number of Teaching Hours : | 36 Hrs | ESE : | 40 % |
| Course Learning Objectives (LOs): <i>This course will develop students' knowledge in /on...</i> | | | |
| LO1: basic structure of computers and instruction set architecture | | | |
| LO2: functional units of a processor | | | |
| LO3: concepts of pipelining and performance evaluation | | | |
| LO4: input/output (I/O) organization and main memory system | | | |
| UNIT-I | | 9 Hrs | |
| Basic Structure of Computers: Functional units, Basic operational concepts, Performance | | | |
| Instruction Set Architecture: Memory locations and addresses, Memory operations, Instructions and instruction sequencing, Addressing modes, Assembly language | | | |
| <i>Self Learning Topics (SLTs): Register transfer notation, Assembly language notation (Text1: topics 2.3.1, 2.3.2), Practice problems (Text1: Prob 1.1, Prob 1.2, Prob 2.4), Solved problems on performance computation (Text1: Prob 1.9.1, Prob 1.9.2)</i> | | | |
| UNIT-II | | 9 Hrs | |
| Basic Processing Unit: Fundamental concepts, Instruction execution, Hardware components, Instruction fetch and execution steps, Control signals, Hard-wired control, CISC- style processors | | | |
| <i>Self Learning Topics (SLTs): Program controlled I/O (Text1: topic 3.1.2), An example of a CISC-style I/O program (Text1: topic 3.1.4), Some fundamental concepts of processing unit (Text1: topic 5.1), Solved problems (Text1: 5.9)</i> | | | |
| UNIT-III | | 9 Hrs | |
| Pipelining: Basic concept, Pipeline organization, Pipelining issues, Data dependencies, Memory delays, Branch delays, Resource limitations, Performance evaluation, Superscalar operation, Pipelining in CISC processors | | | |
| <i>Self Learning Topics (SLTs): Introduction to pipelining (Text1: topic 6.1), Effect of stalls and penalties (Text1: topic 6.8.1), Solved problems (Text1: topic 6.12)</i> | | | |
| UNIT-IV | | 9 Hrs | |
| Basic Input / Output: Accessing I/O devices, Interrupts | | | |
| Input / Output Organization: Bus structure, Bus operation, Arbitration, Interface circuits, Interconnection standards | | | |
| The Memory System: Basic concepts, Semiconductor RAM, Read-only memories, Direct memory access, Memory hierarchy, Cache memories, Performance considerations | | | |
| <i>Self Learning Topics (SLTs): Single bus structure (Text1: topic 7.1), SATA, SAS, PCI Express (Text1: topics 7.5.4, 7.5.5, 7.5.6), Concepts of memory system (Text1: topic 8.1), Practice problems (Text1: topic 8.7)</i> | | | |

Course Learning Outcomes (COs)

After completion of this course, the students should be able to,

CO1: identify functional units of a computer and compare the different addressing modes of instructions for execution

CO2: develop the control sequence for execution of an instruction

CO3: solve the problems on pipelining and implement synchronous and asynchronous schemes for transferring data

CO4: analyze memory access time to fetch instructions from main memory and basic input/output operations

Text Book:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, *Computer Organization and Embedded Systems*, McGraw-Hill Education, NeYork, 6th edition, 2012

Reference Book(s):

1. Morris Mano M, *Computer System Architecture*, Pearson Education, 3rd edition, 2007
2. Rajaraman V and Radhakrishnan T, *Computer Architecture and Organization*, PHI Learning, 4th edition, 2011
3. Ram B and Sanjay Kumar, *Computer Fundamentals: Architecture and Organization*, New Age International Publishers, 5th edition, 2018

Web and Video link(s):

1. https://www.youtube.com/channel/UC2GUBG_WsP0OO5tXXocwp3Q/videos; NPTEL Video Lectures on Computer Organization and Architecture- A Pedagogical Aspect by Dr. Arnab Sarkar, Professor of CSE, IIT Guwahati
2. <https://archive.nptel.ac.in/courses/106/105/106105163/>; NPTEL Video Lectures on Computer Architecture and Organization by Prof. Indranil Sengupta, Professor of CSE, IIT Kharagpur
3. <https://archive.nptel.ac.in/courses/106/106/106106092/>; NPTEL Video Lectures on Computer Organization by Prof. S. Raman, Professor of CSE, IIT Chennai

| Course Articulation Matrix (CAM): | | U24IT203 COMPUTER ARCHITECTURE AND ORGANIZATION | | | | | | | | | | | | | |
|-----------------------------------|------------|---|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
| CO1 | U24IT203.1 | 2 | 2 | - | - | - | - | - | 1 | - | 1 | - | 1 | 1 | 1 |
| CO2 | U24IT203.2 | 2 | 2 | 1 | 1 | - | - | - | 1 | - | 1 | - | 2 | 1 | 2 |
| CO3 | U24IT203.3 | 2 | 2 | 2 | 2 | 1 | - | - | 1 | - | 1 | - | 2 | 2 | 1 |
| CO4 | U24IT203.4 | 2 | 2 | 2 | 2 | 1 | - | - | 1 | - | 1 | - | 2 | 2 | 2 |
| U24IT203 | | 2 | 2 | 1.66 | 1.66 | 1 | - | - | 1 | - | 1 | - | 1 | 1.5 | 1.5 |
| 3 - HIGH, 2 - MEDIUM, 1 - LOW | | | | | | | | | | | | | | | |

DATA STRUCTURES THROUGH C

| | | | |
|---|-------------------|-------------------|------------|
| Class: B.Tech. II -Semester | | Branch: IT | |
| Course Code : | U24IT204 | Credits : | 4 |
| Hours/Week (L-T-P-O-E) : | 2-1-2-5-10 | CIE : | 60% |
| Total Number of Teaching Hours : | 60 Hrs | ESE : | 40% |
| Course Learning Objectives (LOs) : | | | |
| <i>This course will develop students' knowledge in/on...</i> | | | |
| LO1: time complexity, space complexity, array operations, and dynamic memory allocation | | | |
| LO2: stacks and various forms of queues | | | |
| LO3: various types of linked lists | | | |
| LO4: various sorting techniques and hashing techniques | | | |
| THEORY COMPONENT | | | |
| UNIT-I | | 9 Hrs | |
| <p>Data Structures: Basic terminology, Classification of data structures, Applications and operations on data structures, Time and space complexity</p> <p>Arrays: Operations on arrays-traversing an array, Inserting an element in an array, Deleting an element from an array, Searching an element using binary search and their complexities,</p> <p>Dynamic Memory Allocation: Memory allocation functions, Dynamic memory allocation for single and two dimensional arrays</p> <p><i>Self Learning Topics (SLTs): Three dimensional and n-dimensional arrays (Text1: topics 2.4.3), passing arrays to functions and pointers (Reference1: topics 3.6, 3.7), Practice problems (Text1: Prob 2.3, Reference1: Prob 1, Prob 2, Prob 3, Prob 4)</i></p> | | | |
| UNIT-II | | 9 Hrs | |
| <p>Stacks: stacks, Array representation of stacks, Operations on a stack-push and pop; Multiple stacks, Applications of stacks- recursion, Fibonacci series, Tower of hanoi, Evaluation of expressions (Infix to postfix conversion, Evaluation of postfix expression)</p> <p>Queues: Queues, Array representation of queues, Double ended queues, Circular queues</p> <p><i>Self Learning Topics (SLTs): Infix to prefix (Reference1: topics 7.7.3), priority Queue(Reference1: 8.4.3), Solved problems (Reference1: Prob 7.7.1, Prob 7.7.2), Practice problems (Text1: Prob 4.5, Prob 4.11, Prob 5.7, Prob 5.9)</i></p> | | | |
| UNIT-III | | 9 Hrs | |
| <p>Linked Lists: Basic terminologies, Linked list versus arrays, Memory allocation and de-allocation for a linked list, Singly linked list, Circular linked list, Doubly linked list, Circular doubly linked list (Linked list operations- traversing, searching, inserting, deleting), Representing stack and queue using linked list</p> <p><i>Self Learning Topics (SLTs): Merging (Text1: topics 3.3), Skiplist (weblink: https://www.geeksforgeeks.org/skip-list/), Deallocation strategy(Text1: topic 3.9), Solved problems (Text1: Prob 3.6.1, Prob 3.6.2), Practice problems (Reference1: Prob 5.5, Prob 5.7, Prob 5.9)</i></p> | | | |

| UNIT-IV | 9 Hrs |
|---|-------|
| <p>Sorting Techniques: Selection sort, Insertion Sort, Shell sort and Radix sort, Time complexities of sorting</p> <p>Hashing: Hashing techniques, Collision resolution techniques, Closed hashing, Open hashing, Comparison of collision resolution techniques</p> <p>Self Learning Topics (SLTs): Two way insertion sort (<i>Text1: topics 10.3.4</i>), <i>Comparison of sorting techniques(Reference1: topics 14.16)</i> Solved problems (<i>Reference1: Prob 15.5, Prob 15.6, Prob 15.7</i>), <i>Practice problems (Text1: Prob 6.4)</i></p> | |
| LABORATORY COMPONENT | |
| List of Experiments | |
| <p>Experiment-I</p> <ol style="list-style-type: none"> 1. Program to implement initialization of array and perform traversal operations in both the directions 2. Program to implement searching operation on array using Linear Search 3. Program to display the count of occurrences of every number in an array <p>Experiment-II</p> <ol style="list-style-type: none"> 4. Program to implement searching operation on array using Binary Search 5. Program to implement insertion operation on array 6. Program to implement deletion operations on array <p>Experiment-III</p> <ol style="list-style-type: none"> 7. Program to implement initialization of arrays and traversal operation with DMA 8. Program to implement matrix addition and subtraction with DMA <p>Experiment-IV</p> <ol style="list-style-type: none"> 9. Program to implement matrix multiplication with DMA 10. Program to implement stack operations 11. Program to convert infix expression into postfix <p>Experiment-V</p> <ol style="list-style-type: none"> 12. Program to evaluate given postfix expression 13. Program to define recursive function to solve tower of hanoi puzzle 14. Program to display the Fibonacci series with the help of recursive function 15. Program to implement MultiStack <p>Experiment-VI</p> <ol style="list-style-type: none"> 16. Program to implement queue operations using arrays 17. Program to implement circular queue operations using arrays 18. Program to implement double ended queue operations using arrays <p>Experiment-VII</p> <ol style="list-style-type: none"> 19. Program to create single linked list and implement its operations <p>Note:- Linked list Operations: i) traversing ii) inserting iii) deleting iv) searching v) reversing vi) concatenation</p> <p>Experiment-VIII</p> <ol style="list-style-type: none"> 20. Program to create circular linked list and implement its operations 21. Program to create double linked list and implement its operations | |

Experiment-IX

22. Program to create circular double linked list and implement its operations

Experiment-X

23. Program to implement stack operations using linked list

24. Program to implement queue operations using linked list

Experiment-XI

25. Program to implement selection sort

26. Program to implement insertion sort

Experiment-XII

27. Program to implement shell sort

28. Program to implement radix sort

29. Program to implement hash table.

Textbook(s):

1. Debasis Samanta, *Classic Data Structures*, Prentice Hall India, 2nd edition, 2009

Reference Book(s):

1. Reema Thareja, *Data Structures Using C*, Oxford University Press, 2nd edition, 2014
2. Balagurusamy E, *Data Structure Using C*, McGraw Hill Education, 1st edition, 2017
3. Richard F. Gilberg and Behrouz A. Forouzan, *Data Structures: A Pseudocode Approach with C*, Cengage Learning, 2nd Edition, 2007

Web and Video link(s):

1. <https://nptel.ac.in/courses/106106130>; NPTEL Video Lecture on Programming and Data Structures Dr. N. S. Narayana Swamy, CSE, IIT Madras.

Laboratory Manual (for laboratory component):

1. *Data Structures through C Laboratory Manual and Record Book*, Department of IT, KITSW.

Course Learning Outcomes (COs):

After completion of this course, the students should be able to,

(based on cognitive skills acquired from theory component)

CO1: analyze and implement array operations by utilizing dynamic memory allocation and evaluating their time and space complexities

CO2: analyze and implement stack and queue data structures by utilizing array representations and evaluating their applications and operational complexities

CO3: analyze and implement various types of linked lists by utilizing dynamic memory allocation techniques and evaluating their operational complexities

CO4: develop various sorting algorithms, analyze their time complexities, and apply hashing techniques with collision resolution methods, comparing their efficiencies

(based on psychomotor skills acquired from laboratory component)

CO5: develop and test basic data structures and array operations, including dynamic memory allocation to evaluate their performance and complexity

CO6: apply the linear data structures such as stacks and queues and perform various operations using LIFO or FIFO order respectively

CO7: solve problems using various linked list representations for efficiently storing and retrieving the data

CO8: apply different sorting techniques on unsorted data and sort them in an order, able to store the data using hashing techniques to retrieve the data very effectively

| Course Articulation Matrix (CAM): | | U24IT204 DATA STRUCTURES THROUGH C | | | | | | | | | | | | | |
|-----------------------------------|------------|------------------------------------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
| CO1 | U24IT204.1 | 2 | 2 | 2 | 1 | - | - | - | 1 | - | 1 | - | 1 | 2 | 1 |
| CO2 | U24IT204.2 | 2 | 2 | 2 | 2 | - | - | - | 1 | - | 1 | - | 2 | 2 | 2 |
| CO3 | U24IT204.3 | 2 | 2 | 2 | 2 | - | - | - | 1 | - | 1 | - | 2 | 2 | 2 |
| CO4 | U24IT204.4 | 2 | 2 | 2 | 2 | - | - | - | 1 | - | 1 | - | 2 | 2 | 2 |
| CO5 | U24IT204.5 | 2 | 2 | 2 | 1 | - | - | - | 1 | 1 | 1 | - | 1 | 2 | 1 |
| CO6 | U24IT204.6 | 2 | 2 | 2 | 2 | - | - | - | 1 | 1 | 1 | - | 2 | 2 | 2 |
| CO7 | U24IT204.7 | 2 | 2 | 2 | 2 | - | - | - | 1 | 1 | 1 | - | 2 | 2 | 2 |
| CO8 | U24IT204.8 | 2 | 2 | 2 | 2 | - | - | - | 1 | 1 | 1 | - | 2 | 2 | 2 |
| U24IT204 | | 2 | 2 | 2 | 1.75 | - | - | - | 1 | 1 | 1 | - | 1.75 | 2 | 1.75 |

BASIC ELECTRICAL ENGINEERING

| | | | |
|---|--|------------------|--------------|
| Class: B.Tech. II -Semester | Branch: Common to CSM, CSD,CSN,CSO & IT | | |
| Course Code : | U24EE205B | Credits : | 4 |
| Hours/Week (L-T-P-O-E) : | 2-1-2-5-10 | CIE : | 60 % |
| Total Number of Teaching Hours : | 60 Hrs | ESE : | 40 % |
| Course Learning Objectives (LOs): | | | |
| <i>This course will develop students' knowledge in /on...</i> | | | |
| LO1: network elements and DC circuits | | | |
| LO2: DC network theorems | | | |
| LO3: 1- Ø AC and 3-Ø AC circuits | | | |
| LO4: construction, principles and applications of DC & AC machines and concept of Lighting sources | | | |
| THEORY COMPONENT | | | |
| UNIT-I | | | 9 Hrs |
| <p>DC circuits: Network elements, Linear & non-linear elements, Active & passive elements, Unilateral & bilateral elements, Ohm's law, Power, Energy, Kirchhoff's laws, Resistances connected in series and parallel, Voltage divider rule & Current divider rule.</p> <p>DC Circuit analysis: Source transformation, Star-Delta conversion, Mesh analysis & Nodal analysis (T & π networks only).</p> <p><i>Self-Learning Topics (SLTs):</i> Definitions of charge, current, & voltage (Text1: Topics1.2.), Solved problems (Text1: Prob 3.10, 3.11 & 3.12), Practice problems (Text1: Chap-3, Prob 4,5,7&8).</p> | | | |
| UNIT-II | | | 9 Hrs |
| <p>DC network theorems (Independent sources only): Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem (T & π networks only).</p> <p><i>Self-Learning Topics (SLTs):</i> Condition for maximum power transfer (Text1: Topics 3.9), Solved problems (Text1: Prob 3.15, 3.18, 3.23 & 3.25), Practice problems (Text1: Chap-3, Prob 9,10,13 & 14).</p> | | | |
| UNIT-III | | | 9 Hrs |
| <p>1-Ø AC circuits: R.M.S value, Average value, Peak factor and form factor of a sine wave, Concept of phasor, Phase and phase difference, Rectangular and polar form representation, Sinusoidal steady state analysis of R, L, C, Series RL, RC, RLC circuits, Concept of Reactance, Impedance, Complex power, Real Power, Reactive power and Power factor.</p> <p>3- Ø AC circuits: Generation of 3- Ø voltages, Advantages, Disadvantages, Applications of a three-phase system, Voltage & current relationships of line and phase values for balanced star and delta connections.</p> <p><i>Self-Learning Topics (SLTs):</i> Expression for RMS & Average value (Text1: Topic, 4.4 & 4.5) Solved problems (Text1: Prob 4.10, 4.12, 4.13 & 4.14), Practice problems (Text1: Chap-4, Prob 8,9,12&12).</p> | | | |
| UNIT-IV | | | 9 Hrs |
| <p>Electrical Machines & Electrical Lighting (Qualitative treatment): Construction, Principle of operation, Characteristics & applications of 1- Ø transformer, 3- Ø induction motor, 1- Ø induction motor and DC motor and Types of DC motor.</p> <p>Electrical lighting sources and Energy calculations: Lighting sources-incandescent, Fluorescent, CFL & LED lamps, Elementary calculations for energy consumption.</p> | | | |

Self-Learning Topics (SLTs): EMF equation of a Transformer (Text1: Part-II Topic, 4.4.2) Solved problems (Text1: Part-II Prob 4.5, 4.6 & 4.7), Practice problems (Text1: Part-II Prob 5.2, 5.3 & 5.4), Practice problems (Text1: Part-II Prob 6, 7 & 8)

LABORATORY COMPONENT

List of Experiments

1. Verification of voltage divider rule and current divider rule
2. Verification of Mesh Analysis
3. Verification of Nodal Analysis
4. Verification of Superposition Theorem
5. Verification of Thevenin's Theorem
6. Verification of Maximum power transfer Theorem
7. Determination of internal parameters of a choke coil
8. Impedance calculations and phasor representation of RL series circuit
9. Impedance calculations and phasor representation of RC series circuit
10. Load test on 1-phase transformer
11. Verification of Kirchoff's laws using PSPICE/MATLAB
12. **Interfacing Sensors with Arduino using TINKER CAD**
 - i. LED blinking
 - ii. IR Sensor
 - iii. Ultrasonic Sensor
 - iv. Voltage Sensor
 - v. Current Sensor
 - vi. Speed Sensor

Textbook(s):

1. K. Uma Rao, *Basic Electrical Engineering*, Pearson Education, 2011.

Reference Book(s):

1. B.L.Thereja, A.K.Thereja, *Electrical Technology Vol. I & II*, S.Chand & Company Ltd, edition, 2005.
2. Edward Hughes, *Electrical & Electronics Technology*, Pearson Education, 10th edition, 2010.
3. D. P. Kothari and I. J. Nagrath, *Basic Electrical Engineering*, Tata McGraw Hill, 4th edition, 2010.
4. Chakravarthy A, Sudhipanath and Chandan Kumar, *Basic Electrical Engineering*, Tata McGraw Hill Ltd, 2nd edition, 2009.

Web and Video link(s):

<https://nptel.ac.in/courses/108/105/108105112//>; NPTEL Video Lecture on Fundamentals of Electrical Engineering by Prof. Debapriya Das, Professor of EED, IITK Kharagpur.

Laboratory Manual (for laboratory component):

1. *Basic Electrical Engineering Laboratory Manual and Record Book, Department of EEE, KITSW.*

Course Learning Outcomes (COs):

After completion of this course, the students should be able to,

(based on cognitive skills acquired from theory component)

CO1 : determine voltage, current & power in electrical circuits using network reduction techniques, mesh & nodal analysis

CO2 : apply suitable network theorems to analyze DC circuits

CO3 : determine impedance, voltage, current, and power in 1- Ø AC circuits & determine line and phase quantities in 3- Ø AC circuits

CO4 : select a suitable electrical machine for given applications and determine the energy consumed by a lighting load.

(based on psychomotor skills acquired from laboratory component)

CO5: validate mesh and nodal analysis

CO6: validate network theorems

CO7: determine the impedance of series RL & RC circuits at various operating frequencies

CO8: determine the efficiency of a transformer by conducting a load test

| Course Articulation Matrix (CAM): | | U24EE205B: BASIC ELECTRICAL ENGINEERING | | | | | | | | | | | | | |
|-----------------------------------|-------------|---|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
| CO1 | U24EE205B.1 | 2 | 1 | - | - | - | - | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO2 | U24EE205B.2 | 2 | 2 | - | - | - | - | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO3 | U24EE205B.3 | 3 | 3 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO4 | U24EE205B.4 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO5 | U24EE205B.5 | 2 | 1 | - | - | - | - | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO6 | U24EE205B.6 | 2 | 2 | - | - | - | - | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO7 | U24EE205B.7 | 3 | 3 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO8 | U24EE205B.8 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| U24EE205B | | 2.5 | 2.25 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 3 - HIGH, 2 - MEDIUM, 1 - LOW | | | | | | | | | | | | | | | |

ENVIRONMENTAL STUDIES

(Common to ME, CSM, CSD, IT, CSN & CSO)

| | | | |
|---|--|------------------|------------|
| Class: B.Tech. II Semester | Branch: Common to ME, CSM, CSD, IT, CSN & CSO | | |
| Course Code : | U24CY206 | Credits : | 0 |
| Hours/Week(L-T-P-O-E) : | 2-0-0-5-7 | CIE : | 60% |
| Total Number of Teaching Hours : | 24Hrs | ESE : | 40% |
| <p>Course Learning Objectives (LOs): <i>This course will develop students' knowledge in/on...</i> LO1: natural resources and their usage more equitably LO2: ecosystem and the importance of biodiversity conservation LO3: environmental pollution and it's control measures LO4: environmental legislation and green methodology</p> | | | |
| UNIT-I | | 6 Hrs | |
| <p>The Multidisciplinary Nature of Environmental Studies: Definition, Scope and importance Natural Resources: Forest Resources-Use and overexploitation of forests, Deforestation, Timber extraction, Mining, Dams and their effects on forests and tribal people; Water Resources-Use and over-utilization of surface and ground water, Floods, Drought, Conflicts over water; Mineral Resources-Environmental effects of extracting and using mineral resources; Energy Resources-Renewable and non-renewable energy sources, Use of alternate energy sources</p> <p><i>Self Learning Topics (SLTs): Use and over-utilization of surface and ground water(Text1: unit 2, topic: 2.2.2) world food problems(Text1: unit 2, topic 2.2.2)</i></p> | | | |
| UNIT-II | | 6 Hrs | |
| <p>Ecosystem and Biodiversity: Ecosystem: Concepts of an ecosystem, Food chain, Food webs, Ecological pyramids, Energy flow in the ecosystem and ecological succession Biodiversity and its Conservation: Introduction, Definition, Genetic, Species and ecosystem diversity, Value of biodiversity, Biodiversity in India, Hot spots of biodiversity, Man-wildlife conflicts, Endangered and endemic species of India; In-situ and Ex-situ conservation</p> <p><i>Self Learning Topics (SLTs): Introduction and definition of biodiversity (Text1: unit 4, topic 4.1)</i></p> | | | |
| UNIT-III | | 6 Hrs | |
| <p>Environmental Pollution: Global issues-Global climatic change, Greenhouse gases, Effects of global warming, Ozone layer depletion International Conventions/Protocols: Earth summit, Kyoto protocol, Montreal protocol Environmental Pollution-Causes and effects of air, Water, Soil, Marine and noise pollution with case studies Solid and Hazardous Waste Management: Introduction, Types, Effects of urban industrial and nuclear waste Natural Disaster Management: Introduction to disaster, Management of disaster, Disaster management of flood, earthquake, cyclone and landslides Role of information technology in environment and human health <i>Self Learning Topics (SLTs): Role of individual in prevention of pollution (Text1: unit 5, topic 5.10)</i></p> | | | |

| UNIT-IV | 6 Hrs |
|---|-------|
| <p>Social Issues and the Environment: Role of Individual and Society, Water conservation, Rain water harvesting</p> <p>Environmental Protection/Control Acts: Air (prevention and control of pollution) act 1981, Forest conservation act (1980 and 1992), Wildlife protection act 1972, Environment protection act 1986, Issues involved in enforcement of environmental legislations</p> <p>Green Methodology: Principles of green chemistry, Green methods in electronic production, Impact of electronic waste on public health and environment; United nations goals of sustainable development</p> <p><i>Self Learning Topics (SLTs):</i>Water (prevention and control of pollution) act 1974(Text1: unit 6, topics 6.10), Water pollution cess act 1977(Text1: unit 6, topics 6.11)</p> | |
| <p>Course Learning Outcomes (COs):</p> <p>After completion of this course, the students should be able to ...</p> <p>CO1: identify the natural resources and practice their usage more equitably</p> <p>CO2: develop an action plan for sustainable alternatives and conserving biodiversity</p> <p>CO3: examine and perceive the solutions for the environmental pollution</p> <p>CO4:adapt issues involved in enforcement of environmental legislation and green methodology</p> | |
| <p>Text Book:</p> <ol style="list-style-type: none"> Erach Bharucha, <i>Text Book of Environmental Studies for Under Graduate Courses</i>, 2nd edition, Universities Press (India) Pvt. Ltd, 2013 | |
| <p>Reference Book(s):</p> <ol style="list-style-type: none"> Y. Anjaneyulu, <i>Introduction to Environmental Science</i>, B.S. Publications, 2004. Gilbert M. Masters, <i>Introduction to Environmental Engineering & Science</i>, 3rd edition, Prentice Hall of India, 1991 Anubha Kaushik, C.P. Kaushik, <i>Environmental Studies</i>, 4th edition, New Age International Publishers, 2014 R. Rajagopalan, <i>Environmental Studies from crisis to cure</i>, Oxford University Press, 2nd edition, 2011 | |
| <p>Web and Video link(s):</p> <ol style="list-style-type: none"> https://archive.nptel.ac.in/noc/courses/noc22/SEM1/noc22-ch27/ video lecture on renewable energy resources by Prof. Vaibhav. V. Goud and Dr. R. Ananda lakshmi, Dept. Of Chemical Engineering, Guwahati. | |

| Course Articulation Matrix (CAM): | | U24CY206 ENVIRONMENTAL STUDIES | | | | | | | | | | | | | |
|-----------------------------------|------------|--------------------------------|------|------|----|----|------|------|----|----|----|----|----|-----|-----|
| CO | | PO | PO | PO | PO | PO | PO | PO | PO | PO | PO | PO | PO | PSO | PSO |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| CO1 | U24CY206.1 | 2 | 1 | 2 | 1 | - | 2 | 1 | - | 1 | - | - | - | - | - |
| CO2 | U24CY206.2 | - | - | 2 | - | - | 1 | 2 | - | 1 | - | - | - | - | - |
| CO3 | U24CY206.3 | 1 | 2 | 1 | - | - | 1 | 1 | 1 | 1 | - | - | - | - | - |
| CO4 | U24CY206.4 | - | - | 1 | - | - | 1 | 2 | - | 1 | - | - | - | - | - |
| U24CY206 | | 1.50 | 1.50 | 1.50 | 1 | - | 1.25 | 1.50 | 1 | 1 | - | - | - | - | - |
| 3 - HIGH, 2 - MEDIUM, 1 - LOW | | | | | | | | | | | | | | | |

IDEA Lab Makerspace

| | | | |
|------------------------------------|-----------|---------------------------------------|------|
| Class: B.Tech. II -Semester | | Branch: Common to all branches | |
| Course Code: | U24AE207 | Credits: | 1 |
| Hours/Week (L-T-P-O-E): | 0-0-2-2-4 | CIE : | 100% |
| Total Number of Lab Hours: | 36 Hrs | ESE : | - |

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on...

LO1: carpentry and CNC wood router

LO2: mould for sand casting and arc welding joints

LO3: laser engraving, 3D printing and robots in manufacturing

LO4: Printed Circuit Board (PCB) and Internet of Things (IoT)

LABORATORY COMPONENT

| S. No. | Creative Fabrication Technology | List of Experiments |
|-----------------------|---------------------------------|--|
| 1. | Carpentry | Prepare a half lap dovetail joint |
| 2. | CNC Wood Router | Perform wood carving using CNC Wood Router |
| 3. | Foundry | Prepare a sand mould using single piece pattern |
| 4. | Welding | Prepare a single V-butt joint on mild steel plates using AC arc welding machine |
| 5. | Injection Moulding | Prepare a plastic product using Injection moulding machine |
| 6. | Laser Engraving | Perform key chain by using CO ₂ laser cutting machine |
| 7. | 3D Printing | Prepare a key chain on 3D printer with the given dimensions |
| 8. | | Prepare a Spur Gear on 3D printer with the given dimensions |
| 9. | Robotics | Perform basic pick-and-place operation using robot |
| 10. | Printed Circuit Board (PCB) | Design and fabricate a PCB for a given application |
| 11. | Internet of Things (IoT) | Measure the temperature and humidity by using DHT11 sensor and Arduino UNO |
| 12. | | Create a smart plant watering system using IoT |
| Course Project | | <ul style="list-style-type: none"> Students are required to create an affordable prototype as their course project, based on the knowledge and skills acquired during the course. Students have to present and submit their prototypes to demonstrate their ability to apply classroom learning practically, showcasing their creativity and technical aptitude. |

Laboratory Manual:

- IDEA Lab Makerspace Laboratory Manual & Record Book (LMRB) prepared by the faculty of department of Mechanical Engineering, KITSW, Revised version 4, August-2024.*

Text/ Reference Book(s):

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy., "Elements of Workshop Technology", Media Promoters and publishers Pvt. Ltd, India, Vol-I-2008 & Vol-II-2010.

2. Ian Gibson, David Rosen, Brent Stucker, Mahyar Khorasani, "Additive Manufacturing Technologies- 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing" Springer Nature, 2nd Edition 2021.
3. R.S. Khandpur, "Printed Circuit Boards: Design, Fabrication, Assembly and Testing", New Delhi Tata Mc Graw Hill-2008.
4. Sudeep Mishra, Anandarupmukherjee and Arijit Roy, "Introduction to IoT", New Delhi: University Cambridge Press, 2021.

Course Learning Outcomes (COs):

After completion of this course, the students should be able to ...

(based on psychomotor skills acquired from laboratory component)

CO1: produce wooden joints and intricate articles using carpentry and CNC wood router respectively

CO2: implement procedures to prepare the mould cavity for sand casting and arc welding joints

CO3: produce innovative prototypes using laser engraving and 3D printing

CO4: design and develop systems based on PCB and IoT for given applications

| Course Articulation Matrix (CAM): | | U24AE207-IDEA Lab Makerspace | | | | | | | | | | | | | |
|-----------------------------------|------------|------------------------------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
| CO1 | U24AE207.1 | 2 | 2 | 1 | 1 | 2 | 1 | - | 1 | 2 | 2 | - | 1 | - | - |
| CO2 | U24AE207.2 | 2 | 2 | 1 | 1 | 2 | 1 | - | 1 | 2 | 2 | - | 1 | - | - |
| CO3 | U24AE207.3 | 2 | 2 | 1 | 1 | 2 | 1 | - | 1 | 2 | 2 | - | 1 | - | - |
| CO4 | U24AE207.4 | 2 | 2 | 1 | 1 | 2 | 1 | - | 1 | 2 | 2 | - | 1 | - | - |
| U24AE207 | | 2 | 2 | 1 | 1 | 2 | 1 | - | 1 | 2 | 2 | - | 1 | - | - |
| 3 - HIGH, 2 - MEDIUM, 1 - LOW | | | | | | | | | | | | | | | |

PRACTICUM-2

| | | | |
|--|---------------------------------------|-----------------|--------------|
| Class: B.Tech. II -Semester | Branch: Common to all branches | | |
| Course Code: | U24EL209 | Credits: | 1 |
| Hours/Week (L-T-P-O-E): | 0-0-0-4-4 | CIE : | 100 % |
| Total Number of Teaching Hours: | - | ESE : | |

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on...

LO1: literature review and identifying research gaps

LO2: implementing a project independently by applying knowledge to practice

LO3:preparingwell-documented report and informative PPT

LO4: effective technical presentation and creating video pitch

Practicum is an independent project carried out by the student during the course period, under the supervision of allotted course faculty. It helps to reinforce the students' theoretical knowledge and develop their ability to apply this knowledge to the solution of practical problems. Practicums also prepare them for their MINI and MAJOR PROJECTs and for independent work in their chosen field that promotes creative abilities. Besides they provide Higher Order Cognitive Abilities (HOCAs).

- (x). Practicum is a mandatory semester project work.
- (xi). Practicum is offered as a one credit course. Student has to earn 4 credits (one in each semester from I to IV semesters)
- (xii). Allotment of Practicum topics for students:
 - o **Practicum matrix:** In week (-1), the class teacher, in consultation with HoD, shall prepare the practicum matrix of the section. The practicum matrix is the allotment of group of students to the different course faculty of the section, as shown below.

| Course | U24PY202B | U24IT203 | U24IT204 | U24EE205B | U24CY206 | U24MH201 |
|---|-----------|----------|----------|-----------|----------|----------|
| Students allotted to different courses | B24IT001 | B24IT012 | B24IT023 | B24IT034 | B24IT045 | B24IT056 |
| | B24IT002 | B24IT013 | B24IT024 | B24IT035 | B24IT046 | B24IT057 |
| | B24IT003 | B24IT014 | B24IT025 | B24IT036 | B24IT047 | B24IT058 |
| | B24IT004 | B24IT015 | B24IT026 | B24IT037 | B24IT048 | B24IT059 |
| | B24IT005 | B24IT016 | B24IT027 | B24IT038 | B24IT049 | B24IT060 |
| | B24IT006 | B24IT017 | B24IT028 | B24IT039 | B24IT050 | B24IT061 |
| | B24IT007 | B24IT018 | B24IT029 | B24IT040 | B24IT051 | B24IT062 |
| | B24IT008 | B24IT019 | B24IT030 | B24IT041 | B24IT052 | B24IT063 |
| | B24IT009 | B24IT020 | B24IT031 | B24IT042 | B24IT053 | B24IT064 |
| | B24IT010 | B24IT021 | B24IT032 | B24IT043 | B24IT054 | B24IT065 |
| | B24IT011 | B24IT022 | B24IT033 | B24IT044 | B24IT055 | |

- o In week (-1), the class teacher of a section shall collect 10-12 topics for practicum from each of the course teachers of that section.
- o The class teacher, in consultation with HoD shall allot the practicum topics to the students of that section in the following format.

CIRCULAR

Allotment of Practicum topics to students

Section :

| S.No. | Roll number of the student | Practicum topic allotted | Practicum under the course | Course faculty |
|-------|----------------------------|--------------------------|----------------------------|----------------|
| | | | | |
| | | | | |

Note:

4. The students should meet immediately the allotted course faculty for practicum and start working on the practicum with the guidance of course faculty.
5. To complete the Practicum, the student shall work in laboratories under supervision of allotted course faculty, in the allotted hours in the classwork timetable and also outside the class work hours during weekdays.
6. The course faculty are advised to guide the allotted students for practicum during the semester course work.

(Signature of class teacher)

- (xiii). *To complete the practicum, the student shall work in laboratories under supervision of allotted course faculty, in the allotted hours in the classwork timetable and outside the class work hours during weekdays.*
- (xiv). There shall be only continuous Internal Evaluation (CIE) for practicum for a maximum of 100 marks.
- (xv). The practicum course faculty shall evaluate & submit the final marks of the allotted students in week (N+1) to the respective class teacher.
- (xvi). The class teacher shall collect the final marks of practicum of the students allotted to each course teacher and submit them to the CoE.
- (xvii). Course faculty shall follow his/her own rubrics for practicum evaluation. Focus shall be on knowledge, skills & qualities acquired by the student during the practicum course
- (viii). A sample rubrics for assessment and evaluation of practicum is as follows:

| | |
|---|------------------|
| Literature survey & Identification of research gaps | 10 marks |
| Working model / process / software package / system developed | 30 marks |
| Report writing (subjected to max of 30% plagiarism) | 20 marks |
| Oral presentation with PPT and viva-voce | 20 marks |
| Video pitch | 20 marks |
| Total | 100 marks |

Note: It is mandatory for the student to appear for oral presentation and viva-voce to qualify for course evaluation of Practicum.

- (h) **Practicum Topic:** Each student shall be allotted a topic for practicum by the course faculty member attached to him/her. Interested students can work on their own title for practicum, but with due approval from course faculty.
- (i) **Working Model:** Each student is required to develop a prototype / process / system/simulation model on the given practicum topic and demonstrate/present, during the allotted time, before the course teacher.
- (j) **Report:** Each student is required to submit a well-documented report on the allotted practicum topic as per the format specified by the course faculty. The student shall include

answers to the following questions in the report and ppt presentation.

- What was the objective of the practicum assigned?
- What are the main responsibilities and tasks for practicum?
- What knowledge and skills from the coursework are applied in the practicum?
- What new knowledge and skills are acquired during the practicum?
- In what ways, can the practicum be helpful for the professional career?
- What gaps are identified in your practicum work?
- What improvements or changes you suggest for addressing the identified gaps for future work?

(k) **Anti-Plagiarism Check:** The practicum report should clear plagiarism check as per the Anti-Plagiarism policy of the institute

(l) **Presentation:** Each student should prepare PPT with informative slides and make an effective oral presentation before the course teacher as per the schedule notified by the department

(m) **Video Pitch:** Each student should create a pitch video, which is a video presentation on his / her Practicum. Video pitch should be no longer than 5 minutes by keeping the pitch concise and to the point, which shall also include evidence like videos & pics at the time of implementing the practicum and also key points about his / her business idea / plan (*if any*) and social impact

(n) The student has to register for the Practicum as a supplementary examination in the following cases:

- iv) he/she is absent for oral presentation and viva-voce
- v) he/she fails to submit the report in prescribed format
- vi) he/she fails to fulfill the requirements of Practicum evaluation as per specified guidelines

Course Learning Outcomes (COs):

After completion of this course, the students should be able to...

CO1: synthesize literature survey, identify research gaps and define objective & scope of practicum problem

CO2: apply knowledge to design & conduct experiments, utilize modern tools for solution of practicum problem and develop working model/ process/ system

CO3: demonstrate the generic competencies in making a well-documented report portraying knowledge, skills, qualities acquired through practicum

CO4: create a video pitch on practicum and make an effective oral presentation using PPTs

| Course Articulation Matrix (CAM): | | U24EL209 PRACTICUM-2 | | | | | | | | | | | | | |
|-----------------------------------|------------|----------------------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
| CO1 | U24EL209.1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| CO2 | U24EL209.2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| CO3 | U24EL209.3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| CO4 | U24EL209.4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| U24EL209 | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 3 - HIGH, 2 - MEDIUM, 1 - LOW | | | | | | | | | | | | | | | |

| SOCIAL EMPOWERMENT ACTIVITY-2 / SELF ACCOMPLISHMENT ACTIVITY-2 (SEA-2/SAA-2) | | | |
|--|---------------------------------------|-----------------|-------------|
| Class: B.Tech. II Semesters | Branch: Common to all branches | | |
| Course Code: | U24VA210 | Credits: | 1 |
| Hours/Week (L-T-P-O-E): | 0-0-0-2-2 | CIE: | 100% |
| Total Number of Teaching Hours: | - | ESE : | - |
| Course Learning Objectives (LOs): | | | |
| <i>This course will develop students' knowledge in /on...</i> | | | |
| LO1: holistic development through activity-based learning to gain real-life experience which effectively help individuals deal appropriately with problems/challenges | | | |
| LO2: positive mindset by actively adopting optimism, acceptance, resilience, gratitude, mindfulness, and integrity and handling rejection in life | | | |
| LO3: skills for effective fieldwork practice , which include ethics, observation, communication, interviewing, problem solving, time management, organisation and documentation | | | |
| LO4: making a well-documented report and an effective oral presentation through PPTs portraying knowledge, skills, qualities acquired and social impact of the activity | | | |
| <p>Activity Based Liberal Learning about Life, Literature and Culture (ABLL@LLC) is introduced for building generic competencies in students. ABLL is aimed at all dimensional holistic growth of the learner. The holistic development includes the physical, emotional, cognitive, spiritual and social aspects. This is an area which opens the decision-making process, helps the student to develop creativity, an analytical mind, and builds resilience, confidence, hope, well-being and success. This will help student face the world with a greater degree of maturity, stoic and become a wholesome person in the society.</p> <p>It is more than just learning from books to lead a successful life. These activity-based liberal learning courses, which help students to expand their social roles later in life, are offered under two sequels namely SEA (Social Empowerment Activities) and SAA (Self Accomplishment Activities)</p> <p>These SEA/SAA courses also focus on building positive mindset: adopting optimism, acceptance, resilience, gratitude, mindfulness, and integrity in your life will help student develop and maintain a positive mindset.</p> <ul style="list-style-type: none"> (f) Each SEA/SAA activity is treated as one credit course (g) Student must select one activity per semester, through first 04 semesters, from the courses listed under SEA/ SAA, before commencement of the semester. (h) Students are required to earn minimum 04 credits under SEA/SAA, by completing minimum 02 credits through SEA and minimum 02 credits through SAA (i) To complete these activities student shall work outside the class work hours, during weekends, holidays, semester breaks, etc., (j) If a student is not able to attend/ fulfil performance requirements, he/she shall be dropped from the course and shall have to enrol in the forthcoming semesters. <p>Monitoring SEA/SAA:</p> <ul style="list-style-type: none"> (h) Nodal units: The Student Activity Centre (SAC) and Centre for Innovation Incubation Research and Entrepreneurship (C-i²RE) shall act as nodal units for activities listed under | | | |

SEA/SAA.

- (i) During the semester period, the student has to **acquire requisite knowledge, conduct fieldwork**, acquire skills and propose unique solutions to the real-life problems
- (j) **Knowledge Acquisition & Skilling:**
- iv. Students have to identify goals, acquire and accumulate knowledge on the chosen SEA/SAA activity
 - v. For the activities related to social awareness/issues/challenges that affect society, use the knowledge base, apply relevant skills to analyse the issue and propose unique possible solutions to the social issues/challenges. Practice to acquire necessary skills to seek new opportunities in their personal and professional life.
 - vi. For the activities related to physical fitness, music, dance, fine arts, etc., guided practice sessions under supervision of expert/guru are to be planned and executed to acquire the benchmark skills to be demonstrated.
- (k) **Fieldwork:** Fieldwork is an essential component of learning for gaining real-life experiences. In addition to knowledge acquisition & skilling, student has to take up fieldwork on the chosen activity, as part of SEA/SAA course.
- xv. This student-driven Fieldwork allow students to interact with the 'real world'. It is an autonomous learning (self-learning) situation that students are more actively involved during the activity and develop a deeper understanding and develop a more positive attitude.
 - xvi. Fieldwork consists of three phases: preparation, the actual activity and feedback
 - xvii. **As part of fieldwork, student has to interact with at least two eminent personalities/achievers/renowned persons/inspiring and great personalities related to the activity chosen.**
 - xviii. Fieldwork will benefit students for any careers where they need to work with communities of people or which involves analysis of complex processes, especially social and cultural.
 - xix. Certain skills are required for effective fieldwork, which include observation, communication, interviewing, problem solving, documentation, and more
 - xx. Other skills important for fieldwork practice include the ability to act in a crisis, to plan, set priorities, mobilize resources, and implement the plan effectively. These skills used in an integrated manner help students solve their problems and to develop one's own leadership style based on the need and culture of the place.
 - xxi. **Eminent personalities/achievers/renowned persons/inspiring and great personalities**
- Eminent personalities/ Achievers / Renowned personalities:
- (a). **In case of socially relevant problems/ activities of SEA/SAA:** Eminent personalities/ achievers include district administrative officers, Eminent Social workers / NGOs, other inspiring and great personalities
 - (b). **In case of Sports / Games and Cultural activities of SEA/SAA:** Eminent coaches/ trainers/gurus, achievers who represented/won state level/national level /international level competitions, other inspiring and great personalities.
- xxii. **For appointment to interact eminent personalities:** Student is expected to follow email etiquette rules and other appropriate polite communication etiquettes for getting appointment and time for interaction

- xxiii. On fieldwork, student is expected to demonstrate solid time management, organisational and note taking skills during fieldwork
- xxiv. **Ethics of fieldwork:** Fieldwork is an educational process with commitment to positive values. All fieldwork should be planned and conducted in a way that is ethical, responsible and safe, for people, students, visited communities, if any, and all other stakeholders. Student is expected to maintain integrity and honesty. Avoid bias and deception. Protect the rights and well-being of people involved in fieldwork. The privacy, confidentiality and respect for the eminent people interacted should be maintained and their time, inputs & guidance are to be acknowledged
- xxv. Student is expected to take care of health and Safety practices for fieldwork and travel
- xxvi. Student should remember that contrary to a *field trip or company visit*, **the emphasis in fieldwork is on acquiring skills**, and not on casually presenting theory and assessing.
- xxvii. For the fieldwork, student shall go with a scientifically designed questionnaire and record the responses during interaction. These response sheets, along with geo-tagged pic of fieldwork (at the time of interaction & practise sessions, if any) shall be appended as annexures in the report to be submitted for course evaluation.
- xxviii. **Feedback:** The learnings the student made out of interaction with eminent achievers shall be presented in the report as one of the chapters.
 - During feedback, the central focus is on the elaboration of the students' experience during fieldwork. Therefore, the student should create an end product, such as a demonstration/presentation and report in which they demonstrate a link between their experiences during fieldwork and the underlying theoretical concepts and ideas.
- (l) **Demonstration / Presentation and Report:** Student after presentation/demonstration of his/her achievements/work, shall get a certificate from the concerned nodal unit and submit a report, in the prescribed format, to the faculty counsellor for award of grade.
- (m) **Flow process for completion of SEA/SAA course:**
- vi. **Faculty counsellor approval:** In week (-1), in consultation with faculty counsellor, every student shall, identify minimum of 4 activities listed under SEA/SAA activities, lists their priority and fills the same in ONLINE REGISTRATION FORM FOR SEA/SAA (received in their domain mail id) to Dean, Student Affairs. Dean, Student Affairs shall release the section wise allotment of SEA/SAA courses to students along with the details of supervising faculty of nodal centre. The allotment details shall be shared to the SEA/SAA coordinator and the student through domain mail id of the student
- vii. **Identification of goals and preparation of action plan:** In week (1), the respective faculty coordinator(s) of nodal centres shall address the students allotted to them to educate them on fixing goals, plan of action for completion and evaluation. In consultation with nodal centre, based on the workflow of the allotted activity, every student shall identify the goals (of activity) & eminent personalities (to be visited during the field trip) and prepare action plan (oriented workflow) for attaining the identified goals.

- viii. **Field work:** Under the guidance of nodal centre, student shall complete the field work, based on the action plan, with the progress continuously monitored by the faculty counsellor and the nodal centre.
 - ix. **Demonstration/ Presentation:** After completion of field work, student shall demonstrate/present his achievements (knowledge/skills gained during the activity) at the nodal centre in the presence of external experts/senior practitioners of the activity. After successful demonstration/presentation, the nodal centre shall provide a certificate of completion indicating that the student has completed the activity in the stipulated time.
 - x. **Report writing:** After successful demonstration/presentation, student shall write a 2-3-page report and submit the same to the faculty counsellor. The report shall emphasize knowledge, skills and qualities acquired through the SEA/SAA activities. It shall also include the influence of these activities on enhancing confidence, positive change in life, decision making, transforming choices into desired actions/outcomes.
- (n) **Assessment & Evaluation:** There shall be *only Continuous Internal Evaluation (CIE)* for SEA/SAA. The SEA/SAA activities shall be evaluated at the end of the semester through respective evaluation processes, which shall include field work, presentation/demonstration, submission of reports on the gathered data/information/ surveys, the details of which have been shown in below table. The department level SEA/SAA coordinator shall collect marks from the nodal centres and faculty counsellors, consolidate them, and submit the final grades to the examination branch, within one week of the last day of instruction. Evaluation of SEA/SAA activities shall be completed as and when students are ready, but not later than week (N+1).

The CIE for SEA/SAA is as follows:

| Assessment | Maximum marks | Marks to be awarded by |
|--|---------------|------------------------|
| Goal setting, Planning & Knowledge Acquisition | 20 | Nodal centre |
| Field work | 40 | Nodal centre |
| Demonstration/Presentation | 20 | Nodal centre |
| Report submission | 20 | Faculty counsellor |
| Total | 100 | - |

Note:

- (f) **Presentation/ Demonstration:** It is mandatory for the student to appear for demonstration and (or) oral presentation oral presentation to qualify for course evaluation. In case of presentation, student should prepare PPT with informative slides including the geo tagged photos of his/her field trips/interactions as per the schedule notified by the nodal centre. In case of demonstration, student must take timeslot from the nodal centre and demonstrate the skills learnt/improved during the allotted timeslot.

- The necessary arrangements for demonstration shall be looked after the student in consultation with the coordinator with due permission from Head of the department.
- (g) **Report:** Each student is required to submit a well-documented report on the chosen SEA/SAA topic as per the format specified by *department level SEA/SAA coordinator*.
- (h) **Anti-Plagiarism Check:** The SEA/SAA report should clear plagiarism check as per the Anti-Plagiarism policy of the institute.
- (i) **Requirements for passing the course:** A student is deemed to have passed SEA/SAA if he/she
 - a. successfully demonstrates/presents the skills attained at the end of course as per the schedule notified by the nodal centre, **and**
 - b. scores a minimum of 40 marks in the CIE of the course
- (j) **Supplementary examination:** If a student fails in SEA/SAA activity of a particular semester, he must complete the same by enrolling it in the next higher semesters.

Course Learning Outcomes (COs):

After completion of this course, the students should be able to...

- CO1:** integrate the five dimensions of physical, emotional, cognitive, spiritual and social aspects in life for holistic development and demonstrate social sensibility
- CO2:** interact effectively through written, oral and nonverbal communication with external-world in a professional, sensitive and culturally relevant manner
- CO3:** analyse the issues related to social empowerment / self-accomplishment, demonstrate problem-solving skills, articulate solutions and demonstrate social sensibility
- CO4:** demonstrate the generic competencies in making a well-documented report and an effective oral presentation with PPTs portraying knowledge, skills, qualities acquired through fieldwork/practice sessions and social impact of the course learning

Text / Reference book(s):

For knowledge acquisition, students shall refer to textbooks and web resources relevant to the course selected. Plan for fieldwork/practice sessions in coordination with SEA/SAA coordinator

| Course Articulation Matrix (CAM): | | U24VA210- SEA-2/ SAA-2 | | | | | | | | | | | | | |
|-----------------------------------|------------|------------------------|------|------|------|------|------|------|------|------|-------|-------|-------|------|-------|
| CO | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO1 | PSO 2 |
| CO1 | U24VA210.1 | - | - | - | - | - | 2 | 2 | 2 | 2 | 2 | 2 | 2 | - | - |
| CO2 | U24VA210.2 | - | - | - | - | - | 2 | 2 | 2 | 2 | 2 | 2 | 2 | - | - |
| CO3 | U24VA210.3 | - | - | - | - | - | 2 | 2 | 2 | 2 | 2 | 2 | 2 | - | - |
| CO4 | U24VA210.4 | - | - | - | - | - | 2 | 2 | 2 | 2 | 2 | 2 | 2 | - | - |
| U24VA210 | | - | - | - | - | - | 2 | 2 | 2 | 2 | 2 | 2 | 2 | - | - |
| 3 - HIGH, 2 - MEDIUM, 1 - LOW | | | | | | | | | | | | | | | |

EXPERT TALK SERIES-2

| | | | |
|--|------------------|---------------------------------------|------------|
| Class: B.Tech. II -Semester | | Branch: Common to all branches | |
| Course Code: | U24AE211 | Credits: | 1 |
| Hours/Week (L-T-P-O-E): | 0-0-0-1-1 | CIE Marks (%): | 100 |
| Total Number of Teaching Hours: | - | ESE Marks (%): | - |

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on...

- LO1:** 21st century skills needed for industry, current industry trends, challenges and innovations
- LO2:** latest technology in practice and applying knowledge to solve real-world problems
- LO3:** smart work, soft skills, professional etiquette, networking abilities
- LO4:** making a well-documented report portraying the knowledge, skills, qualities acquired and the impact of the learning

In the 21st century, for successful career, degree alone won't suffice. Competencies are much more important.

- (q) You need to be aware of the real-world problems, industry working style, need to be confident and smart and you also need to know the tricks of the trade.
- (r) Learning from industry experts with real-world examples, is important to enhance your educational experience.
- (s) Enhanced graduate employability benefits all stakeholders. To effectively enhance employability and the immediacy of adding value to company/project, it is important that you are aware of what you are learning and its use in the workplace. The cognitive abilities viz., remember, understand, recall, and application of knowledge and other skills acquired in higher education can be maximised if you are clear on the purpose of your developed competencies and how to apply them in a range of complex situations.
- (t) Graduate employability could be enhanced through fostering lifelong learning, the development of a range of employability-related competencies and increased confidence and capacity in "reflecting on and articulating these capabilities and attributes in a range of recruitment situations".

But how would you know all this without venturing into the industry?

- (u) The answer is **Industry Expert Talk Series (ETS)**. Through ETS, we invite industry experts in different fields to deliver talks and interact with students.
- (v) Through Industry expert talks students get to know so much more that textbooks don't explain.
- (w) Students have the opportunity to learn from professionals who have achieved success in their respective fields. These speakers often share their personal experiences, case studies, and anecdotes, providing students with real-world examples and perspectives that go beyond theoretical concepts.
- (x) Our competency-focussed curriculum URR24 is designed to contribute greatly to the nurturing and development of each of these facets among students through ETS courses
- (y) ETS helps students gain improved industry engagement for an easier transition into the workplace, broader career progression opportunities and personal development.
- (z) In URR24 curriculum, Expert talk series (ETS) is offered as a course under **ability enhancement category of courses**.

- (aa) Through ETS sessions, students get the chance to interact with industry regularly which helps them focus on the needs and requirements of current industry. This will not only enthuse the students with new ideas but also motivate them to understand what kind of 21st century skills are needed in industry and how they need to groom themselves.
- (bb) Through ETS sessions, another benefit is that students learn the importance of soft skills like communication, presentation, email etiquettes, corporate grooming and dressing styles. Conversing with successful people is the biggest motivation and students gain in more ways than one through ETS sessions.
- (cc) ETS enhances your learning in many ways for global opportunities for your career.
- (dd) All in all, learning from industry experts, is a wonderful opportunity for student to getting acquainted with professional etiquette, acquiring professional knowledge, and getting to know the internal workings of an organization.
- (ee) Salient features of ETS are hereunder:
- (xii) ETS is offered from I semester to VI semester.
 - (xiii) ETS, in any given semester, is treated as one credit course
 - (xiv) Students are required to earn six credits (from I to VI semester)
 - (xv) **Head, Centre for i²RE** shall be the **institute level ETS coordinator**
 - (xvi) Under this course, a minimum of 10 expert talks shall be organized in **online/offline mode** by the parent department / Centre for i²RE.
 - (xvii) Each expert talk shall be for a minimum duration of 45 minutes (*but not exceeding 90 minutes*) followed by **online quiz/test** for 10 marks (10 MCQs/FiBs; *duration: 10-15 mins*), on the contents covered in the expert talk.
 - (xviii) **The Head C-i²RE** shall share the marks obtained by the students in each of the quizzes / tests to the respective **department ETS coordinators**.
 - (xix) Each student shall attend a minimum of 6 expert talks and attempt the corresponding quizzes/ tests conducted at the end of the talks.
 - (xx) **Report on ETS:** At the end of semester, the student shall submit a well-documented report on the acquired knowledge and skills, in the prescribed format, to the department ETS coordinator.
 - (xxi) **Evaluation:** There shall be only continuous Internal Evaluation (CIE) for ETS for a maximum of 100 marks
 - (xxii) The department ETS coordinator shall, in coordination with institute level ETS coordinator, submit the final scores to the CoE in week (N+1).
- (ff) The CIE for ETS is as follows:

Rubrics for evaluation of ETS

| | |
|--|-----------|
| Quiz score (<i>sum of best 6 quiz scores out of 10 quizzes. Each quiz evaluated for 10 marks</i>) | 60 marks |
| Attendance (<i>out of 10 quizzes</i>) | 20 marks |
| Report in prescribed format (<i>max 30% plagiarism</i>) | 20 marks |
| Total | 100 marks |

- ii. **Attendance:** Maximum of 20 marks shall be awarded based on the attendance maintained by the student over a maximum of 10 lectures.

$$\text{Marks for attendance} = \frac{\text{Number of expert talks attended fully}}{10} * 20$$

iii. Supplementary Exam:

- (e) Student has to register for ETS supplementary examination if he/she scores less than 40 marks in CIE
- (f) The ETS supplementary examination shall be conducted by the parent department, in physical mode, for 100 marks (MCQs/FiBs ; duration: 2Hrs) on the content covered in ETS lectures.
- (g) Department ETS coordinator shall, in coordination with the institute level ETS coordinator, conduct the supplementary exam, and submit scores to the CoE
- (h) Exam material/resources for supplementary: Recorded videos of ETS arranged for that semester, which shall be made available on ETS webpage of institute website

Course Learning Outcomes (COs):

After completion of this course, the students should be able to...

CO5: identify real-world problems, different career paths, industry requirements, emerging job roles, business practices and exploit new opportunities by staying up-to-date with industry knowledge, trends and technology

CO6: identify what 21st century employability-related skills and professional etiquette are must in a range of recruitment situations, what skills are absent in him/her, and demonstrate skill improvement

CO7: interact with experts, exhibit confidence, demonstrate improved communication and networking abilities potentially leading to mentorship opportunities, internships, or even future job prospects

CO8: demonstrate the generic competencies in making a well-documented report portraying knowledge, skills, qualities acquired through ETS sessions and impact of the expert talks

| Course Articulation Matrix (CAM): | | U24AE211 EXPERT TALK SERIES-2 | | | | | | | | | | | | | |
|-----------------------------------|------------|-------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| CO | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO1 | PSO 2 |
| CO1 | U24AE211.1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 |
| CO2 | U24AE211.2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 |
| CO3 | U24AE211.3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 |
| CO4 | U24AE211.4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 |
| U24AE211 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 |
| 3 - HIGH, 2 - MEDIUM, 1 - LOW | | | | | | | | | | | | | | | |

1st Year Exit Courses Syllabus

Courses for Exit:

Successful completion of two subjects (6-Credits) during 2-months internship at the institute
OR
Successful completion of two suitable skill based courses (external) to qualify for Certification

A. After First Year: (UG Certificate in IT)

(i) The candidate should pass any two of the following additional courses (ITI Level) during the 2-Months internship at institute

| Exit Option to Qualify UG Certificate in IT: Any Two (02) Courses during the 2 - Months internship | | | | | | | | | |
|---|----------|-------------|--|---|---|---|---|---|---|
| S. No. | Category | Course Code | Course Title | L | T | P | O | E | C |
| 1 | PCC | U24IT212X | PC Software | 2 | - | 2 | - | 4 | 3 |
| 2 | PCC | U24IT213X | Digital Marketing | 2 | - | 2 | - | 4 | 3 |
| 3 | PCC | U24IT214X | Web Designing | 2 | - | 2 | - | 4 | 3 |
| 4 | PCC | U24IT215X | Hardware and Networking | 2 | - | 2 | - | 4 | 3 |
| 5 | PCC | U24IT216X | Any other course approved by BoS Chair and Dean AA | | | | | | |

(OR)

(ii) Any two suitable skill based courses to qualify for Certification.

| Exit Option to Qualify UG Certificate in IT: Any Two (02) Skill based Courses -: | | | | | | | | | |
|---|----------|-------------|---|---|---|---|---|---|---|
| S. No. | Category | Course Code | Course Title | L | T | P | O | E | C |
| 1 | SEC | U24SE212XIT | UNIX/LINUX Programming https://www.udemy.com/course/complete-linux-training-course-to-get-your-dream-it-job/?couponCode=ST3MT72524 | - | - | 6 | - | 6 | 3 |
| 2 | SEC | U24SE213XIT | Java Programming https://learn.oracle.com/ols/learning-path/java-fundamentals/55593/55578 | - | - | 6 | - | 6 | 3 |
| 3 | SEC | U24SE214XIT | Advanced Data Structures https://www.udemy.com/course/data-structures-and-algorithms-deep-dive-using-java/?couponCode=ST3MT72524 | - | - | 6 | - | 6 | 3 |
| 4 | SEC | U24SE215XIT | SQL and PL/SQL Programming https://www.udemy.com/course/the-ultimate-mysql-bootcamp-go-from-sql-beginner-to-expert/?couponCode=ST3MT72524 | - | - | 6 | - | 6 | 3 |
| 5 | SEC | U24SE216XIT | Any other skill based course approved by BoS Chair and Dean AA | - | - | 6 | - | 6 | 3 |

| PC SOFTWARE | | | |
|--|-------------|-------------------|-------|
| Class: B.Tech. II -Semester (Exit) | | Branch: IT | |
| Course Code | : U24IT212X | Credits | : 3 |
| Hours/Week (L-T-P-O-E) | : 2-0-2-0-4 | CIE | : 60% |
| Total Number of Teaching Hours | : 16 Hrs | ESE | : 40% |
| Course Learning Objectives (LOs): | | | |
| <i>This course will develop students' knowledge in /on...</i> | | | |
| LO5: document, paragraph formatting, formatting sections, tables and mail merge | | | |
| LO6: excel worksheet, formulas, functions and if functions | | | |
| LO7: storing and managing databases in excel and creating charts in excel | | | |
| LO8: formatting a presentation, adding movement and sound to a presentation | | | |
| THEORY COMPONENT | | | |
| UNIT-I | | 4 Hrs | |
| Getting to Know Office: Start and exit an application, Ribbon, File menu operations | | | |
| Creating a Word Document: Start a new document, Choose between manual and style-based text formatting, Change the text font, Size, Apply text-color, effects, formatting, Check spelling and grammar, Email a document to others, Save document in various formats, Print your work | | | |
| Paragraph Formatting: Adjust paragraph spacing, Border, Background, Creating bullets and numbers lists, Apply styles, Modify styles | | | |
| Formatting Sections, Pages, and Documents: Set-margins, Page size and orientation, Multicolumn document | | | |
| Working with Tables and Graphics in Word | | | |
| Reference and Mail Merges in Word | | | |
| UNIT-II | | 4 Hrs | |
| Creating Basic Excel Worksheets: Understanding the excel interface, Move between cells, Select cells and ranges, Enter and edit text in cells, Use autofill to fill cell content, Copy and move data between cells, Insert and delete rows, columns, and cells, Create and manage multiple worksheets | | | |
| Creating Excel Formulas and Functions: Write basic formulas, Copy and move formulas, Insert functions, Show the current date or time with a function, Calculate loan terms, Perform math calculations, Evaluate a condition with an <i>if</i> function, Formatting and printing excel worksheet | | | |
| UNIT-III | | 4 Hrs | |
| Storing and Managing Databases in Excel: Create an excel database, Sort a table, Filter a table, Add a total row to a table, Create queries, Remove duplicates from a dataset, Restrict data entry with validation rules | | | |
| Creating Charts in Excel: Choose the correct chart type, Create a chart, Move and resize a chart, Switch rows and columns, Modify the data range for a chart, Change the axis scale of a chart, Apply a chart style, Change a chart's color, Add or remove chart elements, Format a chart element | | | |
| UNIT-IV | | 4 Hrs | |
| Formatting a Presentation: Understanding templates versus themes, Change the theme, Change the presentation colors and fonts, Modify the theme in slide master view, Enable footer placeholders, Format text boxes and placeholders, Create smart art graphics, Modify the structure of a smart art graphic, Format a smart art graphic | | | |
| Adding Movement and Sound to a Presentation: Add slide transition effects, Set slides to advance manually or automatically, Animate objects, Insert a sound clip, Insert a video clip on a | | | |

slide

Presenting a Slide Show: Display a slide show onscreen, Annotate slides with the pen tools, Use Presenter view, Print handouts, Export handouts to word

LABORATORY COMPONENT

List of Experiments

1. Create a word document about the importance of ms-office tools in the daily life, by applying various word formatting tools - font, size, text color, specific formatting styles
2. Create a document and apply various paragraph features like specified spacing, border, background, and bullet or number list style
3. Create a table and apply all the features related to the tables, split, merge, insert, insert an image to the cell
4. Scenario: You are an administrator at a school and have been tasked with notifying parents about their child's attendance shortage. You have a list of 20 students who have not met the minimum attendance requirements. Prepare a mail merge document with suitable fields and text
5. Describe the process of moving between cells in an Excel worksheet using both mouse and keyboard methods. How would you select a range of cells that are not adjacent to each other
6. Describe how to use the AutoFill feature to populate a series of dates in a column. Additionally, detail the steps required to copy data from one cell to another non-adjacent cell, and describe how to insert a new row between existing rows in a worksheet
7. Loan Term Evaluation Using IF Condition-You have a spreadsheet with loan amounts listed in column A. You need to determine the loan term based on the amount borrowed and calculate the monthly payment for each loan. The loan terms are as follows:
 - If the loan amount is less than 50,000, the term is 5 years
 - If the loan amount is between 50,000 and 100,000, the term is 10 years
 - If the loan amount is more than 100,000, the term is 15 years
8. Create an excel database of customer transactions, apply various filter to sort the database. How would you sort the table to display the most recent transactions first, filter the table to show only transactions above 50000 rupees, and then remove any duplicate entries
9. After analyzing sales data, you decide to create a chart in excel to present the information. Which chart type would be most appropriate for showing monthly sales trends, and how would you customize the chart's colors and format the axis scale to reflect thousands of rupees
10. Using the PowerPoint interface, create a presentation on 'The Evolution of Renewable Energy'. Start by selecting an appropriate theme and customizing it with your preferred colors and fonts in the Slide Master view. Ensure you include a variety of slide layouts. Populate your slides with relevant content, including text, graphics, and images. Add transitions between slides, animate key objects, and insert audio clips to enhance your points. Finally, prepare the presentation for delivery by setting up the slides to advance manually. How would you structure your presentation to maintain a logical flow and engage your audience effectively

Text Book:

1. Faithe Wempen, *Microsoft Office 2016 At Work for Dummies*, New York, John Wiley & Sons, Inc, 1st edition, 2016

Reference Book(S):

1. Sushil Goel *PC Software, Delhi*, Nat Raj Publishing House, 1st edition
2. Alex Leon, Mathew Leon *Introduction Computers with MS-Office 2000*.
3. Lalith Bali, *Microsoft Office 2016 Word Excel One Note Book*, Delhi, Notion Press, 1st edition

Web and Video link(s):

1. https://www.youtube.com/playlist?list=PLLy_2iUCG87CUBbhq5BEAiC--fF6lEOe1
NPTEL Video Lectures on Decision Making with Spreadsheet, by Prof. Ramesh Abanandam, IIT Roorkee

Laboratory Manual (for laboratory component):

1. *PC Software Laboratory Manual and Record Book*, Department of IT, KITSW

Course Learning Outcomes (COs)

*After completion of this course, the students should be able to,
(based on cognitive skills acquired from theory component)*

CO1: design word documents with rich text formatting features

CO2: apply excel mathematical function in various calculations

CO3: design database & apply sorting filters to the data tables and create various charts to for the given data

CO4: create good presentation using various text animations, sound effects and videos
(based on psychomotor skills acquired from laboratory component)

CO5 : implement documents using office formatting tools

CO6 : solve various numerical problems using excel functions

CO7 : create tables in excel and apply various filtering mechanisms to sort the tables

CO8 : design and create presentations using video and audio tools

Course Articulation Matrix (CAM):**U24IT212X PC SOFTWARE**

| CO | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-----------|-------------|-----|-----|-----|------|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | U24IT212X.1 | 2 | 2 | 2 | 2 | - | - | - | 1 | - | 1 | - | 1 | 2 | 2 |
| CO2 | U24IT212X.2 | 2 | 2 | 2 | 2 | - | - | - | 1 | - | 1 | - | 1 | 2 | 2 |
| CO3 | U24IT212X.3 | 2 | 2 | 2 | 2 | - | - | - | 1 | - | 1 | - | 1 | 2 | 2 |
| CO4 | U24IT212X.4 | 2 | 2 | 2 | 2 | - | - | - | 1 | - | 1 | - | 1 | 2 | 2 |
| CO5 | U24IT212X.5 | 1 | 1 | 2 | 1 | - | - | - | 1 | 1 | 1 | - | 1 | 2 | 2 |
| CO6 | U24IT212X.6 | 1 | 1 | 2 | 2 | - | - | - | 1 | 1 | 1 | - | 1 | 2 | 2 |
| CO7 | U24IT212X.7 | 1 | 1 | 2 | 3 | - | - | - | 1 | 1 | 1 | - | 1 | 1 | 1 |
| CO8 | U24IT212X.8 | 1 | 1 | 2 | 3 | - | - | - | 1 | 1 | 1 | - | 1 | 1 | 1 |
| U24IT214X | | 1.5 | 1.5 | 2 | 2.12 | - | - | - | 1 | 1 | 1 | - | 1 | 1.75 | 1.75 |

3 - HIGH, 2 - MEDIUM, 1 - LOW

| DIGITAL MARKETING | | | |
|---|-----------|-------------------|--------------|
| Class: B.Tech. II -Semester (Exit) | | Branch: IT | |
| Course Code : | U24IT213X | Credits : | 3 |
| Hours/Week (L-T-P-O-E) : | 2-0-2-0-4 | CIE : | 60 % |
| Total Number of Teaching Hours : | 32 Hrs | ESE : | 40 % |
| Course Learning Objectives (LOs): <i>This course will develop students' knowledge in /on...</i> | | | |
| LO1: fundamentals of digital marketing, marketing strategy and marketing communications | | | |
| LO2: micro-environment-situation analysis for digital marketing | | | |
| LO3: online macro-environment | | | |
| LO4: digital marketing strategy and situation analysis | | | |
| THEORY COMPONENT | | | |
| UNIT-I | | | 4 Hrs |
| Introducing Digital Marketing: Introduction - How have digital technologies transformed marketing,Definitions - What are digital marketing and multichannel marketing, Introduction to digital marketing strategy,Introduction to digital marketing communications | | | |
| UNIT-II | | | 4 Hrs |
| Online Marketplace Analysis: Micro-environment-situation analysis for digital marketing,Digital marketing environment,Understanding customer journeys,Consumer choice and digital influence,Online consumer behaviour and implications for marketing,Competitors,Suppliers,New channel structures,Business models for e-commerce | | | |
| UNIT-III | | | 4 Hrs |
| The Online Macro-Environment: The rate of environment change,Technological forces,Economic forces,Political forces,Legal forces,Social force,Cultural force | | | |
| UNIT-IV | | | 4 Hrs |
| Digital marketing strategy: The need for an integrated digital marketing strategy,How to structure a digital marketing strategy,Situation analysis,Setting goals and objectives for digital marketing,Strategy formulation for digital marketing,Strategy implementation. | | | |
| LABORATORY COMPONENT | | | |
| List of Experiments-Case studies | | | |
| 1. Case Study on eBay thrives in the global marketplace | | | |
| 2. Case Study on boo hoo - learning from the largest european dot-com failure | | | |
| 3. Case Study on Zopa launches a new lending model | | | |
| 4. Case Study on Tesco online development strategy supports global expansion | | | |
| Textbook(s): | | | |
| 1. Dave Chaffey and Fiona Ellis-Chadwick, <i>Digital Marketing Strategy, Implementation and Practice</i> , Pearson, 6 th edition, 2016. | | | |
| Reference Book(s): | | | |
| 1. Alan Charlesworth, <i>Digital Marketing: A Practical Approach</i> , Routledge, 3 rd edition, 2018. | | | |
| 2. Philip Kotler, Hermawan Kartajaya and Iwan Setiawan, <i>Marketing 4.0: Moving from Traditional to Digital</i> , Wiley, 4 th edition, 2017. | | | |

3. Damian Ryan, *Understanding Digital Marketing Marketing strategies for engaging the digital generation*, Kogan Page Limited, 3rd edition, 2014.

Web and Video link(s):

1. [Digital Marketing - Course \(swayam2.ac.in\)](http://swayam2.ac.in); NPTEL Video Lecture on Digital Marketing by Digital Marketing

Laboratory Manual (for laboratory component):

1. *Digital Marketing Laboratory Manual and Record Book*, Department of IT, KITSW.

Course Learning Outcomes (COs)

After completion of this course, the students should be able to,

(based on cognitive skills acquired from theory component)

- CO1:** illustrate the different types of digital platforms and digital media to marketing, evaluate the advantages and challenges of digital media and identify the key differences between customer communications digital marketing and traditional marketing
- CO2:** identify the elements of an organisation's online marketplace, evaluate techniques for reviewing the importance of different actors in the micro environment, review changes to business and revenue models enabled by digital market
- CO3:** identify how the macro-environment affects an organisation's digital marketing strategy, planning, implementation and performance that able to relate business strategy
- CO4:** Identify opportunities and threats arising from digital media and technology platforms and Evaluate alternative strategic approaches for using digital platforms

(based on psychomotor skills acquired from laboratory component)

- CO5:** develop a case study on how eBay successfully thrives in the global marketplace
- CO6:** identify Boo.com – insights from the largest European dot-com failure
- CO7:** develop a case study on Zopa's launch of a new lending model
- CO8:** analyze how Tesco's online development strategy supports its global expansion.

| Course Articulation Matrix (CAM): | | U24IT213X DIGITAL MARKETING | | | | | | | | | | | | | |
|-----------------------------------|-------------|-----------------------------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
| CO1 | U24IT213X.1 | 2 | 1 | - | - | - | - | - | 1 | - | - | - | 1 | 2 | 2 |
| CO2 | U24IT213X.2 | 2 | 2 | 2 | 1 | - | - | - | 1 | - | - | - | 1 | 2 | 2 |
| CO3 | U24IT213X.3 | 2 | 2 | 2 | 2 | 1 | - | - | 1 | - | - | - | 1 | 2 | 2 |
| CO4 | U24IT213X.4 | 2 | 2 | 2 | 2 | 1 | - | - | 1 | - | - | - | 1 | 2 | 2 |
| CO5 | U24IT213X.5 | 2 | 1 | - | - | - | - | - | 1 | 1 | 1 | - | 1 | 2 | 2 |
| CO6 | U24IT213X.6 | 2 | 2 | 2 | 1 | - | - | - | 1 | 1 | 1 | - | 1 | 2 | 2 |
| CO7 | U24IT213X.7 | 2 | 2 | 2 | 2 | 1 | - | - | 1 | 1 | 1 | - | 1 | 2 | 2 |
| CO8 | U24IT213X.8 | 2 | 2 | 2 | 2 | 1 | - | - | 1 | 1 | 1 | - | 1 | 2 | 2 |
| U24IT213X | | 2 | 2 | 1.75 | 2 | 1.66 | - | - | 1 | 1 | 1 | - | 1 | 2 | 2 |
| 3 - HIGH, 2 - MEDIUM, 1 - LOW | | | | | | | | | | | | | | | |

| WEB DESIGNING | | | | | |
|--|---|------------------|-------------------|---|-------------|
| Class: B.Tech. II -Semester (Exit) | | | Branch: IT | | |
| Course Code | : | U24IT214X | Credits | : | 3 |
| Hours/Week (L-T-P-O-E) | : | 2-0-2-0-4 | CIE | : | 60 % |
| Total Number of Teaching Hours | : | 32 Hrs | ESE | : | 40 % |
| Course Learning Objectives (LOs): | | | | | |
| <i>This course will develop students' knowledge in/on...</i> | | | | | |
| <p>LO1: HTML elements to create accessible and user-friendly pages, incorporate images, links, tables, forms, and media into web content</p> <p>LO2: complex layouts using CSS shapes and text wrapping and utilize relative, absolute, and fixed positioning for precise control</p> <p>LO3: the basic structure of JavaScript and learn how to embed it into an HTML page and understand the Document Object Model (DOM) and its manipulation</p> <p>LO4: optimal image size and resolution for various devices and screen sizes, convert images into web-friendly formats while preserving quality on HTML page</p> | | | | | |
| THEORY COMPONENT | | | | | |
| UNIT-I | | | 4 Hrs | | |
| <p>Creating a Simple Page: A web page step-by-step, Launch a text editor, Step 1: start with content, Step 2: give the HTML document structure, Step 3: identify text elements, Step 4: add an image, Step 5: change the look with a style sheet, When good pages go bad, Validating your documents</p> <p>Marking Up Text: Paragraphs, Headings, Thematic breaks (horizontal rule), Lists, More content elements, Organizing page content, The inline element roundup, Generic elements (div and span), Improving accessibility with ARIA, Character escapes</p> <p>Adding Links: The href attribute, Linking to pages on the web, Linking within your own site, Targeting a new browser window, Mail links, Telephone links</p> <p>Adding Images: First, a word on image formats, The img element, Adding SVG images, Responsive image markup</p> <p>Table Markup: How to use tables, Minimal table structure, Table headers, Spanning cells, Table accessibility, Row and column groups, Wrapping up tables</p> <p>Forms: How forms work, The form element, Variables and content, The great form control roundup, Form accessibility features, Form layout and design</p> <p>Embedded Media: Window-In-A-Window (iframe), Multipurpose Embedder (object), Video and Audio, Canvas</p> | | | | | |
| UNIT-II | | | 4 Hrs | | |
| <p>Introducing Cascading Style Sheets: The benefits of CSS, How Style Sheets Work, The big concepts, CSS units of measurement, Developer tools right in your browser, Moving forward with CSS</p> <p>Formatting Text: Basic Font Properties, Advanced Typography with CSS3, Changing Text Color, A few more selector types, Text line adjustments, Underlines and other "decorations", Changing capitalization, Spaced out, Text shadow, Changing List Bullets and Numbers</p> <p>Colors and Backgrounds: Specifying color values, Foreground color, Background color, Clipping the background, Playing with opacity, Pseudo-class selectors, Pseudo-element selectors, Attribute selectors, Background images, The shorthand background property, Like a rainbow (gradients), Finally, external style sheets</p> <p>Thinking Inside the Box: The element box, Specifying box dimensions, Padding, Borders, Margins, Assigning display types, Box drop shadows</p> <p>Floating and Positioning: Normal flow, Floating, Fancy text wrap with CSS shapes, Positioning basics, Relative positioning, Absolute positioning, Fixed positioning</p> <p>CSS Layout with Flexbox and Grid: Flexible boxes with CSS flexbox, CSS grid layout</p> | | | | | |

| | |
|---|--------------|
| <p>Responsive Web Design: Why RWD?, The responsive recipe, Choosing breakpoints, Designing responsively, A few words about testing, More RWD resources</p> <p>Transitions, Transforms, and Animation: Ease-y does it (CSS transitions), CSS transforms, Keyframe animation</p> <p>More CSS Techniques: Styling forms, Styling tables, A clean slate (reset and normalize.css), Image replacement techniques, CSS sprites, CSS feature detection, Wrapping up style sheets</p> <p>Modern Web Development Tools: Getting cozy with the command line, CSS power tools (processors), Build tools (grunt and gulp), Version control with Git and GitHub</p> | |
| UNIT-III | 4 Hrs |
| <p>Introduction to JavaScript: What Is JavaScript? Adding JavaScript to a page, The anatomy of a script, The browser object, Events</p> <p>Using JavaScript: Meet the DOM, Polyfills, JavaScript libraries, Big finish</p> | |
| UNIT-IV | 4 Hrs |
| <p>Web Image Basics: Image sources, Meet the formats, Image size and resolution, Image asset strategy, Favicons</p> <p>Image Asset Production: Saving images in web formats, Working with transparency, Responsive image production tips, Image optimization</p> <p>SVG: Drawing with XML, Features of SVG as XML, SVG tools, SVG production tips, Responsive SVGs, Further SVG exploration</p> | |
| LABORATORY COMPONENT | |
| List of Experiments | |
| <ol style="list-style-type: none"> 1. Design a home page that displays information about your college departments using headings, HTML entities, and paragraphs 2. Design a timetable and display it in tabular format. 3. Design an admission form for any course in your college with text, password fields, drop-down list, check-boxes, radio buttons, submit and reset button etc. 4. Create a website for online book store with Home, Login, Catalogue, Registration page with links to all these pages in a menu on top of every page. Embed heading, paragraph, images, video, iframe, form controls, table, list in this website. 5. Design a web page of your home town with an attractive background color, text color, an image, font face by using Inline CSS formatting. 6. Write a JavaScript program to remove a character at the specified position of a given string and return the new string. 7. Write a JavaScript program to compute the sum of elements of a given array of integers. 8. Develop and demonstrate a HTML file that includes JavaScript script for taking a number n as input using prompt and display first n Fibonacci numbers in a paragraph. 9. Develop and demonstrate a HTML file that includes JavaScript script for taking full name in a text field and display first, middle, last name in 3 different labels. Middle and last name may be optional, thus message like "NA" should be displayed in corresponding labels. If the input contains 2 words, then they should be considered as first and last names. 10. Develop and demonstrate a HTML file that includes JavaScript script for switching an image source for a image on click of "change" and "original" button. 11. Design HTML form for keeping student record, apply JavaScript validation in it for restriction of mandatory fields, numeric field, email-address field, specific value in a field etc. 12. Write a JavaScript code that displays text "Bigger Text" with increasing font size in the interval of 10ms in red color, when the font size reaches 50pt it displays "Smaller Text" in green color. Then the font size should decrease to 5pt and then stop. | |

Text Book:

1. Jennifer Niederst Robbins, *Learning Web Design A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics*, O'Reilly Media, 5thedition, 2018.

Reference Book(s):

1. Uttam K. Roy, "Web Technologies", *Oxford University Press*, 1stedition, 2016.
2. Kogent, "Web Technologies HTML, CSS, JavaScript, ASP.NET, Servlets, JSP, PHP, ADO.NET, JDBC and XML", *Dreamtech Press*, 1stedition, 2013.

Web and Video link(s):

https://onlinecourses.swayam2.ac.in/nou24_cs12/preview; NPTEL Video Lecture on CIT-003: Web Based Technologies and Multimedia Applications by Prof.P. V. Suresh, Indira Gandhi National Open University

Laboratory Manual (for laboratory component):

1. *Web Designing Laboratory Manual and Record Book*, Department of IT, KITSW

Course Learning Outcomes (COs)

After completion of this course, the students should be able to,

(based on cognitive skills acquired from theory component)

- CO1:** construct HTML documents from scratch, incorporating text, images, links, tables, forms, and embedded media
- CO2:** utilize CSS to control the layout, appearance, and behavior of HTML elements
- CO3:** utilize JavaScript libraries and frameworks and apply tools to enhance development and create complex applications
- CO4:** implement image best practices to integrate images effectively into web pages, considering factors like accessibility and SEO

(based on psychomotor skills acquired from laboratory component)

- CO5:** create functional and informative web pages, design effective layouts, and implement interactive forms
- CO6:** apply CSS styling to modify the appearance of text, background, and images on a web page
- CO7:** understand JavaScript fundamentals and grasp the core concepts, syntax, and structure of JavaScript programming
- CO8:** create scalable and interactive graphics for web applications and integrate images into web pages

| HARDWARE AND NETWORKING | | | | |
|---|------------------|------------------|-------------------|--|
| Class: B.Tech. II -Semester (Exit) | | | Branch: IT | |
| Course Code : | U24IT215X | Credits : | 3 | |
| Hours/Week (L-T-P-O-E) : | 2-0-2-0-4 | CIE : | 60 % | |
| Total Number of Teaching Hours : | 32 Hrs | ESE : | 40 % | |
| Course Learning Objectives (LOs) : <i>This course will develop students' knowledge in /on...</i> | | | | |
| LO1: computer hardware and maintenance LO2: PC assembling and troubleshooting LO3: networking fundamentals, network devices and protocols, network security and wireless networking LO4: internet and network architecture, network management and troubleshooting | | | | |
| THEORY COMPONENT | | | | |
| UNIT-I | | | 4 Hrs | |
| Computer Hardware and Maintenance: Study of maintenance kit, Computer peripheral, Reassembling computer system, Disk drive performance, File system, Unlock USB port, Speaker, Web camera. | | | | |
| UNIT-II | | | 4 Hrs | |
| PC Assembling and Troubleshooting: Troubleshooting & repairing of motherboard & components on motherboard, Software & Hardware troubleshooting, Use basic hand tools effectively, Able to perform basic troubleshoots of PC, Able to install & maintain software for PC. | | | | |
| UNIT-III | | | 4 Hrs | |
| Networking Fundamentals: Introduction to networking, Network Fundamentals :TCP/IP, HTTP, FTP, Network Topologies: LAN, WAN, MAN Network Devices and Protocols: Network Devices: Router, Switch, Hub, Network Protocols: DHCP, DNS, NAT Network Security and Wireless Networking: Network security :Firewall, VPN, Encryption, Wireless networking :Wi-Fi, Bluetooth | | | | |
| UNIT-IV | | | 4 Hrs | |
| Internet and Network Architecture: Internet concepts : ISP, Domain name, Web hosting; Network architecture : Client-Server, Peer-to-Peer Network Management and Troubleshooting: Network management, Network troubleshooting | | | | |
| LABORATORY COMPONENT | | | | |
| List of Experiments | | | | |
| Hardware: | | | | |
| <ol style="list-style-type: none"> 1. Assembling a PC: Assemble a PC from scratch and install the operating system. 2. BIOS Settings and Configuration: Explore and configure BIOS settings (boot order, time, date). 3. Expansion Card Installation: Install and test expansion cards (graphics, sound, network). 4. Hard Drive Installation and Partitioning: Install and partition a hard drive. | | | | |

5. Printer and Scanner Installation: Install and test printers and scanners.
6. Mobile Device Hardware Troubleshooting: Troubleshoot common mobile device hardware issues (display, battery, charging).

Networking:

7. Configuring a Switch: Configure and test a switch (VLAN, trunking, spanning tree).
8. Implementing a Firewall: Implement and test a firewall (rule-based, NAT, port forwarding).
9. Setting up a Wireless Access Point: Configure and test a wireless access point (SSID, WPA2, MAC filtering).
10. Network Monitoring and Troubleshooting: Use tools like Nagios or Wireshark to monitor and troubleshoot a network.
11. Implementing a VPN: Set up and test a virtual private network (VPN).
12. Configuring a Router: Configure and test a router (static routing, RIP, OSPF).

Text Book:

1. Vikas Gupta, *Comdex Information Technology course tool kit*, WILEY Dreamtech, 2005

Reference Book(s):

1. Cheryl A Schmidt, *The Complete Computer upgrade and repair book*, Dreamtech Press, 3rd edition, 2002
2. IITL Education Solutions limited, *Introduction to Information Technology*, Pearson Education, 2nd edition, 2012
3. Kate J. Chase *PC Hardware - A Handbook* -PHI (Microsoft), 2004
4. Frank Mittelbach, Michel Goossens, *The LaTeX Companion* - Addison-Wesley, 2nd edition, 2013
5. David Anfinson and Ken Quamme, *IT Essentials PC Hardware and Software Companion Guide* - CISCO Press, Pearson Education, 3rd edition, 2018
6. Patrick Regan, *IT Essentials PC Hardware and Software Labs and Study Guide* Third Edition by - CISCO Press, Pearson Education, 3rd edition, 2018

Web and Video link(s):

1. https://www.udemy.com/course/computer-hardware-operating-system-and-networking-r/?utm_source=adwords&utm_medium=udemyads&utm_campaign=Search_DSA_Beta_Pr_of_la.EN_cc.India&campaigntype=Search&portfolio=India&language=EN&product=Course&test=&audience=DSA&topic=&priority=Beta&utm_content=deal4584&utm_term=.ag_160270535665.ad_696202838337.kw.de.c.dm.pl.ti.dsa-1677053911888.li_9301462.pd.&matchtype=&gad_source=1&gclid=Cj0KCQjwtsy1BhD7ARIsAHOi4xausSWGyKwWZyTCmMEE4qnMTv5bAtDDA9f05yIlbPP4pHRmeK1MpsaAslGEALw_wcB&couponCode=IND21PM

Laboratory Manual (for laboratory component):

1. *Hardware and Networking Laboratory Manual and Record Book*, Department of IT, KITSW
- 2.

Course Learning Outcomes (COs)

After completion of this course, the students should be able to,

(based on cognitive skills acquired from theory component)

- CO1:** make use of computer hardware for effective maintenance of peripherals
- CO2:** apply troubleshooting techniques in real time problems
- CO3:** illustrate the types of networks, protocol models to configure the network
- CO4:** analyze network architecture and troubleshooting for managing the network

(based on psychomotor skills acquired from laboratory component)

CO5: test for assembled PC and inspect the installed operating system working condition

CO6: experiment with mobile hardware

CO7: test for switches and routers working condition

CO8: analyze network protocols and ensure the network security

| Course Articulation Matrix (CAM): | | | | | | U24IT215X - HARDWARE NETWORKING | | | | | | | | | |
|-----------------------------------|-------------|------|------|------|------|---------------------------------|------|------|------|------|-------|-------|-------|-------|-------|
| CO | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
| CO1 | U24IT215X.1 | 2 | 1 | - | - | - | - | - | 1 | - | 1 | - | 1 | 1 | 1 |
| CO2 | U24IT215X.2 | 2 | 2 | 1 | - | - | - | - | 1 | - | 1 | - | 1 | 1 | 1 |
| CO3 | U24IT215X.3 | 2 | 2 | 1 | - | - | - | - | 1 | - | 1 | - | 1 | 1 | 1 |
| CO4 | U24IT215X.4 | 2 | 2 | 1 | - | - | - | - | 1 | - | 1 | - | 1 | 1 | 1 |
| CO5 | U24IT215X.5 | 2 | 1 | - | - | - | - | - | 1 | 1 | 1 | - | 1 | 1 | 1 |
| CO6 | U24IT215X.6 | 2 | 2 | 1 | - | - | - | - | 1 | 1 | 1 | - | 1 | 1 | 1 |
| CO7 | U24IT215X.7 | 2 | 2 | 1 | - | - | - | - | 1 | 1 | 1 | - | 1 | 1 | 1 |
| CO8 | U24IT215X.8 | 2 | 2 | 1 | - | - | - | - | 1 | 1 | 1 | - | 1 | 1 | 1 |
| U24IT215X | | 2 | 1.75 | 1 | - | - | - | - | - | 1 | 1 | - | 1 | 1 | 1 |