# Minutes of

# BoS meeting

# held on 01-06-2022

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

## Department of Electronics Engineering

## Minutes of the online Board of studies meeting on 01-06-2022

Following members have attended the online meeting;

| | | |
|---|---|---|
| 1. | Dr. Laxmi Shrivastava | Chairperson, Associate Professor and Head |
| 2. | Dr N S Ragava | External Member, Professor, ECE Deptt., DTU, Delhi |
| 3. | Dr Alok Jain | VC Nominee, RGPV, Professor, SATI, Vidisha |
| 4. | Er. Pankaj Agarwal | Alumni, External member, Assistant Engineer, UP Power Corporation Limited |
| 5. | Prof. P. K. Singhal | Professor |
| 6. | Dr. V. V. Thakare | Associate Professor |
| 7. | Dr. R. P. Narwaria | Assistant Professor |
| 8. | Dr. Karuna Markam | Assistant Professor |
| 9. | Prof. Madhav Singh | Assistant Professor |
| 10. | Ms. Pooja Sahoo | Assistant Professor |
| 11. | Prof. D. K. Parsediya | Assistant Professor |
| 12. | Dr. Sandeep Sharma | Assistant Professor |
| 13. | Dr. Vikas Mahor | Assistant Professor |
| 14. | Dr. Rahul Dubey | Assistant Professor |
| 15. | Dr. Hemant Choubey | Assistant Professor |
| 16. | Dr. Deepak Batham | Assistant Professor |
| 17. | Dr. Varun Sharma | Assistant Professor |
| 18. | Dr. Shubhi Kansal | Assistant Professor |
| 19. | Dr. Sushmita Chaudhary | Assistant Professor |
| 20. | Dr. Dinesh Rano | Assistant Professor |
| 21. | Dr. Vikram | Assistant Professor |
| 22. | Mr. Manoj Kumar | Assistant Professor |
| 23. | Dr. Tej Singh | Assistant Professor |
| 24. | Dr. Pawan Dubey | Assistant Professor |

Following external members could not attend the meeting:

1. Er. Gaurav Tripathi, Representative from industry/ corporate sector/ allied area External member, Sr. Enterprise Architect, HCL Technologies SEZ, Noida
2. Dr. Jyoti Singhai, RGPV nominee by Academic Council, Professor, MANIT, Bhopal

At the onset, the chairperson welcomed external members to the meeting of BoS and placed the agenda for the deliberation to the members. The following deliberations were made as per the items of circulated agenda:

## BoS Agenda Items

**Item 1**

**To confirm the minutes of previous BoS meeting held in the month of December 2021**

*The minutes of previous BOS held on 21 Dec 2021 are confirmed.*

**Item 2**

**To prepare and finalize the scheme structure of B.Tech. VII Semester with the provision of *Two Departmental Electives (DEs) and Two Open Category (OC) Course* (in which one Departmental Elective is to be offered in online mode with credit transfer) for the batch admitted in 2019-20.**

*Scheme Structure of B.Tech VII Semester with provision of Two Departmental Electives and Two Open Category courses has been discussed and finalized. Same can be find in Annexure I*

**Item 3**

**To prepare and finalize the syllabus of courses to be offered *(for batch admitted in 2019-20)* under *Departmental Elective (DE) Course* (in traditional mode) for B.Tech. *VII Semester* along with their COs**

*Following Subjects has been finalized as Departmental Electives to be offered through traditional teaching mode. Detailed syllabi can be find in Annexure II.*

| S.No | Category | Subject Code | Subject Name |
|---|---|---|---|
| 1 | DE-III | 140711 | Satellite & Radar Communication |
| 2 | DE-III | 140712 | VLSI Design |
| 3 | DE-III | 140713 | Microwave Engineering |

**Item 4**

**To propose the list of courses which the students can opt from SWAYAM/NPTEL/MOOC based Platforms, to be offered in *online mode under* Departmental Elective (DE)Course, with credit transfer in the B.Tech. *VII Semester under* the flexible curriculum (*Batch admitted in 2019-20)***

*The list of courses which the students can opt from SWAYAM/NPTEL/MOOC based Platforms, to be offered in **online mode under Departmental Elective (DE)** Course, with credit transfer in the B.Tech. **VII Semester under** the flexible curriculum has been discussed and finalized. Same can be find in Annexure-III.*

| S.No | Category Code | Course Code | Name of The course | Weeks |
|---|---|---|---|---|
| 1 | DE-IV | 140751 | Digital Image Processing | 12 |
| 2 | | 140752 | Introduction to Wireless Cellular Communication | 12 |

**Item 5**

**To prepare and finalize the syllabus of courses to be offered *(for batch admitted in 2019-20)* under the *Open Category (OC) Courses* (in traditional mode) for B.Tech. *VII semester* students of other departments along with their COs**

The syllabus of courses to be offered ***(for batch admitted in 2019-20)*** under the ***Open Category (OC) Courses***(in traditional mode) for B.Tech. ***VII semester*** students of other departments along with their COs has been discussed and finalized. The syllabi can be find in Annexure-IV.

| S.No | Category | Subject Code | Subject Name |
|---|---|---|---|
| 1 | OC-II | 900206 | Satellite Systems |
| 2 | OC-II | 900207 | Consumer Electronics |
| 3 | OC-III | 900218 | MEMS & Mechatronics |
| 4 | OC-III | 900219 | Multimedia Communication |

**Item 6**

**To prepare and finalize the Experiment list/ Lab manual for Departmental Laboratory Course (DLC) to be offered in B.Tech. VII semester *(for batches admitted in 2019-20)***

*The Experiment list/ Lab manual for Departmental Laboratory Course (DLC) to be offered in B.Tech. VII semester has been finalized and approved by BOS members. The list can be find in Annexure-V.*

| S.No | Category | Subject Code | Subject Name |
|---|---|---|---|
| 1 | DLC | 140705 | VLSI Design |
| 2 | DLC | 140707 | Creative Problem Solving |

**Item 7**

**To propose the list of "Additional Courses" which can be opted for getting an**

***(i) Honours (for students of the host department)***

***(ii) Minor Specialization (for students of other departments)***

***[These will be offered through SWAYAM/NPTEL/MOOC based Platforms for the* B.Tech. *VII semester students (for the batch admitted in 2019-20)] and for* B.Tech. *V semester (for the batch admitted in 2020-21)].***

*The list with name of mentor, date of registration can be find in Annexure-VI.*

| Semester | Hons/Minor | Domain | Subject Name | Weeks |
|---|---|---|---|---|
| V | Hons | Communication and Signal Processing | Principles and Techniques of Modern Radar Systems | 12 |
| | | VLSI Design | Hardware modeling using verilog | 08 |
| | Minor | Control & Sensor Technology | Control System | 12 |
| | | Communication and Signal Processing | Introduction to Wireless and Cellular Communications | 12 |
| VII | Hons | | Data Science for Engineer | 08 |
| | | | Design of Photovoltaic Systems | 08 |
| | Minors | | Microwave Engineering | 12 |
| | | | Control Engineering | 12 |

**Item 8**

**To prepare and recommend the *scheme structure of B.Tech. V Semester under* the flexible curriculum (*Batch admitted in 2020-21)***

*[This will also include all the emerging area programmes]*

*The **scheme structure of B.Tech. V Semester under** the flexible curriculum (Batch admitted in 2020-21) has been discussed and finalized. Same can be find in Annexure-VII.*

**Item 9**

**To prepare and recommend the syllabi for all *Departmental Core (DC) Courses* of B.Tech. *V Semester (for b*atch admitted in 2020-21) under the flexible curriculum along with their COs.**

*[This will also include all the emerging area programmes]*

*The syllabi for all **Departmental Core (DC) Courses** of B.Tech. **V Semester (for batch admitted in 2020-21)** under the flexible curriculum along with their COs has been discussed and finalized. The detailed syllabi for the same can be find in Annexure-VIII.*

| S.No | Category | Subject Code | Subject Name |
|---|---|---|---|
| 1 | DC | 140512 | Microprocessor and Interfacing |
| 2 | | 140513 | Linear Control Theory |
| 3 | | 140514 | Digital Communication |

**Item 10**

**To prepare and recommend the Experiment list/ Lab manual for all the Laboratory Courses to be offered in B.Tech.V semester *(for batch admitted in 2020-21)***

*[This will also include all the emerging area programmes]*

*The Experiment list/ Lab manual for all the Laboratory Courses to be offered in B.Tech.V semester **(for batch admitted in 2020-21) has been discussed and finalized. The list can be find in Annexure-IX***

| S.No | Category | Subject Code | Subject Name |
|---|---|---|---|
| 1 | DC | 140512 | Microprocessor and Interfacing |
| 2 | DC | 140514 | Digital Communication |
| 3 | DLC | 140515 | Minor Project-I |

**Item 11**

**To prepare and recommend the suggestive list of projects which can be assigned under the 'Skill based mini-project' category in various laboratory component based courses to be offered in B.Tech. V Semester *(for the batch admitted in 2020-21)*.**

*[This will also include all the emerging area programmes]*

*The suggestive list of projects which can be assigned under the 'Skill based mini-project' category in various laboratory component based courses to be offered in B.Tech. V Semester **(for the batch admitted in 2020-21) has been discussed and finalized**. The list can be find out in Annexure-X.*

| S.No | Category | Subject Code | Subject Name |
|---|---|---|---|
| 1 | DC | 140512 | Microprocessor and Interfacing |
| 2 | DC | 140514 | Digital Communication |

**Item 12**

To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered ***(for batch admitted in 2020-21)*** in online mode under ***Self-Learning/ Presentation***, in the B.Tech. ***V Semester***

*[This will also include all the emerging area programmes]*

*The list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered* ***(for batch admitted in 2020-21)*** *in online mode under* ***Self-Learning/ Presentation****, in the B.Tech.* ***V Semester has been finalized with the concern of the BOS members. The detailed about the courses can be find out in Annexure-XI.***

| *S.No* | *Semester* | *Subject Category* | *Subject Name* | *Duration (weeks)* |
|---|---|---|---|---|
| *1* | *V* | *Self Learning* | Demystifying Networks | *04* |
| *2* | | | Basics of Software defined Radios and Practical applications | *04* |
| *3* | | | Foundation of Cognitive robotics | *04* |

**Item 13**

To prepare and recommend the ***Scheme & Syllabi (along with the Course Outcomes) of B.Tech. III semester*** **of the newly started B. Tech. programmes in the emerging areas (AI & ML, AI & DS, CSD) (started from 2021-22 Session)**

*{Applicable for the concerned departments}*

*NOT APPLICABLE*

**Item 14**

To prepare and recommend the list of experiments and skill based mini projects of ***B.Tech.III semester*** **of the newly started B. Tech. programmes in the emerging areas (AI & ML, AI & DS, CSD) (started from 2021-22 Session)**

*{Applicable for the concerned departments}*

*NOT APPLICABLE*

**Item 15**

**To review, prepare, finalize and recommend the *Scheme & Syllabi (along with the Course Outcomes) of III semester* B. Tech. programmes (batch admitted 2021-22 Session) {(all traditional and emerging area programmes (IT-IoT, AIR, EE-IoT, MAC)}**

*Scheme & Syllabi (along with the Course Outcomes) of III semester B. Tech. programmes (batch admitted 2021-22 Session) has been discussed and finalized. The Syllabi of Network Theory and Analog Communication have been revised. The same can be find out in Annexure-XII.*

| S.No | Category | Subject Code | Subject Name |
|---|---|---|---|
| 1 | DC | 140311 | Electronic Circuit Design |
| 2 | | 140312 | Digital Circuits and Systems |
| 3 | | 140313 | Network Theory |
| 4 | | 140314 | Analog Communication |

**Item 16**

**To review, prepare, finalize and recommend the list of experiments/ Lab manual and skill based mini projects for various laboratory courses to be offered in III Semester *(for the batch admitted in 2021-22)*.{(all traditional and emerging area programmes (IT-IoT, AIR, EE-IoT, MAC)}**

*The list of experiments/ Lab manual and skill based mini projects for various laboratory courses to be offered in III Semester has been discussed and finalized. The list can be find out in Annexure-XIII*

| S.No | Category | Subject Code | Subject Name |
|---|---|---|---|
| 1 | DC | 140311 | Electronic Circuit Design |
| 2 | | 140312 | Digital Circuits and Systems |
| 3 | | 140315 | Software Lab |

**Item 17**

**To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered *(for batches admitted in 2021-22)* in online mode under *Self-Learning/ Presentation*, in the *III Semester*{(all traditional and emerging area programmes (IT-IoT, AIR, EE-IoT, MAC, AI&DS, AI& ML, CSD)}**

The list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered ***(for batches admitted in 2021-22)*** in online mode under ***Self-Learning/ Presentation***, in the ***III Semester has been discussed and finalized. The detailed about the courses can be find out in Annexure-XIV.***

| *S.No* | *Semester* | *Subject Category* | *Subject Name* | *Duration (weeks)* |
|---|---|---|---|---|
| *1* | *III* | *Self Learning* | C Programming and assembly language | *04* |
| *2* | | | Fundamentals of Electronics Device Fabrication | *04* |
| *3* | | | Python for Data Science | *04* |

**Item 18**

**To review the *Scheme & Syllabi, list of experiments and skill based mini projects of First semester* of the B. Tech. programmes *(for the batch 2022-23)*.(all traditional and emerging area programmes)**

*The Syllabi, list of experiments and skill based mini projects of First semester of the B. Tech. programmes(for the batch 2022-23) has been finalized. The detailed list can be find out in Annexure-XV.*

| S.No | Category | Subject Code | Subject Name |
|---|---|---|---|
| 1 | DLC | 140111 | Electronic Workshop |

| | |
|---|---|
| **Item 19** | **To review the CO attainments, to identify gaps and to suggest corrective measures for the improvement in the CO attainment levels for (i) I year November 2021 – February 2022Semester (ii) July-December 2021 Session for II to IV year students**<br>*The review of the CO attainments, gaps and corrective measures for the improvement in the CO attainment levels for (i) I year November 2021 – February 2022Semester (ii) July-December 2021 Session for II to IV year students has been finalized as per the discussion with BOS members. Same can be find in Annexure-XVI.* |
| **Item 20** | **To review PO attainment of 2017-2021 batch, CO-PO mapping matrix with attainments and gap analysis**<br>*The PO attainment of 2017-2021 batch, CO-PO mapping matrix with attainments and gap analysis has been discussed and finalized. Same can be find in Annexure-XVII.* |
| **Item 21** | **To review curricula feedback from various stakeholders, its analysis and impact**<br>**{Stakeholder feedback analysis must also contain an Action Taken Report (ATR) and the details/data of the stakeholders who have responded through GOOGLE form (such as Name, organization, mail id, phone no., if available) must also be shared along with the feedback of the alumni/employer}**<br>*Curricula feedback from various stakeholders include students, faculty, employer and alumni has been discussed and action taken report has been finalized. Same can be find in Annexure-XVIII.* |
| **Item 22** | **To review the Course Outcomes (COs) feedback of various courses, its analysis, and ATR**<br>*The Course Outcomes (COs) feedback of various courses, its analysis, and ATR has been discussed and approved by BOS members. Same can be find in Annexure-XIX.* |
| **Item 23** | **Any other matter**<br>*Expert list for viva-voce examination has been discussed and finalized. List can be find in Annexure-XX.* |

The following suggestions were provided by the external BOS members:

1. As per the suggestion given by external members, Skill based mini projects have been mapped with the bloom's taxonomy.
2. As suggested by the external member, the list of experiments of Electronic Workshop has been modified.

| | | |
|---|---|---|
| **Dr. N. S. Raghava**<br>**Professor, DTU, New Delhi**<br>**External Member** | **Dr. Alok Jain**<br>**Professor, SATI, Vidisha**<br>**RGPV Nominee** | **Mr. Pankaj Agrawal**<br>**AE, UPPCL, Bulandshehar**<br>**Alumni Member** |
| **Dr. P. K. Singhal** | **Dr. Vandana Vikas Thakare** | **Dr. R. P. Narwaria** |
| **Dr. Karuna Markam** | **Prof. Madhav Singh** | **Prof. Pooja Sahoo** |
| **Prof D K Parsedia** | **Dr. Sandeep Sharma** | **Dr. Vikas Mahor** |

**Dr. Rahul Dubey** **Dr. Hemant Choubey** **Dr. Deepak Batham**

**Dr. Varun Sharma** **Dr. Shubhi Kansal** **Dr. Sushmita Chaudhari**

**Dr. Dinesh Rano**

**Dr. Laxmi Shrivastava**

**Head of the Department**

## ANNEXURE I

**Item 2**

To prepare and finalize the **scheme structure of B.Tech. VII Semester** with the provision of *Two Departmental Electives (DEs) and Two Open Category (OC) Course* **(in which one Departmental Elective is to be offered in online mode with credit transfer)** for the batch admitted in 2019-20.

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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## Department of Electronics Engineering

## B. Tech. VII Semester (Electronics Engineering)

***Effective for academic session 2019-2023***

| S. No. | Subject Code | Category Code | Subject Name | Maximum Marks Allotted | | | | | | | | | Total Marks | Contact Hours per week | | | Total Credits | Mode of Teaching (Online, Offline, Blended) | $$Mode of Exam. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Slot | | | | Practical Slot | | | MOOCs | | | | | | | | |
| | | | | End Term Evaluation | | Continuous Evaluation | | End Sem. Exam. | Continuous Evaluation | | Assignment | Exam | | L | T | P | | | |
| | | | | End Sem. Exam. | $Proficiency in subject /course | Mid Sem. Exam | Quiz/ Assignment | | Lab work & Sessional | Skill Based Mini Project | | | | | | | | | |
| **1.** | 14071X | DE | Departmental Elective (DE-2) | 50 | 10 | 20 | 20 | - | - | - | - | - | 100 | 3 | - | - | **3** | Blended (2/1) | PP |
| **2.** | 14075X | DE | Departmental Elective* (DE-3 | - | - | - | - | - | - | - | 25 | 75 | 100 | 3 | - | - | **3** | Online | MCQ |
| **3.** | OC | OC | Open Category (OC-2) | 50 | 10 | 20 | 20 | - | - | - | - | - | 100 | 3 | - | - | **3** | Blended (2/1) | PP |
| **4.** | OC | OC | Open Category (OC-3) | 50 | 10 | 20 | 20 | - | - | - | - | - | 100 | 3 | - | - | **3** | Blended (2/1) | PP |
| **5.** | 140701 | DLC | VLSI Lab | - | - | - | - | 60 | 20 | 20 | - | - | 100 | - | - | 4 | **2** | Offline | SO |
| **6.** | 140702 | DLC | Creative Problem Solving (Evaluation) | - | - | - | - | 25 | 25 | - | - | - | 50 | - | - | 2 | **1** | Offline | SO |
| **7.** | 140703 | DLC | Summer Internship Project-III (04 weeks) (Evaluation) | - | - | - | - | 60 | - | - | - | - | 60 | - | - | 4 | **2** | Offline | SO |
| **Total** | | | | **150** | **30** | **60** | **60** | **145** | **45** | **20** | **25** | **75** | **610** | **12** | **-** | **10** | **17** | - | - |
| **Additional Course for Honours or minor Specialization** | | | | **Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization** | | | | | | | | | | | | | | | |

**$ proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.**

$$**MCQ:** Multiple Choice Question $$**AO:** Assignment + Oral $$**PP:** Pen Paper $$**SO:** Submission + Oral

*** Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform with Credit Transfer**

| | | | |
|---|---|---|---|
| **Department Electives-1 (DE-3) (14071X)** | Satellite and Radar Communication Systems **140711** | VLSI Design **140712** | Microwave Engineering **140713** |
| **Department Electives-2 (DE-4) (MOOCS) (14075X)** | Digital Image Processing **140751** | Introduction to Wireless Cellular Communication **140752** | |

| | | |
|---|---|---|
| **Open Course-1 (OC-2)** | **Satellite System (900206)** | **Consumer Electronics (900207)** |
| **Open Course-1 (OC-3)** | **MEMS & Mechatronics (900218)** | **Multimedia Communication (900219)** |

| | | |
|---|---|---|
| **Honors** | Data Science for Engineers | Design of Photovoltaic Systems |
| **Minors** | Microwave Engineering | Introduction to Coding Theory |

**ANNEXURE II**

## Item 3

To prepare and finalize the courses to be offered ***(for batch admitted in 2019-20)*** under ***Departmental Elective (DE) Course*** (in traditional mode) for B. Tech. ***VII Semester*** along with their COs

| S.No | Category | Subject Code | Subject Name |
|---|---|---|---|
| 1 | DE-III | 140711 | Satellite & Radar Communication |
| 2 | DE-III | 140712 | VLSI Design |
| 3 | DE-III | 140713 | Microwave Engineering |

| Subject Code | Category Code | Subject Name | Theory Slot | | | Practical Slot | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | | L | T | P | |
| 140711 | DE-III | Satellite & Radar Communication | 70 | 20 | 10 | - | - | 100 | 3 | - | - | 3 |

### Satellite & Radar Communication (140711)

**Course objective:** The main objective of the course is to provide a comprehensive and state of the art knowledge in the area of satellite communication and radar Systems.

**Unit I Introduction**: Introduction to Satellite Communication, Origin and History of Satellite Communication, Current State of Satellite Communication, Orbital Aspect of Satellite Communication , Orbital Mechanism, Equation of Orbit, Locating Satellite in Orbit , Orbital Elements ,Orbital Perturbation , Frequency Allocations and Applications.

**Unit II Space Craft Sub System and Earth Station:** Altitude and Orbit Control System , Telemetry Tracking and Commend Power System, Communication Sub System, Earth Station Design , Antenna Tracking, LNA, HPA,RF, Multiplexing Factor Affecting Orbit Utilization, Tracking, Equipment for Earth Station.

**Unit III Satellite Link Design:** Satellite Link Design, System Noise Temperature and G/T Ratio, Downlink Design, Domestic Satellite System, Uplink Design, Earth Path Propagation Effect, Losses in Link Design.

**Unit IV Introduction to RADAR:** Principles of RADAR, Radar Frequencies, Pulse RADAR, RADAR Range Equation, RADAR Application, RADAR Cross Section of Targets RADAR Indicator, Noise Figure of Receiver, Mixer Duplexer, Line Pulsar.

**Unit V Operational RADAR :**MTI RADAR, Delay Line Canceller, Digital Signal Processing, Limitation of MTI RADAR, CW RADAR, FM CW RADAR.

**Text Book:**


1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. RADAR System –Skolnik, 4th Edition, Tata McGraw-Hill, 2006.


**References Books:**


3. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson and Henri G. Suyderhoud, 2nd Edition, Pearson Publications, 2003.
4. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed, 2007.
5. Satellite Communications – Dennis Roddy, McGraw Hill, 2nd Edition, 1996.


**Course Outcomes**

After the completion of this course students will be able to:

- **CO1.** **Explain**Basic Concepts and Terminologies of Satellite Communication
- **CO2.** **Design** the Earth Station and Space Craft System
- **CO3.** **Calculate** the Link Power Budget Including Propagation Effects in Satellite.
- **CO4.** **Evaluate** the Various Performance Factors Related to the RADAR
- **CO5.** **Explain**Target Detection and Tracking using Radar Systems.

| Subject Code | Category Code | Subject Name | Theory Slot | | | Practical Slot | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | | L | T | P | |
| 140712 | DE-III | VLSI Design | 70 | 20 | 10 | - | - | 100 | 3 | - | - | 3 |

## VLSI Design (140712)

**Course objectives:** To understand the fundamental properties of digital CMOS logic circuits using basic MOSFET equations and to develop skills for various logic circuits using CMOS design.

**Unit I MOS Transistor:** The Metal Oxide Semiconductor (MOS) Structure, The MOS System under External Bias, Structure and Operation of MOS Transistor (MOSFET), MOSFET Current-Voltage Characteristics, MOSFET Scaling and Small-Geometry Effects, MOSFET Capacitances.

**Unit II MOS Inverters Static Characteristics:** Introduction, Voltage Transfer Characteristic (VTC), Noise Immunity and Noise margins, Resistive-Load Inverter, Inverters with n-Type MOSFET Load and CMOS Inverter, DC Characteristics of CMOS Inverter, Calculation of VIL, VIH, VOL, VOH and Vth, Design of CMOS Inverters, Supply Voltage Scaling in CMOS Inverters, Power and Area considerations.

**Unit III MOS Inverters Dynamic Characteristics:** Switching Characteristics and Interconnect Effects, Switching Characteristics of CMOS Inverter- Delay-Time Definitions, CMOS Propagation Delay, Calculation of Delay times, Power Dissipation-Switching, Short-Circuit and Leakage Components of Energy and Power, Power-Delay Product.

**Unit IV CMOS Logic Structures and Layout Design:** Combinational MOS logic circuits- CMOS Logic circuits (NAND, NOR and Complex Logic Gates, Multiplexers etc.), CMOS Transmission Gates (Pass Gates). CMOS n-Well Process, layout design rules, layout design of CMOS Inverter, designing of stick diagram.

**Unit V Semiconductor Memories and Low-Power CMOS Logic Circuits:** Semiconductor memories: non-volatile and volatile memory devices, flash memories, SRAM cell design, 1T DRAM cell design, dynamic CMOS logic circuits, domino logic CMOS circuits.

**Text Books**


1. Sung-Mo Kang & Yusuf Leblebici, "CMOS Digital Integrated Circuits – Analysis and Design", 3rd Edition, Tata McGraw-Hill, New Delhi, 2003.
2. Jan M. Rabaey, Anantha Chandrakasan and Borivoje Nikolic, "Digital Integrated Circuits: a design perspective", 2nd Edition, Pearson Education, 2003.


**Reference Books**


1. David A. Hodges, Horace G. Jackson, Resve A. Saleh, "Analysis and Design of Digital Integrated Circuits: In Deep Submicron Technology", McGraw, 2003.
2. David A. Johns and Ken Martin, "Analog Integrated Circuit Design" John Wiley and Sons Inc., 1997.
3. Neil Weste and David Harris, "CMOS VLSI Design: A Circuits and Systems Perspective", 4th Edition, Addison-Wesley, 2010
4. John P.Uyemura, "CMOS Logic Circuit Design", Springer International Edition.2005.Logic Circuit Design", Springer International Edition.2005.


### Course Outcome:

After completion of the course the students will be able to:

**CO1.** **Analyze** the working of CMOS Transistors in different Modes of Operation.
**CO2.** **Derive** the Static Characteristics of Resistive Load, N-Type MOSFET Load CMOS Inverters.
**CO3.** **Evaluate** the Propagation Delay and Power Dissipation of a CMOS Inverter.
**CO4.** **Design** a CMOS Logic Circuit and Layout Design for a Given Boolean Function.
**CO5.** **Analyze** the Design and Operation of Various Semiconductor Memories.

| Subject Code | Category Code | Subject Name | Theory Slot | | | Practical Slot | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | | L | T | P | |
| 140713 | DE-III | Microwave Engineering | 70 | 20 | 10 | - | - | 100 | 3 | - | - | 3 |

### Microwave Engineering (140713)

**Course objectives:** The goal of this course is to introduce students to the concepts and principles of the advanced microwave engineering, theory and design of passive and active microwave components, and microwave circuits.

**Unit I Waveguides**: Review of Maxwell's equation, Rectangular Waveguides, Characteristics of TE and TM wave in Rectangular Wave Guides, Dominant mode in Rectangular Waveguide, Cylindrical Waveguides, Waveguide Excitation.

**Unit II Microwave components & their S-parameters Analysis**: Microwave Resonator, Microwave Network representations. Scattering Matrix, S-Matrix for two, three & four port Networks such as E-plane Tee, H-plane Tee, Magic Tee, Directional Coupler, Tuning Screw, Quarter Wave Transformer, Matched Load, Isolator, Circulator.

**Unit III Microwave Tubes** : Transit Time Effect, Tubes for very high frequency, Limitation of Conventional Tubes, Reflex Klystron, Two Cavity Klystron, Magnetron, Travelling Wave Tube.

**Unit IV Microwave Solid State Devices**: Pin diode, Tunnel diode, Gunn Effect devices, Varactor diode, IMPATT diode, Circuit applications of above devices.

**Unit V Microwave Measurement and Introduction to Planer Transmission lines:** Measurement of VSWR, Impedance, Frequency, Dielectric Constant Power, Attenuation and Phase Shift, Planar Transmission lines, Introduction to Micro Strip Lines, Slotlines, Coplanar lines.

**Text books:**


1. Microwave Devices and Circuits, Samuel Y. Liao, Prentice Hall, 3rd edition, 2003.
2. Microwave engineering-David M. Pozar, 4th ed., John Wiley & Sons, Inc., 2004.


**Reference Books:**


1. Introduction to Microwaves -Wheeler G.J., Literary Licensing, LLC, 2012
2. Microwave circuits & passive devices- Sisodia and Raghuvanshi, New age International, 1st edition, 1987.
3. Microwave and Radar Engineering. Kulkarni, 5th edition, Dipan, 2016.


**Course Outcomes**

After the completion of this course students will be able to:

- **CO1. Analyze**Rectangular and Circular Waveguides.
- **CO2. Calculate** S- parameters of Microwave components.
- **CO3. Describe** the working characteristics and applications of Microwave Tubes.
- **CO4. Explain** the working characteristics and applications of Microwave Diodes.
- **CO5. Measure** VSWR, Impedance, Frequency, Dielectric Constant Power, Attenuation and phase shift and planar transmission lines.

| Subject Code | Category Code | Subject Name | Theory Slot | | | Practical Slot | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | | L | T | P | |
| 100008 | MC | Intellectual Property Rights | 70 | 20 | 10 | - | - | 100 | 2 | - | - | 2 |

**Intellectual Property Rights (100008)**

### Course Objectives:

To acquaint the learners with the basic concepts of Intellectual Property Rights. To develop expertise in the learners in IPR related issues and sensitize the learners with emerging issues in IPR and the rationale for the protection of IPR.

UNIT – I: Introduction: Introduction to IPRs, Basic concepts and need for Intellectual Property – Meaning and practical aspects of Patents, Copyrights, Geographical Indications, IPR in India and Abroad. Nature of Intellectual Property, Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR.

UNIT – II: Intellectual Property Rights: The IPR tool kit, Patents, the patenting process, Patent cooperation treaties: International Treaties and conventions on IPRs, TRIPS Agreement, PCT Agreement, Patent Act of India, Patent Amendment Act, Design Act, Trademark Act, Geographical Indication Act.

UNIT – III: Intellectual Property Protections: IPR of Living Species, protecting inventions in biotechnology, protections of traditional knowledge, biopiracy and documenting traditional knowledge, Digital Innovations and Developments as Knowledge Assets – IP Laws, Cyber Law and Digital Content Protection. Case studies: The basmati rice issue, revocations of turmeric patent, revocation of neem patent.

UNIT – IV: Exercising and Enforcing of Intellectual Property Rights: Rights of an IPR owner, licensing agreements, criteria for patent infringement. Case studies of patent infringement, IPR – a contract, unfair competitions and control, provisions in TRIPs.

UNIT- V: Role of Patents in Product Development & amp: Commercialization, Recent changes in IPR laws impacting patents and copy rights, intellectual cooperation in the science and allied industry. Patentable and non-patentable research. Case studies

### Reference Books:


1. P.B. Ganguli, Intellectual Property Rights: Unleashing the Knowledge Economy. Tata Mc Graw Hill, 2001.
2. Steve Smith, The Quality Revolution.1st ed., Jaico Publishing House, 2002.
3. Kompal Bansal and Praishit Bansal. Fundamentals of IPR for Engineers, 1st Edition, BS Publications, 2012.
4. Prabhuddha Ganguli. Intellectual Property Rights. 1st Edition, TMH, 2012.

5. R Radha Krishnan & S Balasubramanian. Intellectual Property Rights. 1st Edition, Excel Books, 2012.
6. M Ashok Kumar & Mohd. Iqbal Ali. Intellectual Property Rights. 2nd Edition, Serial Publications, 2011.
7. VinodV. Scople, Managing Intellectual Property. Prentice Hall of India PvtLtd, 2012.
8. Deborah E. Bouchoux. Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets. Cengage Learning, 3rd ed. Edition, 2012.
9. Prabuddha Ganguli. Intellectual Property Rights: Unleashing the Knowledge Economy. McGraw Hill Education, 2011. Edited by Derek Bosworth and Elizabeth Webster.
10. The Management of Intellectual Property. Edward Elgar Publishing Ltd.,2013.
11. B.S. Patil, Legal Aspects of Building and Engineering Contracts, 1974.
12. Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co.
13. Ramappa (2010), Intellectual Property Rights Law in India, Asia Law House.

**Course Outcomes:**

At the end of this course, the student will be able to

CO1. Imbibe the knowledge of Intellectual Property and its protection through various laws
CO2. Apply the knowledge of IPR for professional development
CO3. Develop a platform for protection and compliance of Intellectual Property Rights & knowledge
CO4. Create awareness amidst academia and industry of IPR and Copyright compliance
CO5. Deliver the purpose and function of IPR and patenting.

**Item 4**

To propose the list of courses which the students can opt from SWAYAM/NPTEL/MOOC based Platforms, to be offered in ***online mode under*** **Departmental Elective (DE)**Course, with credit transfer in the B. Tech. ***VII Semester under*** the flexible curriculum (*Batch admitted in 2019-20)*

| S.No | Category Code | Course Code | Name of The course | Duration of the Course in weeks | Course Registration | | Name of the Mentor Faculty |
|---|---|---|---|---|---|---|---|
| | | | | | Start Date | End Date | |
| **Electronics Engineering** | | | | | | | |
| 1 | DE-4 | **140751** | Digital Image Processing | 12 | 20-05-2022 | 01-08-2022 | Prof. Pooja Sahoo |
| 2 | | **140752** | Introduction to Wireless Cellular Communication | 12 | 20-05-2022 | 01-08-2022 | Prof. Madhav Singh |

**ANNEXURE IV**

## Item 5

To prepare and finalize the syllabus of courses to be offered ***(for batch admitted in 2019-20)*** under the ***Open Category (OC) Courses***(in traditional mode) for B. Tech. ***VII semester*** students of other departments along with their COs

| S.No | Category | Subject Code | Subject Name |
|---|---|---|---|
| 1 | OC-2 | 900206 | Satellite Systems |
| 2 | OC-2 | 900207 | Consumer Electronics |
| 3 | OC-3 | 900218 | MEMS & Mechatronics |
| 4 | OC-3 | 900219 | Multimedia Communication |

| Subject Code | Category Code | Subject Name | Theory Slot | | | Practical Slot | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | | L | T | P | |
| 900206 | OC-2 | Satellite Systems | 70 | 20 | 10 | - | - | 100 | 2 | 1 | - | 3 |

## Satellite Systems (900206)

**Course objective:** The main objective of the course is to provide a comprehensive knowledge in the area of satellite system. The course emphasis is on the study of orbital mechanics, launching techniques, working of Indian Regional Navigation Satellite System.

**Unit I Introduction**: Introduction of Satellite Communication, Origin and History of Satellite Communication, Current State of Satellite Communication, Orbital Aspect of Satellite Communication , Orbital Mechanism , Equation of Orbit, Locating Satellite in Orbit , Orbital Elements , Orbital Perturbation.

**Unit II Space Craft Sub System andEarth Station:** , Altitude and Orbit Control System, Telemetry Tracking and Commend Power System, Communication Sub System, Earth Station Design, Antenna Tracking, LNA, HPA,RF, Multiplexing Factor Affecting Orbit Utilization, Tracking, Equipment for Earth Station, Frequency Allocation in Satellite Communication.

**Unit III Indian Satellite Launch Vehicle:** SLV (Satellite Launch Vehicle), ASLV (Augmented Satellite Launch Vehicle),PSLV(Polar Satellite Launch Vehicle), GSLV (Geosynchronous Satellite Launch Vehicle), GSLV Mk III, Sounding Rockets.

**Unit IV Satellite Link Design:**Satellite Link Design, System Noise Temperature andG/T Ratio, Downlink Design, Domestic Satellite System, Uplink Design

**Unit V Indian Regional Navigation Satellite System:** IRNSS System Overview, IRNSS Signal Characteristics, IRNSS Data Structure, Sub Frame Structure.

**TEXT BOOK:**


1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. https://www.isro.gov.in/update/06-nov-2015/book-indian-space-programme-released-second-anniversary-of-mars-orbiter


**REFERENCES BOOKS:**


3. Satellite Communications – Dennis Roddy, McGraw Hill, 2nd Edition, 1996.
4. IRNSS SIS ICD for standard positioning service, version 1.1, August 2017, ISRO Satellite Centre Indian Space Research Organization Bangalore


**Course Outcomes**

After the completion of this course students will be able to:

- **CO1.** **Explain** basic concepts and terminologies of Satellite Communication.
- **CO2.** **Design** the Earth station and Space Craft System.
- **CO3.** **Explain** the Indian Satellite Launchers.
- **CO4.** **Calculate** the Link power budget including Propagation effects in Satellite.
- **CO5.** **Examine** the Indian Regional Navigation Satellite System.

| Subject Code | Category Code | Subject Name | Theory Slot | | | Practical Slot | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | | L | T | P | |
| 900207 | OC-2 | Consumer Electronics | 70 | 20 | 10 | - | - | 100 | 2 | 1 | - | 3 |

### Consumer Electronics (900207)

**Course objectives:** Objective of this course is to make the students understand the technology behind consumer electronics appliances. The units in the course are designed to impart the concepts of Audio Video systems, Television and other domestic appliances like Microwave ovens and air-conditioning system.

**Unit I Introduction To Audio Systems:** Microphone, Carbon, Crystal and Moving Coil Microphone. Loudspeakers: Permanent Magnet Loudspeaker and its Construction, Introduction to Woofers and it's Operation, Audio System, Anatomy of Hi-Fi System.

**Unit II Television System:** Elements of Television System, Scanning Process, Persistence of Vision and Flicker, Vertical and Horizontal Resolution. Introduction to LCD and Plasma Display. Introduction to LED TV Technology.

**Unit III Landline and Mobile Telephony:** Telecommunication Systems, Modulation Techniques: Analog and Digital Methods, Radio System Characteristics, Telephone Receiver and Handset.

**Unit IV Cellular and Mobile Communication:** Cellular Communications, Transmitting Receiving Antenna, Digital Cellular Phone Block Diagram, Types of Mobile Phones, Cellular Systems.

**Unit V Domestic Appliances:** Microwave Oven: Microwaves, Transit Time, Magnetrons, Wave Guides, Microwave Oven Block Diagram. Air Conditioning System: Components of Air Conditioning System, All-Water Air Conditioning System, All-Air Air Conditioning System.

**Text Book:**

1. S. P. Bali, "Consumer Electronics" Pearson Education India, 2nd Edition.

**Reference Books:**

1. Electronic communication systems by Roy Blake, Thomson Delmar, Cengage Learning, inc; 2nd edition edition, 2011
2. Colour Television by R.R.Gulati, New Age international; Second edition, 2007
3. How Electronic Things Work.& What to Do When They Don't -Robert L. Goodman, TMH, 1998
4. Digital Satellite Television Handbook By Mark E. Long, Newnes; Pap/Cdr edition, 1999.

**Course Outcome:**

After completion of the course the students will be able to:

**CO1.** **Describe** various types ofAudio Systems.
**CO2.** **State** the working principle ofTelevision System.
**CO3.** **Analyze** the operation of a Landline Telephone System.
**CO4.** **Explain** the working ofCellular and MobileSystem.
**CO5.** **Explain** the working of various Consumer Electronic appliances.

| Subject Code | Category Code | Subject Name | Theory Slot | | | Practical Slot | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | | L | T | P | |
| 900218 | OC-3 | MEMS & Mechatronics | 70 | 20 | 10 | - | - | 100 | 3 | - | - | 3 |

## MEMS and Mechatronics (900218)

**Course Objectives:** To understand basics of MEMS and basic architecture of the mechatronics system; design and characteristics of different sensors, mechanical and electrical actuators and their selection for design of mechatronic systems

**UNIT I Introduction to MEMS**: Basics of MEMS (Micro-Electro Mechanical Systems), Need of Miniaturization, Micro fabrication, Micromachining, Material for MEMS, Types of MEMS: RF-MEMS, Bio-MEMS, etc, Various Applications.

**UNIT II Introduction to Mechatronics Systems:** Basic Building Blocks of Mechatronic Systems. Mechatronics Key Elements, Mechatronics in Home, office and Industry Automation, Scope of Mechatronics, Advantages of Mechatronics, Pre-Requisites for Mechatronics.

**UNIT III Sensors:** Performance Characteristics of Sensors and Transducers, Position and Speed Measurement; Proximity Sensor, Potentiometer, LVDT, Digital Optical Encoder, Stress and Strain Measurement; Strain Gages, force Measurement With Load Cells, Temperature Measurement; Thermometer, Thermocouple, Vibration and Acceleration Measurement, Pressure and Flow Measurement.

**UNIT IV Actuators and Control Unit:** Electromagnetic Principles, Solenoids and Relays, Electric Motors, DC Motors, Stepper Motors, Hydraulic and Pneumatic Actuators, Microactuators, Piezoelectric Actuators, Selection Criteria for Sensors and Actuators, Interfacing of Sensors and Actuators, Control Unit; Microcontroller, PLC.

**UNIT V Various Example of Mechatronics System:** Manipulator/ Robotic Arm, Quad copter, Mobile Robots, Hexapod Robots, Humanoidand Biped Robots.

**Text Books:**


1. Introduction to Mechatronics and Measurement Systems, Alciatore and Histand Tata McGraw-Hill, 3rd edition, 2007.
2. Mechatronics, Kenji Uchino and Jayne R. Giniewicz, CRC Press, 2nd edition, 2019.


**Reference Books:**


1. Applied Mechatronics- A. Smaili and F. Mrad, OXFORD university press, 2007.
2. Mechatronics System Design, Shetty and Kolk CENGAGE Learning, India Edition, 2nd edition, 2010.
3. Mechatronics, Necsulescu, Pearson education, 1st edition, 2002


### Course Outcome:

After completion of this course students will be able to:

- **CO1.** **Describe** MEMS, their types and applications.
- **CO2.** **Analyze** the Mechatronics system.
- **CO3.** **Analyze** the performance characteristics of Sensors and Actuators.
- **CO4.** **Interface** Sensors and Actuators using control unit such as Microcontroller and PLC.
- **CO5.** **Construct** the prototype of manual Robotic Arm.

| Subject Code | Category Code | Subject Name | Theory Slot | | | Practical Slot | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | | L | T | P | |
| 900219 | OC-3 | Multimedia Communication | 70 | 20 | 10 | - | - | 100 | 3 | - | - | 3 |

## Multimedia Communication (900219)

**Course Objective:** To Understand the Multimedia Communications Systems, Applications and its Principles **.**

**Unit I Basics of Analog And Digital Video:** Color Video Formation and Specification, Analog TV System, Video Raster, Digital Video Formats, 2D Motion Estimation: Optical Flow Equation.

**Unit II Multimedia Information Representation:** Introduction to Compression Techniques, Text and Image Compression, Standards for Multimedia Communications..

**Unit III Basic Compression Techniques:** Information Bound for Lossless and Lossy Source Coding: Shannon Source Coding Theorem, Binary Encoding(Huffman Coding and Arithmetic Coding).

**Unit IV Video Compression Standards:** H.261 and H.263, MPEG1, MPEG2, MPEG4, MPEG7.

**Unit V Error Control :**Error Control in Video Communications. Video Transport over the Internet and Wireless.Networks.

**Textbook:**


1. Y. Wang, J. Ostermann, and Y.Q.Zhang, "Video Processing and Communications," 1st ed., Prentice Hall, 2002. ISBN: 0130175471.


**Reference Book:**


1. Iain E G Richardson, "H.264 and MPEG-4 Video Compression," John Wiley &Sons,September 2003, ISBN 0-470-84837-5.


**Course Outcomes:**

**CO1.** **Understand** the basics of Analog and Digital Video: Video representation and transmission.
**CO2.** **Analyze** Analog and Digital Video Signals and Systems.
**CO3.** **Know** the fundamental video processing techniques.
**CO4.** **Acquire** the basic skill of designing video compression and familiarizing with Video Compression standards.
**CO5.** **Know** the basic techniques in designing video transmission systems: error control and rate control.

**ANNEXURE V**

## Item 6

To prepare and finalize the Experiment list/ Lab manual for Departmental Laboratory Course (DLC) to be offered in B. Tech. VII semester ***(for batches admitted in 2019-20)***

| S.No | Category | Subject Code | Subject Name |
|---|---|---|---|
| 1 | DLC | 140705 | VLSI Design |
| 2 | DLC | 140707 | Creative Problem Solving |

| Subject Code | Category Code | Subject Name | Theory Slot | | | Practical Slot | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | | L | T | P | |
| 140705 | DLC | VLSI Design Lab | - | - | - | 50 | 50 | 100 | - | - | 4 | 2 |

### VLSI Design Lab (140705)

**Lab Objectives**

To learn the fundamental principles of CMOS VLSI circuit design using SYMICA EDA CAD tool.

**List of Experiments:**

**Digital CMOS logic circuit design using SYMICA CAD tool:**

1. Design and simulate basic CMOS logic Gates: AND, OR, NOT.
2. Design and simulate CMOS logic universal gates: NAND and NOR.
3. Design and simulate CMOS logic 2:1 MUX.
4. Design and simulate CMOS logic 2 x 4 Decoder.
5. Design and simulate CMOS logic Half-Adder and Full Adder.
6. Design and simulate CMOS logic RS, JK and D flip-flops.

**Gate level design using SYMICA CAD tool:**

1. Design and simulate a Verilog program for the following combinational designs:
   a) 2 to 4 decoder
   b) 8 to 1 multiplexer
   c) 4 bit binary to gray converter
2. Design and simulate a Verilog code to describe the functions of a full adder using three modeling styles.
3. Design and simulate a model for 32 bit ALU.

## Course Outcomes

After the completion of this course students will be able to:

**CO1. Demonstrate** a clear understanding in hardware design language Verilog and SPICE.
**CO2. Model** a combinational circuit using hardware description language Verilog and SPICE Netlist.
**CO3. Model** a sequential circuit using hardware description language Verilog and SPICE Netlist.
**CO4. Model** a computational circuit using hardware description language Verilog and SPICE Netlist.
**CO5. Simulate** and validate the functionality of the CMOS VLSI circuits using CAD tools.

| Subject Code | Category Code | Subject Name | Theory Slot | | | Practical Slot | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | | L | T | P | |
| 140707 | DLC | Creative Problem Solving | - | - | - | 25 | 25 | 50 | - | - | 2 | 1 |

## Creative Problem Solving Lab (140707)

**Lab Objective:**

The lab comprises of two modules each of which students need to finish passing this course. These 02 modules are named as

(i) Communication Systems
(ii) Antenna Design

**Tools Required:**
**Network Simulator, QualNet, CST Design Studio**

### List of Experiments

### Communication Module:

1. Program in NS(network simulator)/QualNet to implement different topology
2. Program in NS(network simulator)/QualNet for connecting multiple routers and nodes and building a hybrid topology
3. Program in NS(network simulator)/QualNet to implement FTP using TCP bulk transfer
4. Program in NS(network simulator)/QualNet for connecting multiple routers and nodes and building a hybrid topology and then calculating network performance
5. To analyse network traces using Wireshark software.

### Antenna Module

1. Design and Simulation of Microstrip Antenna Using CST Tool.
2. Design and Simulation of Microstrip Transmission Line Using CST Tool.
3. Design and Simulation of Waveguide Using CST Tool.
4. Design and Simulation of Half Wave Dipole Antenna Using CST Tool.

### Course Outcomes:

After the successful completion of this course students will be able to:

**CO1.** **Write** a program in Network Simulator for various topologies.
**CO2.** **Design** a network using NS2 or QualNet.
**CO3.** **Design** an antenna of given specification.

## Item 7

To propose the list of "Additional Courses" which can be opted for getting an

***(i) Honours (for students of the host department)***
***(ii) Minor Specialization (for students of other departments)***

*[These will be offered through SWAYAM/NPTEL/MOOC based Platforms for the* B.Tech. ***VII semester students*** *(for the batch admitted in 2019-20)] and for* B.Tech. ***V semester*** *(for the batch admitted in 2020-21)]*

| Semester | Hons/ Minor | Domain | Subject Name | Duration of the Course in weeks | Course Registration start date | Course Registration end date | Name of the Mentor Faculty |
|---|---|---|---|---|---|---|---|
| V | Hons | Communication and Signal Processing | Principles and Techniques of Modern Radar Systems | 12 | 20-05-2022 | 01-08-2022 | Prof Madhav Singh |
| | | | Signal Processing for mm Wave communication for 5G and beyond | 08 | 20-05-2022 | 01-08-2022 | Dr. Karuna Markam |
| | | VLSI Design | Hardware modeling using Verilog | 12 | 20-05-2022 | 01-08-2022 | Dr. Varun Sharma |
| | | | System Design Through VERILOG | 08 | 20-05-2022 | 01-08-2022 | Dr. Varun Sharma |
| | Minor | Control & Sensor Technology | Control System | 12 | 20-05-2022 | 01-08-2022 | Dr. R P Narwaria |
| | | | Analog Electronic Circuit | 12 | 20-05-2022 | 01-08-2022 | Dr. Vikas Mahor |
| | | Communication and Signal Processing | Introduction to Wireless and Cellular Communications | 12 | 20-05-2022 | 01-08-2022 | Prof Madhav Singh |
| | | | Principles and Techniques of Modern Radar Systems | 12 | 20-05-2022 | 01-08-2022 | Prof Madhav Singh |
| VII | Hons | | Data Science for Engineer | 08 | 20-05-2022 | 01-08-2022 | Dr. Sandeep Sharma |
| | | | Design of Photovoltaic Systems | 12 | 20-05-2022 | 01-08-2022 | Dr. Sushmita Chaudhari |
| | Minors | | Microwave Engineering | 12 | 20-05-2022 | 01-08-2022 | Dr. Dinesh Rano |
| | | | Control Engineering | 08 | 20-05-2022 | 01-08-2022 | Dr. Rahul Dubey |

**Item 8**

To prepare and recommend the ***scheme structure of B.Tech. V Semester under*** the flexible curriculum (*Batch admitted in 2020-21)*

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

## Department of Electronics Engineering

## B.Tech. (Electronics Engineering) V Semester

***Effective for 2020-21, 2021-22 & 2022-23***

| S. No. | Subject Code | Category Code | Subject Name | Maximum Marks Allotted | | | | | | | Total Marks | Contact Hours per week | | | Total Credits | Mode of Teaching (Offline/ Online) | Mode of Exam. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Slot | | | | Practical Slot | | | | | | | | | |
| | | | | End Sem. | | Mid Sem. Exam. | Quiz/ Assignment | End Sem | Lab Work & Sessional | Skill Based Mini Project | | L | T | P | | | |
| | | | | End Term Evaluation | $Proficiency in subject /course | | | | | | | | | | | | |
| 1. | 140511 | MC | Data Science | 50 | 10 | 20 | 20 | 60 | 20 | 20 | 200 | 3 | 0 | 2 | 4 | Blended(2/1) | MCQ |
| 2. | 140512 | DC | Microprocessor & Interfacing | 50 | 10 | 20 | 20 | 60 | 20 | 20 | 200 | 2 | 1 | 2 | 4 | Blended(2/1) | PP |
| 3. | 140513 | DC | Linear Control Theory | 50 | 10 | 20 | 20 | - | - | - | 100 | 2 | 1 | - | 3 | Blended(2/1) | PP |
| 4. | 140514 | DC | Digital Communication | 50 | 10 | 20 | 20 | 60 | 20 | 20 | 200 | 2 | 1 | 2 | 4 | Blended (2/1) | PP |
| 5. | 140515 | DC | Electromagnetic Fields | 50 | 10 | 20 | 20 | - | - | - | 100 | 2 | 1 | - | 3 | Blended (2/1) | PP |
| 6. | 140516 | DLC | Minor Project-I | - | - | - | - | 60 | 40 | - | 100 | - | - | 4 | 2 | Offline(2/0) | SO |
| 7. | 140517 | DLC | Self-learning/ Presentation# | - | - | - | - | - | 40 | - | 40 | - | - | 2 | 1 | Online +Mentoring | SO |
| 8. | | CLC | Novel Engaging Course | - | - | - | - | 50 | - | - | 50 | - | - | 2 | 1 | Interactive | SO |
| 9. | 140518 | DLC | Summer Internship Project–II (Institute Level Evaluation) | - | - | - | - | 60 | - | - | 60 | - | - | 4 | 2 | Offline | SO |
| **Total** | | | | **250** | **50** | **100** | **100** | **350** | **140** | **60** | **1050** | **11** | **4** | **18** | **24** | | |
| **Additional Courses for obtaining Honours/Minor Specialization by desirous students** | | | | | | | **Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization** | | | | | | | | | | |
| **#compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation** | | | | | | | | | | | | | | | | | |
| 10. | | MAC | Disaster Management | 50 | 10 | 20 | 20 | - | - | - | 100 | 2 | - | - | GRADE | Online | MCQ |
| | | MAC | Project Management & Financing | 50 | 10 | 20 | 20 | - | - | - | 100 | 2 | - | - | GRADE | Online | MCQ |

| Category | Domain | Subject Names | |
|---|---|---|---|
| Hons | Communication and Signal Processing | Principles and Techniques of Modern Radar Systems | Signal Processing for mm Wave communication for 5G and beyond |
| | VLSI Design | Hardware modeling using VERILOG | System Design Through VERILOG |
| Minor | Control & Sensor Technology | Analog Electronic Circuit | Control System |
| | Communication and Signal Processing | Introduction to Wireless and Cellular Communications | Principles and Techniques of Modern Radar Systems |

**ANNEXURE VIII**

**Item 9**

To prepare and recommend the syllabi for all ***Departmental Core (DC) Courses*** of B. Tech. ***V Semester (for b*atch admitted in 2020-21)** under the flexible curriculum along with their COs.

| S.No | Category | Subject Code | Subject Name |
|---|---|---|---|
| 1 | DC | 140511 | Data Science |
| | | 140512 | Microprocessor and Interfacing |
| 2 | | 140513 | Linear Control Theory |
| 3 | | 140514 | Digital Communication |
| 4 | | 140515 | Electromagnetic Fields |

| Subject Code | Category Code | Subject Name | Theory Slot | | | | Practical Slot | | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Proficiency | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | Skill based mini proj | | L | T | P | |
| 140511 | DC | Data Science | 50 | 10 | 20 | 20 | 60 | 20 | 20 | 200 | 2 | 1 | 2 | 4 |

## Data Science (140511)

**COURSE OBJECTIVES**:

To provide the fundamental knowledge of Data Science. To present the basic representation and exploratory data analysis used in Data Science. To understand the working of techniques used in Data Science.

**Unit 1:** Need for data science, benefits and uses, facets of data, data science process, Introduction of basics python tool, Setting working Directory, Creating and saving a script file, File execution, removing variables from environment, clearing environment, Commenting script files, Variable creation, Data types and associated operations, Arithmetic and logical operators.

**Unit 2:** Control structures, loop, Functions, data structures: Lists, Arrays, Tuples, Dictionary, Sets, NumPy library, Data Collection: Getting to know your data, Types of Data, Data collection strategies, Data Pre-processing, Feature engineering, Exploratory Data Analytics.

**Unit 3:** Descriptive Statistics, Mean, Standard Deviation, Skewness and Kurtosis, inferential statistics: hypothesis testing, probability: probability theory, conditional probability, Pandas library, dataframe and dataframe related operations, Reading files.

**Unit 4:** Data Cleaning and Preparation, Handling Missing Data, Data Transformations using pandas and sklearn library, Removing Duplicates, Replacing Values, Detecting Outliers. Data visualization on different dataset using matplotlib and seaborn libraries, Scatter plot, Line plot, Bar plot, Histogram, Box plot, Pair plot.

**Unit 5:** Supervised learning: Regression, classification, Linear regression, logistic regression, decision tree, tree creation with entropy and information gain, ID3 algorithm, random forest, naïve bayes theorem, K-nearest neighbor and ensemble methods for solving real world problems, Unsupervised learning: Clustering, Reinforcement learning.

**BOOKS AND REFERENCES**


1. Mastering python for data science, Samir Madhavan
2. Introduction to linear algebra - by Gilbert Strang
3. Applied statistics and probability for engineers – by Douglas Montgomery
4. Pattern Recognition and Machine Learning, Christopher M. Bishop


**COURSE OUTCOMES:**

After completing the course, the student will be able to:

CO1. Define different Data Science techniques.
CO2. Illustrate various tools used for Data Science technique.
CO3. Apply data visualization techniques to solve real world problems.
CO4. Build exploratory data analysis for Data Science methods.
CO5. Apply Data Science techniques for solving real world problems.
CO6. Evaluate the performance of algorithms in data science.

| Subject Code | Category Code | Subject Name | Theory Slot | | | | Practical Slot | | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Proficiency | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | Skill based mini proj | | L | T | P | |
| 140512 | DC | Microprocessor & Interfacing | 50 | 10 | 20 | 20 | 60 | 20 | 20 | 200 | 2 | 1 | 2 | 4 |

## Microprocessor and Interfacing (140512)

**Course objectives:** To introduce the basic concepts of microprocessor and to develop assembly language programming skills along with the introduction of microprocessor and microcontroller applications.

### Unit I: Introduction to Microprocessor

Introduction to microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations, Interrupts and interrupt service routine.

### Unit II: 8085 Assembly language Programming

8085 instruction set, 8085 assembly language programming, Addressing modes, Counters and time Delays, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instructions.

### Unit III: Peripheral devices and their interfacing

Introduction to memory interfacing and interfacings chips: Programmable input/output ports 8255, Programmable interval timer 8253, Programmable interrupt controller 8259, DMA controller 8257.

### Unit IV: Architecture and Programming of 16-Bit Microprocessor

8086 Block diagram and architecture, pin configuration of 8086, Execution Unit (EU) and Bus Interface Unit(BIU), Minimum mode & Maximum mode Operation, Memory segmentation. Instruction set and addressing modes of 8086, Introduction to 8086 assembly language programming.

### Unit V: 8051 Microcontroller

Introduction to microcontrollers and embedded systems, 8051 architecture, pin description, use of microcontrollers in real time embedded system design.

**Text Book:**


1. Ramesh. S. Gaonkar, Microprocessor architecture Programming and Application with 8085 - Penram International Publishing, 4th Edition.
2. B. Ram, "Fundamentals of Microprocessors and Microcomputer" DhanpatRai, 5th Edition.


**Reference Books:**


1. Douglas V Hall., "Microprocessor and Interfacing" Tata Mcgraw Hill
2. A.K. Ray and K. M. Bhurchandi , "Advance Microprocessor and Peripheral", Tata Mcgraw Hill


**Course Outcomes**

After successful completion of the course, students will be able to:

- **CO1.** Explain the architecture and organization of 8085 microprocessors.
- **CO2.** Develop assembly language programming skill for 8085.
- **CO3.** Design memory and I/O interfacing circuits using 8255, 8253/8254, 8257/8237 and 8259A with 8085 microprocessor
- **CO4.** Illustrate 8086 microprocessorarchitecture and programming skills.
- **CO5.** Discuss 8051 microcontroller architecture ant its application in Embedded systems.

| Subject Code | Category Code | Subject Name | Theory Slot | | | | Practical Slot | | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Proficiency | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | Skill based mini proj | | L | T | P | |
| 140513 | DC | Linear Control Theory | 50 | 10 | 20 | 20 | - | - | - | 100 | 2 | 1 | - | 3 |

## Linear Control Theory (140513)

**Course Objectives:** learning of control system theory and its implementation in practical systems using electronic devices.

**UNIT I: Introduction to Control Systems:** Basic control system terminology, Open loop and Closed loop system, Feedback control, Different modeling of physical systems, Linear approximation of physical systems. Transfer function of linear systems, Block diagram algebra and Signal flow graphs, Effects of negative feedback.

**UNIT II**: **Time Domain Analysis:** Test input signals, First order systems, Second order systems, Effects of addition of poles and zeros to open and closed loop transfer functions, Steady state error, Constant and error coefficients for type 0, 1, and 2 systems.

**UNIT III: Stability Analysis:** Concept of stability of linear systems, Relation between the closed loop poles and stability, Relative stability, Absolute stability, Routh Hurwitz criteria and its applications, Root locus plot.

**UNIT IV: Frequency Domain Analysis:** Performance specifications in frequency domain, Co-relation between frequency domain and time domain, Polar plots and Bode plots of transfer function, Nyquist stability criterion, Assessment of relative stability.

**Unit V: Introduction to Controllers:** Introduction to Proportional, Integral, and Derivative controller, PD controller, PI controller, PID controller, Design of various controllers and their limitations.

**Text Books:**


1. Control System Engineering- I. J. Nagrath & M. Gopal, New Age International.
2. Modern Control Engineering –K. Ogata, Prentice Hall.
3. Control System- A. Anand Kumar, PHI
4. Control System Engineering – B.S. Manke, Khanna publications.


**Reference Books:**


1. Automatic Control System— B. C. Kuo,Wiley.
2. Control System Engineering- Norman Nise, John Wiley & Sons.


**Course Outcomes**:

After successful completion of the course, students will be able to:

- **CO1. Determine** the transfer function of linear control system.
- **CO2. Evaluate** the time domain response of control system for different standard inputs.
- **CO3. Compute** the steady state error for type 0,1,2 systems.
- **CO4. Analyze** the stability of control system using time and frequency domain methods.
- **CO5. Design** proportional, integral, and derivative controller, PD, PI, PID controllers.

| Subject Code | Category Code | Subject Name | Theory Slot | | | | Practical Slot | | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Proficiency | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | Skill based mini proj | | L | T | P | |
| 140514 | DC | Digital Communication | 50 | 10 | 20 | 20 | 60 | 20 | 20 | 200 | 2 | 1 | 2 | 4 |

## Digital Communication (140514)

**Course Objectives:**The main objective of this course is to understand the basic concepts of digital modulations, signal-space analysis and digital transmission techniques.

**Unit I Sampling:** Sampling theorem for Low pass and Band pass signals, Ideal sampling, Natural sampling and Flat top sampling, Crosstalk, Aliasing, Time division multiplexing, PAM, PWM and PPM their generation and detection.

**Unit II Digital Modulation Systems:** Pulse Code Modulation, Quantization, Quantization noise, Companding, Inter symbol interference, Eye pattern, Delta modulation, Adaptive delta modulation and DPCM. Encoding techniques: On-Off signaling, Polar signaling, RZ signaling, Bipolar signaling, AMI, Manchester code, Differential encoding their advantage and disadvantages.

**Unit III Band Pass Data Transmission:** ASK, Binary phase shift keying (BPSK), QPSK, DPSK, Coherent and Non coherent BFSK, Minimum shift keying, QAM, Concept of M-ary PSK and M-ary FSK, Spectral properties of QPSK and MSK.

**UNIT IV Detection Techniques:** Matched filter and Correlator detector, Gram Schmidt orthogonalization procedure and Concept of signal space for the computation of probability of error, Calculation of error probability for BPSK, QPSK, QAM and coherent BFSK, Comparison of different modulation techniques.

**Unit V Information Theory and Coding:** Concept of information theory, Entropy and Information rate, Channel capacity, Shannon's theorem, Shannon Hartley theorem , BW and signal to noise ratio trade off, Sources encoding, Extension of zero memory source.
**Error correcting codes:** Properties of linear block codes, Encoding and Decoding of linear block codes and cyclic codes, Burst error correcting codes, Concept of convolution codes.

**Text Books:**


1. Singh, R.P. &Sapre, S.D, "Communication Systems: Analog & Digital", Tata McGraw-Hill, 5th reprint, 2000.
2. John G. Proakis, "Digital Communication", McGraw Hill Inc, 5th Edition, 2008.


**Reference Books:**


1. Simon Haykin, "Communication Systems", John Wiley & Sons, 4th Edition, 2000.
2. Taub& Schilling, "Principle of Communication Systems", 2nd Edition, 2003.


**Course Outcomes:**

After successful completion of the course, students will be able to:

CO1. **Explain** the process of sampling and pulse modulation.
CO2. **Analyze** digital modulation systems and line coding schemes.
CO3. **Describe** the different band pass data transmission techniques with spectral analysis.
CO4. **Determine** the base band pulse transmission techniques and error probability.
CO5. **Illustrate** the concepts of information theory and source coding.

| Subject Code | Category Code | Subject Name | Theory Slot | | | | Practical Slot | | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Proficiency | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | Skill based mini proj | | L | T | P | |
| 140515 | DC | Electromagnetic Theory | 50 | 10 | 20 | 20 | - | - | - | 100 | 2 | 1 | - | 3 |

### Electromagnetic Theory (140515)

**Course objectives:** To develop an understanding of fundamental concepts of electromagnetic fields with an emphasis on wave propagation and to create ability to relate basic electromagnetic concepts to the performance of devices, circuits, and systems.

**Unit I Electrostatics:** Coulomb's Law, Electric field intensity, Electric flux and flux density, Gauss law, Boundary relations, Concept of divergence, Curl, Scalar and vector potential, Divergence theorem, Stokes theorem, Electric field in dielectric and conductor, Continuity equation, Poisson's and Laplace's equations.

**Unit II Magnetostatics:** Lorentz force, Magnetic field intensity (H) – Biot–Savart's Law– Ampere's Circuit Law – H due to straight conductors, Circular loop, Infinite sheet of current, Magnetic flux density (B) –in free space and conductor, Magnetic materials – Magnetization.

**Unit III Electrodynamic Fields:** Magnetic field in multiple media – Boundary conditions, Scalar and vector potential, Poisson's equation, Magnetic force, force between current carrying wires, Magnetic circuits – Faraday's law, Displacement current – Maxwell's equations (differential and integral form) –for steady, time varying and time harmonic fields.

**Unit IV Electromagnetic Wave Equation:** General wave equation, Uniform plane wave in free space, Perfect dielectric, Lossy dielectric and conducting medium, Skin depth, Poynting vector and Poynting theorem.

**Unit V Polarization and Reflection of Wave: Wave Polarization- linear-elliptic-circular, R**eflection of uniform plane waves, Normal incidence and Oblique incidence, Brewster angle, Total internal reflection.

**Text Books:**

1. Elements of Engineering Electromagnetic Third Edition- N.N. Rao- Prentice Hall, India.
2. Elements of Electromagnetic, Second Edition- Matthew N.O. Sadiku- Saunders coll Publishing.

**Reference Books:**

1. Fields & Waves in Communication Electronics - S.Ramo, J.R. Whinnery& T. Van Duzer- John Wiley & Sons.
2. Electromagnetic - J.D. Kraus-McGraw Hill.
3. Electromagnetic Waves & Radiating Systems - E.C. Jordan & K.G. Balmain- Prentice Hall.

**Course Outcomes**

After successful completion of the course, students will be able to:

**CO1. Solve** the problems associated with static electromagnetic fields in different engineering situation.
**CO2. Describe** static and dynamic electric and magnetic field.
**CO3. Apply** boundary conditions for electric and magnetic fields at the interface of two different media.
**CO4. Solve** diverse engineering problems with the help of Maxwell equations.
**CO5. Analyze** the behavior of plane waves in different media

| Subject Code | Category Code | Subject Name | Theory Slot | | | Practical Slot | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | | L | T | P | |
| 100007 | MC | Disaster Management | 70 | 20 | 10 | - | - | 100 | 3 | - | - | 3 |

### Disaster Management (100007)

**Course objectives:**

- To understand basic concepts in Disaster Management
- To understand Definitions and Terminologies used in Disaster Management
- To understand Types and Categories of Disasters
- To understand the Challenges posed by Disaster
- To understand Impact of Disasters key skills

**Unit 1:** Introduction to disaster management, concepts and definitions: disaster, vulnerability, risk severity, frequency and details, capacity impact, prevention, mitigation.

**Unit 2:** Disasters – Disasters classification, demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends, hazard and vulnerability profile of India.

**Unit 3:** Disaster Impacts – Disaster impact (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues, impact of natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides etc.), impact of manmade disasters (industrial pollution, artificial flooding in urban areas, urban disasters, transportation accidents etc.).

**Unit 4:** Disaster Risk Reduction (DRR) - Disaster management cycle- its phases; prevention, mitigation, preparedness, relief and recovery; structural and non- structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post disaster environmental response. Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders: Policies and legislation for disaster management. DRR programmes in India and the activities of National Disaster Management Authority.

**Unit 5:** Disasters, Environment and Development – Factors affecting vulnerability such as impact of development projects and environmental modifications (including of dams, land use changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

**Text Books:**


1. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
2. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation
3. Srivastava H.H. & Gupta G.D., Management of Natural Disasters in developing countries, Daya Publishers Delhi, 2006.


**Reference Books:**


1. http://ndma.gov.in (Home page of National Disaster Management Authority)
2. http://www.ndmindia.nic.in / (National Disaster Management in India)
3. Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.

4. National Disaster Management Policy, 2009, GOI.
5. Inter Agency Standing Committee (IASC) (Feb. 2007), IASC Guidelines on Mental Health and Psychosocial Support in Emergency Setting. Geneva: IASC

**Course Outcomes:**

After successful completion of the course, the students will be able to

CO1. Identify disaster prevention and mitigation approaches.
CO2. Classify global and national disasters, their trends and profiles.
CO3. Determine the impacts of various disasters.
CO4. Apply Disaster Risk Reduction in management.
CO5. Infer the linkage between disasters, environment and development.

**Item 10**

To prepare and recommend the Experiment list/ Lab manual for all the Laboratory Courses to be offered in B. Tech.V semester ***(for batch admitted in 2020-21)***

| S.No | Category | Subject Code | Subject Name |
|---|---|---|---|
| 1 | DC | 140512 | Microprocessor and Interfacing |
| 2 | DC | 140514 | Digital Communication |
| 3 | DLC | 140515 | Minor Project-I |

**B. Tech. V Semester (Electronics Engineering)**

| L | T | P | C |
|---|---|---|---|
| - | - | 2 | 1 |

**Subject Name: Microprocessor and Interfacing**
**Subject Code: 140512**

**Course Objectives**
This course gives the ability to the students to learn the assembly language programming of 8085 and 8086 microprocessor and their interfacing with different peripherals.

**List of Experiments**

1. Write an assembly language program to perform different arithmetic operations on 8 bit numbers using 8085 microprocessor kit and simulator.
2. Write an assembly language program to find whether the number is even or odd using 8085 microprocessor kit.
3. Write an assembly language program to find largest Number in a given array using 8085 microprocessor kit.
4. To display standard waveform on CRO using 8085, 8255 and ADC card.
5. Write an assembly language program to interfacing 8253 Timer with 8085 microprocessor kit in different modes.
6. Write an assembly language program to obtain 2's complement of a given number using 8086 microprocessor kit.
7. Write an assembly language program to perform arithmetic operations of two BCD numbers using 8086 microprocessor kit and simulator.

**Course Outcomes:**
After successful completion of the course, students will be able to:

- **CO1.** **Execute** the assembly language programs for arithmetic and logical operations with 8085 and 8086 microprocessor.
- **CO2.** **Design** interfacing circuits using 8255 and 8253 with 8085 microprocessors.

**B.Tech. V Semester (Electronics Engineering)**

| L | T | P | C |
|---|---|---|---|
| - | - | 2 | 1 |

**Subject Name: Digital Communication Lab**
**Subject Code: 140514**

**Course Objectives**
The main objective of course is to give hardware knowledge of various pulse and digital modulation techniques. Students will also learn the implementation using MATLAB software.

**List of Experiments**

1. To perform sampling and reconstruction.
2. To identify the various encoding schemes for a given data stream.
3. To analyze pulse amplitude modulation.
4. To analyze pulse width modulation.
5. To generate amplitude shift key signal.
6. To generate amplitude shift key signal using MATLAB.
7. To generate phase shift key signal using MATLAB.
8. To generate frequency shift key signal using MATLAB.
9. To generate quadrature phase shifted key signal using MATLAB.

**Course Outcome:**
After successful completion of the lab, students will be able to:

- **CO1. Understand** sampling theorem.
- **CO2. Perform** lines coding technique.
- **CO3. Construct** different pulse modulation technique.
- **CO4. Implement** different digital modulation technique
- **CO5. Evaluate** the performance of the digital communication system using MATLAB.

**B.Tech. V Semester (Electronics Engineering)**

**Departmental Lab Core**

| L | T | P | C |
|---|---|---|---|
| - | - | 2 | 1 |

**Subject Name: Minor Project-I**
**Subject Code: 140515**

**Course objectives**

This course gives the ability to the students to learn hardware and software implementation of electronic circuits.

**List of Exercise/ Experiments**

1. To develop interactive software and hardware based projects.

**Course Outcomes**

After successful completion of the workshop, students will be able to:

**CO1.** **Simulate** electronics circuits using software.

**CO2.** **Design** hardware based electronics circuits.

**ANNEXURE X**

## Item 11

To prepare and recommend the suggestive list of projects which can be assigned under the 'Skill based mini-project' category in various laboratory component based courses to be offered in B.Tech. V Semester ***(for the batch admitted in 2020-21)***.

| S.No | Category | Subject Code | Subject Name |
|---|---|---|---|
| 1 | DC | 140512 | Microprocessor and Interfacing |
| 2 | DC | 140514 | Digital Communication |

## Microprocessor and Interfacing

1. Develop an 8085 microprocessor assembly language program to generate Fibonacci series using 8085 Simulator.
2. Develop an 8085 microprocessor assembly language program to calculate the square root using 8085 Simulator.
3. Develop an 8086 microprocessor assembly language program to interface a virtual stepper motor on Emu86 simulator.
4. Develop an 8086 microprocessor assembly language program to check a string as palindrome or not.
5. Write an assembly language program to interface ADC card with 8085 and display the digital value of the LCD.

## Digital Communication

1. Implementation of sampling theorem.
   (a) Sampling at Nyquist rate (b) Over sampling and (c) Under sampling.
2. Implementation of Eye Diagram/Eye Pattern for any of the modulation technique.
3. PPM using IC 555.
4. PAM using IC 555.
5. PWM using IC 555.
6. Generation of On-off Keying signal.
7. Generation of ASK, FSK and PSK signal.
8. Generation of QAM signal and its constellation diagram.
9. To develop a GUI based project in MATLAB for PCM.
10. To develop a GUI based project in MATLAB for Differential-PCM.
11. To develop a GUI based project in MATLAB for Delta Modulation.
12. To develop a GUI based project in MATLAB for Adaptive Delta Modulation.

## Item 12

To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered ***(for batch admitted in 2020-21)*** in online mode under ***Self-Learning/ Presentation***, in the B.Tech. ***V Semester***

| Category | Semester | Name of The course | Duration of the Course in weeks | Course Registration | | Name of the Mentor Faculty |
|---|---|---|---|---|---|---|
| | | | | Start Date | End Date | |
| **Electronics Engineering (V Semester)** | | | | | | |
| Self Learning | V | Demystifying Networks | 4 | 20-05-2022 | 01-08-2022 | Dr. Deepak Batham |
| | V | Basics of Software defined Radios and Practical applications | 4 | 20-05-2022 | 01-08-2022 | Dr. Shubhi Kansal |
| | V | Foundation of Cognitive robotics | 4 | 20-05-2022 | 01-08-2022 | Dr. Sushmita Chaudhari |

**Item 15**

To review, prepare, finalize and recommend the ***Scheme & Syllabi (along with the Course Outcomes) of III semester*** **B. Tech. programmes (batch admitted 2021-22 Session) {**(all traditional and emerging area programmes (IT-IoT, AIR, EE-IoT, MAC)}

| S.No | Category | Subject Code | Subject Name |
|---|---|---|---|
| 1 | DC | 140311 | Electronic Circuit Design |
| 2 | | 140312 | Digital Circuits and Systems |
| 3 | | 140313 | Network Theory |
| 4 | | 140314 | Analog Communication |

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

## Department of Electronics Engineering

## Scheme of Examination

## B.Tech. (Electronics Engineering) III Semester *Effective for academic session 2021-22 & 2022-23*

| S. No. | Subject Code | Category Code | Subject Name | Maximum Marks Allotted | | | | | | | Total Marks | Contact Hours per week | | | Total Credits | Mode of Teaching (Offline/ Online) | Mode of Exam. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Slot | | | | Practical Slot | | | | | | | | | |
| | | | | End Sem. | | Mid Sem. Exam. | Quiz/ Assignment | End Sem | Lab Work & Sessional | Skill Based Mini Project | | L | T | P | | | |
| | | | | End Term Evaluation | $Proficiencyin subject /course | | | | | | | | | | | | |
| 1. | 100025 | BSC | Mathematics-II | 50 | 10 | 20 | 20 | - | - | - | 100 | 3 | 1 | - | 4 | Offline (3/0) | PP |
| 2. | 140311 | DC | Electronics Circuit Design | 50 | 10 | 20 | 20 | 60 | 20 | 20 | 200 | 2 | 1 | 2 | 4 | Blended (3/1) | PP |
| 3. | 140312 | DC | Network Theory | 50 | 10 | 20 | 20 | - | - | - | 100 | 2 | 1 | - | 3 | Blended (2/1) | PP |
| 4. | 140313 | DC | Digital Circuits & Systems | 50 | 10 | 20 | 20 | 60 | 20 | 20 | 200 | 2 | 1 | 2 | 4 | Blended (3/1) | PP |
| 5. | 140314 | DC | Analog Communication | 50 | 10 | 20 | 20 | - | - | - | 100 | 2 | 1 | - | 3 | Blended (2/1) | PP |
| 6. | 140315 | DLC | Hardware lab | - | - | - | - | 60 | 20 | 20 | 100 | - | - | 2 | 1 | Offline(1/0) | SO |
| 7. | 140316 | DLC | Self-learning/ Presentation# | - | - | - | - | - | 40 | - | 40 | - | - | 2 | 1 | Online +Mentoring | SO |
| 8. | | CLC | Novel Engaging Course | - | - | - | | 50 | - | - | 50 | - | - | 2 | 1 | Interactive | SO |
| 9. | 140317 | DLC | Summer Internship Project–I (Institute Level Evaluation | - | - | - | - | 60 | - | - | 60 | - | - | 4 | 2 | Offline | SO |
| **Total** | | | | **250** | **50** | **100** | **100** | **290** | **100** | **60** | **950** | **11** | **5** | **14** | **23** | | |
| 10. | | MAC | Project Management & Financing | 50 | 10 | 20 | 20 | - | - | - | 100 | 2 | - | - | Grade | Online | MCQ |

**$Proficiency in course/subject – includes the weightage towards ability/ skill/ competence /knowledge level /expertise attained /attendance etc. in that particular course/subject**

**#compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation**

| Mode of Teaching | | | | | | Mode of Examination | | | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory | | | | Lab | NEC | Theory | | | Lab | SIP/ SLP/ NEC | |
| Offline | Online | Blended | | Offline | Interactive | PP | A+O | MCQ | SO | SO | |
| | | Offline | Online | | | | | | | | |
| 3 | 1 | 8 | 4 | 5 | 1 | 17 | 0 | 0 | 1 | 4 | 22 |
| 13.63% | 4.54% | 36.36% | 18.18% | 22.72% | 4.54% | 77.27% | 0% | 0% | 4.54% | 18.18% | Credits % |

| Subject Code | Category Code | Subject Name | Theory Slot | | | | Practical Slot | | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Proficiency | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | Skill based mini proj | | L | T | P | |
| 140311 | DC | Electronic Circuit Design | 50 | 10 | 20 | 20 | 60 | 20 | 20 | 200 | 2 | 1 | 2 | 4 |

### Electronic Circuit Design (140311)

**Course Objective:** To understand different semiconductor circuits and grab the way to design circuits and perform measurements of circuit parameters.

**Unit I: Diode Circuits**: Review of P-N Junction Diodes, Power supply parameters, SMPS, Zener and Avalanche Breakdown, Zener voltage regulator, series pass regulator (with feedback) and shunt voltage regulators, Short circuit protection.

**Unit II: Introduction to BJT Biasing and Stability**: Review of BJTs, Transistor biasing and bias stabilization, the operating point, stability factor, analysis of fixed base bias, Voltage divider bias, collector to base bias, Emitter resistance bias circuit and Bias compensation techniques.

**Unit III: BJT as an Amplifier**:Low frequency BJT amplifiers, equivalent circuit of BJT using h parameter for CB, CE, CC configurations, calculation of transistor parameter for CB, CE, CC using h parameters. High frequency BJT amplifier: Hybrid-pi (π) common emitter transistor model, hybrid – π conductance and capacitance, gain-bandwidth product.

**Unit IV: Feedback amplifiers:**Introduction to Feedback Amplifiers & their design parameters, comparison of different feedback amplifier configuration viz (gain, input impedance, output impedance, current gain, voltage gain), cascading of BJT amplifier, Darlington Pair.

**Unit V: Oscillators and Tuned Amplifiers**: Barkhausen criterion, Sinusoidal oscillators, L-C (Hartley-Colpitts) oscillators, RC phase shift, resonant oscillator, Wien Bridge and crystal oscillators, Clapp oscillator, Tuned amplifier design using BJTs.

**Text Books:**


1. Microelectronic Circuits:Theory and Application: Sedra& Smith,**7th Edition,** Oxford University Press.
2. Electronics Devices and Circuits: Boylested&Nashelsky,**11th Edition,** Pearson Education India

Reference Books:

3. Electrical Engineering material: A.J Dekker, 1st Edition, Prentice Hall of India.
4. Micro Electronics: Millman, &Grabel,**2nd Edition,** McGraw Hill Education
5. Integrated Electronics: Millman&Halkias,McGraw Hill Education.


**Course Outcomes**

After the completion of this course students will be able to:

- CO 1. **Design** different diode circuits.
- CO 2. **Design** the biasing circuits for BJTs.
- CO 3. **Examine** the working of BJT amplifiers.
- CO 4. **Analyze**the different parameters of feedback amplifiers.
- **CO 5. Design** the Oscillator and Tuned amplifier circuits.

| Subject Code | Category Code | Subject Name | Theory Slot | | | | Practical Slot | | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Proficiency | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | Skill based mini proj | | L | T | P | |
| 140319 | DC | Digital Circuit & Systems | 50 | 10 | 20 | 20 | 60 | 20 | 20 | 200 | 2 | 1 | 2 | 4 |

### Digital Circuits & Systems (140319)

**Course Objective:** To understand the concept of digital systems, design&analyze the combinational and sequential logic circuits.

**Unit I: Boolean algebra and switching functions**: Minimization of Boolean functions, Canonical & standard form, concept of prime implicant etc. Karnaugh's map method, Quine-McCluskey's method, Universal gates, NAND/NOR realization of Boolean functions.

**Unit II: Combinational Logic circuits**: Half adder, Half subtractor, Full adder, Full subtratctor circuits. Serial and parallel adder, BCD adders, look-ahead carry generator, Code Converters, Decoders, Encoders, Multiplexers & demultiplexers.

**Unit III: Sequential Circuits:** Latches, Flip-flops - SR, JK, D, T, and Master-Slave,Race around condition Characteristic table and equation, Excitation table, Edge triggering, Level Triggering, Realization of one flip flop using other flip flops.

**Unit IV: Registers and Counters**: Asynchronous Ripple or serial counter, Asynchronous Up/Down counter, Synchronous counters, Synchronous Up/Downcounters, Design of Synchronous counters: State diagram, State table, State minimization, State assignment, Excitation table and Maps Circuit, Implementation: Modulo-n-counter, Registers:Shift registers, Universal shift registers, Shift register counters, Ring counter, Sequence generators, Johnson Counter.

**Unit V: Logic Families:** Diode and transistor as a switch, FET as a switch, specifications for Logic Families, RTL, DCTL, IIL, DTL, all types of TTL circuits, ECL, HTL and PMOS, NMOS & CMOS logic, Comparison of various logic families.

**Text Books:**


1. Digital Design: M. Mano,4th Edition**,** Prentice Hall of India.
2. Logic & Computer Design Fundamental: M.Mano, 5th Edition, Pearson Education India.
3. Digital Circuits and Design: S. Salivahanan,5th Edition**,** Oxford University Press.


**Reference Books:**


1. Digital Electronics: W.H. Gothman, Prentice Hall of India.
2. Digital System Principles & Applications: R.J. Tocci,11th Edition**,** Pearson Education India.
3. Pulse, Digital & Switching Waveforms: Millman&Taub,McGraw Hill Education.


**Course Outcomes**

After the completion of this course students will be able to:

- **CO1. Implement** the Boolean expression using basic and universal logic gates.
- **CO2. Design** different combinational logic circuits
- **CO3. Design** various latches and flip-flops
- **CO4. Design** various shift registers and counters using flip-flops.
- **CO5. Analyze** different types of logic families, semiconductor memories, & multivibrators.

| Subject Code | Category Code | Subject Name | Theory Slot | | | | Practical Slot | | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Proficiency | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | Skill based mini proj | | L | T | P | |
| 140318 | DC | Network Theory | 50 | 10 | 20 | 20 | - | - | - | 100 | 2 | 1 | - | 3 |

### Network Theory (140318)

**Courseobjective:**Tounderstandbasicelectriccircuits,studyofnetworktheorems,transientanalysis, graphtheory, analysisoftwoportnetworks.

**Unit-I Introduction –** Basics of Circuit Elements**,** Characterization of Resistors, Capacitors & Inductors in Termsof their linearity & time dependence features, Characteristics of Independent & Dependent Sources, KCL& KVL for circuits with dependent & independent sources, Dot convention for coupled inductor and their characteristics, co-efficientofcoupling.

**Unit-II Network theorems**- Superposition, Thevenin, Norton, Millman, Reciprocity and Maximum Power Transfer theorems, Network topology, concept of network graph, Tree, Twigs and link, Incident matrix, Cutset and Tieset matrices.

**Unit-III Transient analysis**- Transients in RL, RC and RLC circuits, initial conditions, time constants,Steady state analysis, Node and mesh analysis of RL, RC and RLC networks with sinusoidal sources.

**Unit-IVLaplace Transform & Passive Filters**: The Laplace transform, Properties of Laplacetransform, solution of differential equation using Laplace Transform, Initial and final value theorem.Waveformsynthesis&LaplaceTransformofvariouswaveformfunction, Low pass, high pass, band pass and band elimination filters,

**Unit-V Two Port Network**: Concept of Ports, Calculation ofnetwork functions for one port and two port, Two portparameters– Z,Y,hybridandchainParameters,Relationshipbetweentwoportnetworkparameters, T and π networks, Characteristics impedance & propagation constant.

**Text Books:**

1. NetworkAnalysis:M.E.VanValkenberg,3rdEdition,PrenticeHallofIndia.
2. NetworkandSystems:D.RoyChaudhary,**2nd Edition,**NewAcademicScienceLtd.

**Reference Books:**

3. IntroductiontoModernNetworkSynthesis:M.E.VanValkenberg,PrenticeHallofIndia.
4. NetworkAnalysis&Synthesis:F.Kuo,2ndEdition,Wiley&Sons.
5. NetworkAnalysis&Synthesis:RavishRSingh,1stEdition,McGrawHillEducation.

**Course Outcomes**

After the completion of this course students will be able to:

CO1. **Analyze** the circuits using Kirchoff's laws.
CO2. **Apply** Network theorems and concept of graph theory for simplification of circuits. .
CO3. **Evaluate** transient response and steady state response.
CO4. **Apply** the Laplace transform to linear circuits and systems.
CO5. **Determine** ABCD,Z,Y and h parameter of an electrical circuits.

| Subject Code | Category Code | Subject Name | Theory Slot | | | | Practical Slot | | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Proficiency | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | Skill based mini proj | | L | T | P | |
| 140320 | DC | Analog Communication | 50 | 10 | 20 | 20 | - | - | - | -100 | 2 | 1 | - | 3 |

**Analog Communication (140320)**

**Course objective:** To understand the concept of modulation, various types of modulation, application, standards, analysis of modulation and demodulation process, probability theory and probability function, and concept of noise.

**Unit I: Spectral Analysis:** Introduction to signals and classifications, Introduction to Fourier series, Introduction to Fourier Transforms and its properties, Fourier transform of important functions, Autocorrelation, Cross correlation and their properties.

**Unit II: Amplitude Modulation:** Needs of modulation, Amplitude modulation, SSB, DSB,VSB suppressed carrier modulation, Modulation techniques their generation, detection and spectral analysis, square law modulators, switching modulator, envelope and square law detector, balanced modulator, Superhetrodyne receiver, Power calculation for AM, DSB-SC & SSB-SC, FDM.

**Unit II Angle Modulation:** Relationship between Frequency and phase modulation, frequency and phase deviation, types of FM, comparison between NBFM & AM signal., Carson's rule, spectrum of FM signal, comparison of narrow band and wide band FM, generation and detection of FM. Pre-emphasis and de-emphasis, capture effect.

**Unit IV Probability, and random variables**: Random variable, sample space and events, probability and its properties, distribution function, discrete random variable and probability mass function, continuous random variable and probability density function, cumulative distribution function, probability density function, statistical average, variance, moment, Distributions: Binomial, Poisson, Gaussian and Rayleigh probability density function.

**Unit V Noise Analysis:** Various sources of noise, types of noise with their characteristics, Mathematical representation of noise figure, Noise bandwidth, Noise temperature and noise figure of amplifiers in cascades, Figure of merit of modulation techniques, comparison of modulation scheme for noise.

**Text Books:**


1. Communication System: Simon Haykins, Wiley & Sons.
2. Communication Systems - B. P. Lathi, BSP Publication


**Reference Books:**


1. Electronic Communication System: Kennedy-Devis, Tata McGraw-Hill Education.
2. Modern Digital & Analog Communication System: B.P. Lathi ,Oxford University Press.
3. Principles of Communication System: Taub and Schilling McGraw-Hill Education.


**Course Outcomes** After the completion of this course students will be able to:

CO1. **Analyze** the frequency domain representation of various signals.
CO2. **Describe** amplitude modulation, their generation & detection methods.
CO3. **Explain** the generation and detection techniques for angle modulated signal.
CO4. **Evaluate** the statistical parameters for general PDF/CDF.
CO5. **Evaluate** the effects of noise on modulation techniques

| Subject Code | Category Code | Subject Name | Theory Slot | | | | Practical Slot | | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Proficiency | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | Skill based mini proj | | L | T | P | |
| 100005 | MAC | Project Management & Financing | 50 | 10 | 20 | 20 | - | - | - | -100 | 2 | 1 | - | 3 |

**Project Management & Financing (100005)**

**Course Objectives:** 1) To know about project, its attributes and essentials of project planning 2) To develop the project network 3) To take rational decisions using project networks for successful completion of the projects 4) To decide about about rational utilization of resources in project. 5) To have an elementary idea of finances involved in a project and managing it.

**Unit I:** Project Planning: Introduction to Project Management, Difference between Project and Production, Attributes of a Project: Time, Cost, Quality and Safety. Stakeholders of a Project, Project life cycle. Project Planning: Types of Project Plans and feasibility.

**Unit-II:** Project Network logic: Project Networking and work flows, Activity duration and methods of estimating activity duration – One time estimate three time estimates, Duration estimation procedure. Use of Bar Charts, Mile stone charts and networks, Network representation schemes: Activity on Arrow and Activity on Node Networks (A-o-A & A-o-N), Logic behind developing project network and simple network calculations, Critical paths and floats.

**Unit-III:** Decision making through networks: CPM, PERT & PDM: Use of network in Decision Making: Importance of critical path, Monitoring the progress and updating the project plan. Use of floats in Resource smoothening, Introduction to Precedence Diagramming Method (PDM), Different lag and lead relations in terms of SS(Start to Start), SF( Start to Finish), Finish to Start(FS), and Finish to Finish(FF) and composite relations.

**Unit-IV:** Project Cost Control: Breakeven analysis in planning stage, Direct and indirect cost, slope of direct cost curve, Total project cost and optimum duration, contracting the network for cost optimization. Escalation & Variation in prices

**Unit-V:** Projects Financing: Introduction to project financing; Role of governments in financing projects, Funder and Concessionaire: Economic multiplier effects of Projects; Means of financing-public finance and private finance, Granting authority: World Bank Group, IMF, ADB, Micro and Small Enterprises Funding Scheme (MSME), Elementary understanding of Procurement of infrastructure projects through Public Private Partnership (PPP) route, Build Operate Transfer (BOT), Build Operate Own & Transfer (BOOT); Stakeholders' perspectives, Lifecycle of PPP projects, Micro & Macro economics concepts and its application in Project Financing.

**Recommended Text-Books:**


1. Project Management Scheduling PERT and CPM by Dr. B.C. Punmia, K.K. Khandelawal
2. PERT & CPM Principles and Applications by L.S. Srinath, Affiliated EWP Pvt. Ltd.
3. Project Planning and Control by Albert Lester, Fourth Edition Elsevier Butterworth-Heinemann.


**Recommended Reference Books:**

1. A Management Guide to PERT/CPM With GERT/PDM/DCPM and Other networks by Jerome D. Wiest, Ferdinand K. Levy, Prentice Hall.
2. Project M anagement with C PM a nd P ERT b y J oseph J . M oder, C ecil R . P hillips, Van Nostrand Reinhold Company

**Course Outcomes**

Upon completion of the course, the students will be able to:

CO1. Know the attributes of project and its different phases.
CO2. Develop the project network based on work breakdown structure and esimation of activity durations
CO3. Analyze the project network and make decide the various alternates.
CO4. Evaluate the optimum cost of project for assigned deadlines.
**CO5.** Understand the different options to arrange the finances to complete it within stipulated time.

## Item 16

To review, prepare, finalize and recommend the list of experiments/ Lab manual and skill based mini projects for various laboratory courses to be offered in III Semester ***(for the batch admitted in 2021-22)***.**{**(all traditional and emerging area programmes (IT-IoT, AIR, EE-IoT, MAC)}

| S.No | Category | Subject Code | Subject Name |
|---|---|---|---|
| 1 | DC | 140311 | Electronic Circuit Design |
| 2 | | 140312 | Digital Circuits and Systems |
| 3 | | 140315 | Software Lab |

| L | T | P | C |
|---|---|---|---|
| - | - | 2 | 1 |

**Subject Name: Electronic Circuit Design**
**Subject Code: 140311**

**Course Objectives**

This course gives the ability to the students to design and analyze various electronics circuits using BJT.

### List of Experiment

1. To design a voltage regulator using BJT and Zener Diode.
2. To design BJT as a switch.
3. To design a Common Emitter amplifier and determine its voltage gain and output resistance.
4. To determine the gain and bandwidth of 2-stage RC coupled amplifier.
5. To analyze the working operation of LC Oscillator using BJT.
6. To analyze the working of RC Phase shift Oscillator using BJT.
7. To analyze the working of Hartley and Colpitt's Oscillators.
8. To analyze the working of Clapp Oscillator.

**Course Outcomes:**

After completing the lab, students will be able to

CO1. **Design** of the voltage regulator with specific voltage range.
CO2. **Design** of BJT as a switch
CO3. **Implement** the voltage amplifier using BJT.
CO4. **Analyze** the RC and LC oscillator using BJT.
CO5. **Analyze** Clapp oscillator using BJT.

| L | T | P | C |
|---|---|---|---|
| - | - | 2 | 1 |
| | | | |

**Subject Name: DIGITAL CIRCUITS AND SYSTEMS**
**Subject Code: 140319**

**Course Objectives**

This course gives the ability to the students to learn the operation of different digital logic circuits.

**List of Experiments**

1. To Implement logic gates – NAND, AND, NOR, EX-OR, EX-NOR.
2. To construct the basic gates using universal gates.
3. To verify the truth table of half adder and full adder.
4. To verify the truth table of half and full subtractor.
5. To Design R-S flip flop.
6. To Design J-K flip flop.
7. To examine parity generator/checker circuit.
8. To design ripple counter using J-K Flip Flop.

**Course Outcomes:**

After completing the lab, students will be able to:

**CO1.** **Verify** the operation of basic logic gates
**CO2.** **Construct** the basic gates by using universal gates.
**CO3.** **Develop** half adder/subtractor and full adder/subtractor circuits using their truth table.
**CO4.** **Develop** RS and JK flip-flops and verify their operation.

| L | T | P | C |
|---|---|---|---|
| - | - | 2 | 1 |
| | | | |

**Subject Name: Hardware Lab**
**Subject Code: 140321**

**Course Objectives**

This course gives the ability to the students to learn the verification of circuit laws and theorems, also learn the methods for generation and detection of analog modulated signals

**List of Experiments**

1. Verification of KVL and KCL on bread board.
2. Verification of Thevenin's & Norton's Theorems.
3. Verification of Superposition Theorem.
4. Verification of Millman's Theorem.
5. Verification of Reciprocity Theorem.
6. Verification of Maximum Power Transfer Theorem.
7. Generation and detection of analog modulated signals.

**Course Outcomes:**

After completing the lab, students will be able to:

CO1. Analyze circuits using network theorems.
CO2. Examine performance parameters of analog modulated signals.

## Skill based mini projects

**Subject Name: Electronic Circuit Design**

1. Design of +5V/+9/+12 V regulated power supply on PCB.
2. Fabrication of an oscillator (RC, LC, Clapp) circuit to generate 1 kHz sine wave on PCB.
3. Construction of a circuit of BJT as a switch using LED on PCB.

**Subject Name: Digital Circuits & Systems**

1. Design of an up-counter circuit.
2. Design of a down counter circuit.
3. Design of the flip-flops.
4. Design of the latches.
5. Design of a ring counter.

**Subject Name: Hardware lab**

1. Design pure resistive circuits.
2. Design of Beeper Circuit.
3. Design of Water Level Indicator.
4. Design of Rain Alarm.

**Item 17**

To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered ***(for batches admitted in 2021-22)*** in online mode under ***Self-Learning/ Presentation***, in the ***III Semester*****{**(all traditional and emerging area programmes (IT-IoT, AIR, EE-IoT, MAC, AI&DS, AI& ML, CSD)}

| Category | Semester | Name of The course | Duration of the Course in weeks | Course Registration | | Name of the Mentor Faculty |
|---|---|---|---|---|---|---|
| | | | | Start Date | End Date | |
| **Electronics Engineering (III Semester)** | | | | | | |
| Self Learning | III | C Programming and assembly language | 4 | 20-05-2022 | 01-08-2022 | Prof D K Parsedia |
| | III | Fundamentals of Electronics Device Fabrication | 4 | 20-05-2022 | 01-08-2022 | Dr. Varun Sharma |
| | III | Python for Data Science | 4 | 20-05-2022 | 01-08-2022 | Dr. Rahul Dubey |

**ANNEXURE XV**

**Item 18**

To review the ***Scheme & Syllabi, list of experiments and skill based mini projects of First semester*** **of the B. Tech. programmes** ***(for the batch 2022-23)***.

| S.No | Category | Subject Code | Subject Name |
|---|---|---|---|
| 1 | DLC | 140111 | Electronic Workshop |

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

## Department of Electronics Engineering

## B.Tech. (Electronics Engineering) I Semester

***For batches admitted in academic session 2022-23***

| S. No. | Subject Code | Category Code | Subject Name | Maximum Marks Allotted | | | | | | | Total Marks | Contact Hours per week | | | Total Credits | Mode of Teaching (Offline/ Online) | Mode of Exam. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Slot | | | | Practical Slot | | | | | | | | | |
| | | | | End Sem. | | Mid Sem. Exam. | Quiz/ Assignment | End Sem | Lab Work & Sessional | Skill Based Mini Project | | L | T | P | | | |
| | | | | End Term Evaluation | $Proficiency in subject /course | | | | | | | | | | | | |
| 1. | 100013 | BSC | Engineering Physics | 50 | 10 | 20 | 20 | 60 | 40 | - | 200 | 2 | 1 | 2 | 4 | Blended (2/1) | MCQ |
| 2. | 100020 | ESC | Basic Civil Engineering & Mechanics | 50 | 10 | 20 | 20 | - | - | - | 100 | 2 | 1 | - | 3 | Blended (2/1) | PP |
| 3. | 100021 | ESC | Basic Mechanical Engineering | 50 | 10 | 20 | 20 | - | - | - | 100 | 2 | 1 | - | 3 | Blended (2/1) | MCQ |
| 4. | 100023 | ESC | Basic Computer Engineering | 50 | 10 | 20 | 20 | 60 | 20 | 20 | 200 | 2 | 1 | 2 | 4 | Blended (2/1) | AO |
| 5. | 100016 | HSMC | Technical English | 50 | 10 | 20 | 20 | - | - | - | 100 | 3 | - | - | 3 | Blended (2/1) | MCQ |
| | 100017 | HSMC | Language Lab | - | - | - | - | 60 | 20 | 20 | 100 | - | - | 2 | 1 | Offline (2/0) | SO |
| 6. | 140111 | ESC | Electronics Workshop | - | - | - | - | 60 | 20 | 20 | 100 | - | - | 2 | 1 | Offline (2/0) | SO |
| Total | | | | 250 | 50 | 100 | 100 | 240 | 100 | 60 | 900 | 11 | 4 | 8 | 19 | | |

**Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.**

$Proficiency in course/subject – includes the weightage towards ability/ skill/ competence /knowledge level /expertise attained /attendance etc. in that particular course/subject

| Mode of Teaching | | | | | Mode of Examination | | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|
| Theory | | | | Lab | Theory | | | Lab | |
| Offline | Online | Blended | | Offline | PP | A+O | MCQ | SO | |
| | | Offline | Online | | | | | | |
| 0 | 0 | 10 | 5 | 8 | 3 | 4 | 11 | 1 | 19 |
| 0% | 0% | 52.63% | 26.31% | 42.10% | 15.78% | 21.05% | 57.89% | 5.26% | |

**B.Tech. I Semester (Electronics Engineering)**

| Subject Code | Category Code | Subject Name | Theory Slot | | | Practical Slot | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | | L | T | P | |
| 140111 | ESC | Electronics Workshop | - | - | - | 60 | 40 | 100 | - | - | 2 | 1 |

**Subject Name: Electronic Workshop**
**Subject Code: 140111**

## Course Objectives:

Students will be able to learn the practical aspects of the basic electronic components, instruments and PCB designing.

### List of Experiment

1. To identify Basic Electronic Components.
2. To learn the use of Breadboard, power supply, digital storage oscilloscope, zero PCB and multimeter.
3. To measure Phase shift using Lissajous Pattern on Oscilloscope.
4. To Design layout of electronic circuits using LT Spice.
5. To fabricate electronic circuits on Printed Circuit Board.

## Course Outcome:

After completing the course, students will be able to

CO1. **Evaluate** the parameters of basic electronic components.
CO2. **Calculate** the phase shift between two waveforms.
CO3. **Design** small electronics circuits.

## Skill based mini projects

1. Design of Half wave rectifier using PN junction diode on zero PCB.
2. Design of Bridge type Full wave rectifier using PN junction diode on zero PCB.

| Subject Code | Category Code | Subject Name | Theory Slot | | | Practical Slot | | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | Skill based mini project | | L | T | P | |
| 140313 | DC | Network Theory | 60 | 20 | 20 | 60 | 20 | 20 | 200 | 2 | 1 | 2 | 4 |

**Network Theory (140313)**

**Course objective:** To understand basic electric circuits, study of network theorems, transient analysis, graph theory, analysis of two port networks.

**Unit-I Introduction –** Basics of Circuit Elements**,** Characterization of Resistors, Capacitors & Inductors in Terms of their linearity & time dependence features, Characteristics of Independent & Dependent Sources, KCL& KVL for circuits with dependent & independent sources, Dot convention for coupled inductor and their characteristics, coefficient of coupling.

**Unit-II Network theorems**- Superposition, Thevenin, Norton, Millman, Reciprocity and Maximum Power Transfer theorems, Network topology, concept of network graph, Tree, Twigs and link, Incident matrix, Cutset and Tieset matrices.

**Unit-III Transient analysis**- Transients in RL, RC and RLC circuits, initial conditions, time constants, Steady state analysis, Node and mesh analysis of RL, RC and RLC networks with sinusoidal sources.

**Unit-IV Laplace Transform & Passive Filters**: The Laplace transform, Properties of Laplace transform, solution of differential equation using Laplace Transform, Initial and final value theorem. Waveform synthesis & Laplace Transform of various waveform function, Low pass, high pass, band pass and band elimination filters,

**Unit-V Two Port Network**: Concept of Ports, Calculation of network functions for one port and two port, Two port parameters– Z,Y, hybrid and chain Parameters, Relationship between two port network parameters, T, π, Bridged T and Lattice networks and their Characteristics impedance & propagation constant.

**Text Books:**


6. NetworkAnalysis:M.E.VanValkenberg,3rdEdition,PrenticeHallofIndia.
7. NetworkandSystems:D.RoyChaudhary,**2nd Edition,**NewAcademicScienceLtd.


**Reference Books:**


8. IntroductiontoModernNetworkSynthesis:M.E.VanValkenberg,PrenticeHallofIndia.
9. NetworkAnalysis&Synthesis:F.Kuo,2ndEdition,Wiley&Sons.
10. NetworkAnalysis&Synthesis:RavishRSingh,1stEdition,McGrawHillEducation.


**Course Outcomes**

After the completion of this course students will be able to:

CO1. **Analyze** the circuits using Kirchoff's laws.
CO2. **Apply** Network theorems and concept of graph theory for simplification of circuits. .
CO3. **Evaluate** transient response and steady state response.
CO4. **Apply** the Laplace transform to linear circuits and systems.
CO5. **Determine** ABCD,Z,Y and h parameter of an electrical circuits.

| Subject Code | Category Code | Subject Name | Theory Slot | | | Practical Slot | | | Total Marks | Contact Hr/week | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | End Sem Marks | Mid Sem Marks | Quiz/ Assignment Marks | End Sem Mark | Lab work & Sessional Mark | Skill based mini project | | L | T | P | |
| 140314 | DC | Analog Communication | 60 | 20 | 20 | - | - | - | 100 | 3 | - | - | 3 |

**Analog Communication (140314)**

**Course objective:** To understand the concept of modulation, various types of modulation, application, standards, analysis of modulation and demodulation process, probability theory and probability function, and concept of noise.

**Unit I: Spectral Analysis:** Introduction to signals and classifications, Introduction to Fourier series, Introduction to Fourier Transforms and its properties, Fourier transform of important functions, Autocorrelation, Cross correlation and their properties.

**Unit II: Amplitude Modulation:** Needs of modulation, Amplitude modulation, SSB, DSB,VSB suppressed carrier modulation, Modulation techniques their generation, detection and spectral analysis, square law modulators, switching modulator, envelope and square law detector, balanced modulator, Superhetrodyne receiver, Power calculation for AM, DSB-SC & SSB-SC, FDM.

**Unit II Angle Modulation:** Relationship between Frequency and phase modulation, frequency and phase deviation, types of FM, comparison between NBFM & AM signal., Carson's rule, spectrum of FM signal, comparison of narrow band and wide band FM, generation and detection of FM. Pre-emphasis and de-emphasis, capture effect.

**Unit IV Probability, and random variables**: Random variable, sample space and events, probability and its properties, distribution function, discrete random variable and probability mass function, continuous random variable and probability density function, cumulative distribution function, probability density function, statistical average, variance, moment, Distributions: Binomial, Poisson, Gaussian and Rayleigh probability density function.

**Unit V Noise Analysis:** Various sources of noise, types of noise with their characteristics, Mathematical representation of noise figure, Noise bandwidth, Noise temperature and noise figure of amplifiers in cascades, Figure of merit of modulation techniques, comparison of modulation scheme for noise.

**Text Books:**


1. Communication System: Simon Haykins, Wiley & Sons.
2. Communication Systems - B. P. Lathi, BSP Publication


**Reference Books:**


1. Electronic Communication System: Kennedy-Devis, Tata McGraw-Hill Education.
2. Modern Digital & Analog Communication System: B.P. Lathi, Oxford University Press.
3. Principles of Communication System: Taub and Schilling McGraw-Hill Education.


**Course Outcomes** After the completion of this course students will be able to:

- CO1. **Analyze** the frequency domain representation of various signals.
- CO2. **Describe** amplitude modulation, their generation & detection methods.
- CO3. **Explain** the generation and detection techniques for angle modulated signal.
- CO4. **Evaluate** the statistical parameters for general PDF/CDF.
- CO5. **Evaluate** the effects of noise on modulation techniques

### ANNEXURE-XX

### M.E./M.Tech. Dissertation Experts Name

| S. No. | Name | Designation | Affiliation | Mobile no. |
|---|---|---|---|---|
| 1. | Dr. Rajiv Kapoor | Professor | DTU, New Delhi | 9999432549 |
| 2. | Dr. Neeraj Shrivastava | Associate professor | RJIT, Tekanpur | 8989563787<br>9425754197 |
| 3. | Prof. Aditya Trivedi | Professor | IIITM, Gwalior | 942513799 |
| 4. | Dr. L.D.Malviya | Associate Professor | SGSITS, Indore | 9826583204 |
| 5. | Dr. D.K. Shrivastava | Professor | BIET, Jhansi | 9415179133 |
| 6. | Dr. Mahendra Kumar | Associate Professor | BIET, Jhansi | 9450079696 |
| 7. | Dr. D.C. Dubkaria | Associate Professor | BIET, Jhansi | 9415194924 |
| 8. | Dr. Jyotsna V Ogale | Professor | SATI, Vidisha | 9650395550,<br>93402 63179 |
| 9. | Dr. Amritanshu Pandey | Associate professor | IIT BHU, Varanasi | 9454749047 |
| 10. | Mr. Ravi Pratap Kushwah | Industry Head | ACE Antenna, Hyderabad | 9650395550 |
| 11. | Dr. Y.K. Prajapati | Professor | MNNIT, Allahabad | 0532-227469(O) |
| 12. | Dr. S.N. Sharma | Associate professor | SATI, Vidisha | 07592250356 |
| 13. | Dr Alok Jain | Professor | SATI, Vidisha | 9425463116 |
| 14. | Dr. Rakesh Singhai | Professor | UIT, Rajiv Gandhi Proudyogiki(Engineering)Bhopal | 9406540888 |
| 15. | Dr. Devendra Chak | Associate professor | IIT (ISM) Dhanbaad | 9471191821 |
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