Zagdu Singh Charitable Trust's (Regd.)
THAKUR COLLEGE OF ENGINEERING & TECHNOLOGY
(Approved by AICTE, Govt. of Maharashtra & Affiliated to University of Mumbai*)
(Accredited Programmes by National Board of Accreditation, New Delhi**)
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ISO 9001 : 2008 Certified

*Permanent Affiliated UG Programmes : • Computer Engineering • Electronics & Telecommunication Engineering • Information Technology (w.e.f.: A.Y. 2015-16 onwards)
**1st time Accredited UG Programmes : • Computer Engineering • Electronics & Telecommunication Engineering • Information Technology
**2nd time Accredited UG Programmes : • Computer Engineering • Electronics & Telecommunication Engineering • Information Technology • Electronics Engineering (3 years w.e.f.: 01-07-2016)

TCET/FRM/IP-02/09 Revision: A

**Semester Plan**
**(Theory)**

Semester: VII Course: EXTC

Subject: Microwave and Radar Engineering Class: BE A

| Sr. No | Prerequisite /Bridge Course | Duration(Hr/week) | Modes of learning | Recommended Resources |
|---|---|---|---|---|
| 1 | Electric field intensity(E),Electric flux density(D),Magnetic field intensity(H),Magnetic flux density(B),Gauss's Law for electric and magnetic field, Amperes Law's, Faraday's Law for electromagnetic Induction and Maxwell's Equation. | 4 hrs | Self learning and classroom revision | Elements of electromagnetic By Sadiku (Page No.103-155,261-296,369-404) |

| Sr. No | Module No. | Lesson No. | Topics Planned (Technology to be used) | Teaching Aids Required | Planned /Completion Date | Resource Book Reference | Remarks |
|---|---|---|---|---|---|---|---|
| 1 | ----- | 1.1 | MWRE(Th) | PPT | 10/07/17 | | |
| 2 | | 1.2 | ACEL-II(PR) | PPT | 11/07/17 | | |
| 3 | | 1.3 | MWRE(OBE) | PPT | 13/07/17 | | |
| 4 | M1 | 2.1 | Frequency bands and characteristics of microwaves | Black board and PPT | 17/7/17 | 1.7.1 | |
| 5 | M1 | 2.2 | Rectangular , mode analysis | Black board and PPT | 18/7/17 | 1.7.2 | |
| 6 | M1 | 2.3 | circular waveguides, mode analysis | Black board and PPT | 18/7/17 | 1.7.3 | Instead of 2 lectures will be completed in 1 lectures |
| 7 | M1 | 2.4 | Resonators, reentrant cavities, scattering parameters, | Black board and PPT | 19/7/17 | 1.7.4 | |
| 8 | M1 | 2.5 | tees, hybrid ring, directional couplers, phase shifters, | Black board and PPT | 21/7/17 | 1.7.5 | Instead of 2 lectures will be completed in 1 lectures |

| Sr. No | Module No. | Lesson No. | Topics Planned (Technology to be used) | Teaching Aids Required | Planned /Completion Date | Resource Book Reference | Remark |
|---|---|---|---|---|---|---|---|
| 9 | M1 | 3.1 | terminations attenuators, | Blackboard and PPT | 24/7/17 | 1.7.6 | |
| 10 | M1 | 3.2 | ferrite devices such as isolators,. | Blackboard and PPT | 26/7/17 | 1.7.7 | |
| 11 | M1 | 3.3 | gyrators, and circulators | Blackboard and PPT | 27/7/17 | 1.7.8 | |
| 12 | M2 | 3.4 | Lumped element matching | Blackboard and PPT | 28/7/17 | 2.7.1 | Instead of 2 lectures will be completed in 1 lectures |
| 13 | M2 | 4.1 | Single stub tuning | Blackboard | 31/7/17 | 2.7.2 | |
| 14 | M2 | 4.2 | double stub tuning | Blackboard and PPT | 2/8/17 | 2.7.3 | |
| 15 | M2 | 4.3 | double stub tuning | Blackboard and PPT | 3/8/17 | 2.7.4 | |
| 16 | M2 | 4.4 | triple stub tuning | Blackboard and PPT | 4/8/17 | 2.7.5 | Instead of 2 lectures will be completed in 1 lectures |
| 17 | M2 | 5.1 | Quarter wave transformer | Blackboard and PPT | 7/8/17 | 2.7.6 | |
| 18 | M3 | 5.2 | Two Cavity Klystron | Blackboard and PPT | 9/8/17 | 3.7.1 | |

| Sr. No | Module No. | Lesson No. | Topics Planned (Technology to be used) | Teaching Aids Required | Planned /Completion Date | Resource Book Reference | Remark |
|---|---|---|---|---|---|---|---|
| 19 | M3 | 5.3 | Reflex Klystron | Blackboard and PPT | 10/8/17 | 3.7.2 | |
| 20 | M3 | 5.4 | Helix Travelling Wave Tube | Blackboard and PPT | 11/8/17 | 3.7.3 | Instead of 2 lectures will be completed in 1 lectures |
| 21 | M3 | 6.1 | Helix Travelling Wave Tube | Blackboard | 14/8/17 | 3.7.4 | |
| 22 | M3 | 6.2 | Backward Wave Oscillator | Blackboard and PPT | 16/8/17 | 3.7.5 | |
| 23 | M3 | 6.3 | Cross Field Amplifier | Blackboard and PPT | 18/8/17 | 3.7.6 | |
| 24 | M3 | 7.1 | Cylindrical Magnetron, | Blackboard and PPT | 24/8/17 | 3.7.7 | Instead of 2 lectures will be completed in 1 lectures |
| 25 | M3 | 8.1 | Operation of Gyrotrons | Blackboard and PPT | 30/8/17 | 3.7.8 | |
| 26 | M4 | 8.2 | Characteristics of Varactor diode | Blackboard and PPT | 31/8/17 | 4.7.1 | |
| 27 | M4 | 8.3 | Characteristics of PIN diode | Blackboard and PPT | 1/9/17 | 4.7.2 | |
| 28 | M4 | 9.1 | Characteristics of Tunnel diode, Point Contact | Blackboard and PPT | 4/9/17 | 4.7.3 | Instead of 2 lectures will be completed in 1 lectures |
| 29 | M4 | 9.2 | Schottky Barrier, Gunn,IMPATT. | Blackboard and PPT | 6/9/17 | 4.7.4 | |

| Sr. No | Module No. | Lesson No. | Topics Planned (Technology to be used) | Teaching Aids Required | Planned /Completion Date | Resource Book Reference | Remark |
|---|---|---|---|---|---|---|---|
| 30 | M4 | 9.3 | TRAPATT,BARITT. | Blackboard and PPT | 7/9/17 | 4.7.5 | |
| 31 | M4 | 9.4 | Characteristics of Point Contact diode | Blackboard and PPT | 8/9/17 | 4.7.6 | |
| 32 | M4 | 10.1 | MESFET, BJT, | Blackboard and PPT | 11/9/17 | 4.7.7 | |
| 33 | M4 | 10.2 | Hetro junction BJT | Blackboard and PPT | 13/9/17 | 4.7.8 | |
| 34 | M4 | 10.3 | HEMT ,Parametric Amplifiers | Blackboard and PPT | 14/9/17 | 4.7.9 | |
| 35 | M5 | 11.1 | Basics of RADAR ,RADAR range equation | Blackboard and PPT | 18/9/17 | 5.7.1 | |
| 36 | M5 | 11.2 | Types of RADAR: Pulsed, Continuous wave | Blackboard and PPT | 20/9/17 | 5.7.2 | |
| 37 | M5 | 11.3 | Types of RADAR : FMCW | Blackboard and PPT | 21/9/17 | 5.7.3 | |
| 38 | M5 | 11.4 | Types of RADAR : Doppler, MTI, | Blackboard and PPT | 22/9/17 | 5.7.4 | |
| 39 | M5 | 12.1 | Types of RADAR : Phased Array, displays and Clutter | Blackboard and PPT | 25/9/17 | 5.7.5 | Instead of 2 lectures will be completed in 1 lectures |

| Sr. No | Module No. | Lesson No. | Topics Planned (Technology to be used) | Teaching Aids Required | Planned /Completion Date | Resource Book Reference | Remark |
|---|---|---|---|---|---|---|---|
| 40 | M5 | 13.1 | Tracking RADAR: Mono pulse<br>Tracking RADAR: Conical, | | 4/10/17 | 5.7.6 | |
| 41 | M5 | 13.2 | Tracking RADAR: Sequential lobbing | Blackboard and PPT | 5/10/17 | 5.7.7 | |
| 42 | M6 | 13.3 | Microwave heating and bio-medical applications | Blackboard and PPT | 6/10/17 | 6.7.1 | Instead of 2 lectures will be completed in 1 lectures |
| 43 | M6 | 14.1 | Remote sensing RADAR | Blackboard and PPT | 12/10/17 | 6.7.3 | |
| 44 | M6 | 14.2 | MSTRADAR | Blackboard and PPT | 13/10/17 | 6.7.4 | |
| 45 | M6 | 15.1 | instrumentation landing system | Blackboard and PPT | 16/10/17 | 6.7.4 | |
| 46 | M6 | 15.2 | RADAR based navigation , radiometer | Blackboard and PPT | 17/10/17 | 6.7.5 | |
| Remark:: Course: | | Syllabus Coverage: | | Practice Session: | | Beyond Syllabus: Beyond Syllabus: Introduction to MEMS &SOC | |
| No. of (lectures planned)/(lecture taken): | | | | | | | |

| Sr. No | | Duration(Hr/week) | Modes of learning | Recommended Resources |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| 1 | Advanced course: MEMS and Micrrosystems | 12 week | NPTEL videos with hands on training in Laboratory | 1.: http://nptel.ac.in/courses/117105082<br>2. "Microsystem Design" by Stephen D. Senturia<br>2) "Fundamentals of Microfabrication" by Marc Madou |

**Text Books:**


1. David M Pozar, ―Microwave Engineering‖, John Wieley & Sons,Inc. Hobokenh,New Jersey, Fourth Edition, 2012.
2. Samuel YLiao, ―Microwave Devices and Circuits‖, Pearson Education, Third Edition


**Reference Books:**


1. Merill Skolnik, ―Introduction to RADAR Systems‖, TataMcgraw Hill , Third Edition
2. Annapurna Das and Sisir K Das, ―Microwave Engineering‖, Tata McGraw Hill,New Delhi, Second Edition, 2009
3. K. T. Matthew, ―Microwave Engineering‖, Wieleyindia, ,2011


**Digital Reference:**

| | | |
|---|---|---|
| Sd---------- | Sd---------- | Sd---------- |
| Mr. Yogesh Kumar | Dr.Vinitkumar Dongre | Dr.R.R.Sedamkar |
| Name & Signature of Faculty | Signature of HOD | Signature of Dean (Academics) |
| Date: | Date: | Date: |

**Note:**

1. Plan date and completion date should be in compliance
2. Courses are required to be taught with emphasis on resource book, course file, text books, reference books, digital references etc.
3. Planning is to be done for 15 weeks where 1st week will be AOP, 2nd -13th for effective teaching and 14th -15th week for effective university examination oriented teaching, mock practice session and semester consolidation.
4. According to university syllabus where lecture of 4 hrs/per week is mentioned minimum 55 hrs and in case of 3 lectures per week minimum 45 lectures are to be engaged are required to be engaged during the semester and therefore accordingly semester planning for delivery of theory lectures shall be planned.
5. In order to improve score in NBA, faculty members are also required to focus course teaching beyond university prescribed syllabus and measuring the outcomes w.r.t learning course and programme objectives.
6. Text books and reference books are available in syllabus. Here only additional references w.r.t. non –digital/ digital sources can be written (if applicable)
7. Technology to be used in class room during lecture shall be written below the topic planned within the bracket.