| Government Polytechnic, Mandi Adampur | | | | |
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| Name of Faculty: Sh. Ravinder Kumar | | | | |
| Discipline: Electronics | | | | |
| Semester: 5 | | | | |
| Subject: Microwave and Radar Engineering | | | | |
| Lesson Plan Duration: 18 Weeks | | | | |
| **Week** | **Theory** | | **Practical** | |
| | **Lecture Day** | **Topic** | **Practical Day** | **Topic** |
| **Week 1** | Day 1 | **Unit 1: Introduction to Microwaves** | day 1 | To measure electronics and mechanical tuning range of a reflex klystron |
| | Day 2 | Introduction to microwaves and its applications, | | |
| | Day 3 | Classification on the basis of its frequency bands (HF, VHF, UHF, L, S, C, X, KU, KA, mm, SUB, mm) | | |
| **Week 2** | Day 4 | **Test Unit 1** | day 2 | To measure electronics and mechanical tuning range of a reflex klystron |
| | Day 5 | **Unit 2: Wave guides** | | |
| | Day 6 | Rectangular and circular wave guides and their applications. | | |
| **Week 3** | Day 7 | Mode of wave guide; | day 3 | File Check |
| | Day 8 | Propagation constant of a rectangular wave guide, cut off wavelength, | | |
| | Day 9 | guide wavelength and their relationship with free space wavelength (no mathematical derivation). | | |
| **Week 4** | Day 10 | Impossibility of TEM mode in a wave guide. | day 4 | To measure VSWR of a given load. |
| | Day 11 | **Test Unit 2** | | |
| | Day 12 | **Unit 3: Microwave Components** | | |
| **Week5** | Day 13 | Constructional features | day 5 | To measure VSWR of a given load. |
| | Day 14 | **characteristics and application of** | | |
| | Day 15 | **matched termination, twists,** | | |
| **Week 6** | Day 16 | detector, mount, slotted section, | day 6 | File Check |
| | Day 17 | directional coupler, fixed and variable attenuator, | | |
| | Day 18 | isolator, circulator and duplex, | | |
| **Week 7** | Day 19 | coaxial to wave guide adapter. | day 7 | To measure the Klystron frequency by slotted section method |
| | Day 20 | **Test Unit 3** | | |
| | Day 21 | **Unit 4: Microwave Devices** | | |
| **Week 8** | Day 22 | Basic concepts of thermionic emission and vacuum tubes | day 8 | To measure the Klystron frequency by slotted section method |
| | Day 23 | Effects of interelectrode capacitance, Lead Inductance and Transit time on the high frequency performance of conventional vacuum tubes, | | |

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| | Day 24 | steps to extend their high frequency operations. | | |
| **Week 9** | Day 25 | Construction, characteristics, operating principles and typical applications of the following devices (No mathematical treatment) - Multi cavity klystron | day 9 | File Check |
| | Day 26 | Reflex klystron | | |
| | Day 27 | Multi-cavity magnetron | | |
| **Week 10** | Day 28 | Traveling wave tube | day 10 | To measure the directivity and coupling of a directional coupler. |
| | Day 29 | Gunn diode and | | |
| | Day 30 | Impatt diode | | |
| **Week 11** | Day 31 | **Test Unit 4** | day 11 | To measure the directivity and coupling of a directional coupler. |
| | Day 32 | **Unit 5: Microwave antennas** | | |
| | Day 33 | Structure characteristics and typical applications of Horn antennas | | |
| **Week 12** | Day 34 | Structure characteristics and typical applications of Horn antennas | day 12 | File Check |
| | Day 35 | Structure characteristics and typical applications of Dish antennas | | |
| | Day 36 | Structure characteristics and typical applications of Dish antennas | | |
| **Week 13** | Day 37 | **Test unit 5** | day 13 | To plot radiation pattern of a horn antenna in horizontal and vertical planes. |
| | Day 38 | **Unit 6: Microwave Communication systems** | | |
| | Day 39 | a) Block diagram and working principles of microwave communication link. | | |
| **Week 14** | Day 40 | Block diagram and working principles of microwave communication link. | day 14 | To plot radiation pattern of a horn antenna in horizontal and vertical planes. |
| | Day 41 | b) Troposcatter Communication | | |
| | Day 42 | Troposphere and its properties, | | |
| **Week 15** | Day 43 | Tropospheric duct formation and propagation, troposcatter propagation. | day 15 | File Check |
| | Day 44 | **Test Unit 6** | | |
| | Day 45 | **Unit 7: Radar Systems** | | |
| **Week 16** | Day 46 | Introduction to radar, its various applications, radar range equation (no derivation) and its applications. | day 16 | To verify the properties of magic tee. |
| | Day 47 | Block diagram and operating principles of basic pulse radar. Concepts of ambiguous range, | | |
| | Day 48 | radar area of cross-section and its dependence on frequency. | | |
| **Week 17** | Day 49 | Block diagram and operating principles of CW (Doppler) and FMCW radars, and their applications. | | To verify the properties of magic tee. |

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| | Day 50 | Block diagram and operating principles of MTI radar. Radar display- PPI | | |
| | Day 51 | **Test Unit 7** | | |
| **Week 18** | Day 52 | **Unit 8: Introduction to VSAT transponders multiple access techniques,** | | File Check |
| | Day 53 | VSAT and its features | | |
| | Day 54 | **Test Unit 8** | | |