**KANNUR UNIVERSITY**

**(Abstract)**

***B.Sc. Electronics and Communication*** Course/***Programme- Scheme and Syllabus for*** I & II Year (2008 admission) and ***I to IV Semesters (2009 admission)*** implemented-Orders issued.

ACADEMIC BRANCH

U.O.No.Acad/C2/8966/2008 K.U.Campus, Dated,23-11-2009

Read:-1. U.O.No.Acad/A2/OCAS/05 dated 23//05/2006 & 31/10/2009.

2. Letter dated, 11-11-2009 from the Principal in charge, Our College of Applied Science, Thimiri, Kannur.

3. Letters dated, 13-11-2009 from the Chairman, Board of Studies in Electronics (Cd)

**O R D E R**

1. As per paper read (1) above, Provisional Affiliation is granted to B.Sc Electronics and Communication Course to Our College of Applied Science,Thimiri, Kannur during 2005-2006 and Continuation of Provisional Affiliation is granted during 2008-2009 as the College informed that the Course has been started with effect from 2008 admission.

2. The Principal in charge, Our College of Applied Science, Thimiri, Kannur vide paper read (2) above,has informed that the Examination for the I year of 2008 admission and I Semester of 2009 admission are not conducted as the Syllabus for B.Sc Electronics & Communication was not approved.

3. The Chairman, Board of Studies in Electronics(Cd), vide paper read (3) above, has recommended to implement the Scheme and Syllabus of the I and II year of 2008 admission and I to IV Semesters of 2009 admission of B.Sc Electronics Course, for B.Sc Electronics and Communications Course also.

4. The Vice Chancellor, after considering the matter in detail, and in exercise of the powers of the Academic Council as per section 11 (1) of Kannur University Act 1996 and all other enabling provisions read together with, has accorded sanction to implement the recommendations of the Chairman, Board of Studies in Electronics(Cd).

5. The following orders are therefore issued in this regard:

(*i) The Scheme and Syllabus of B,.Sc Electronics Course (I&II year) of 2008 admission under Grading System will be applicable for B.Sc Electronics and Communication Course of 2008 admission also.*

***(ii) The Scheme and Syllabus of B.Sc Electronics Programme (I to IV Semesters) of 2009 admission under Choice based Credit Semester System will be applicable for B.Sc Electronics and Communication Programme of 2009 admission also.***

6. The Scheme and Syllabus for III year of 2008 admission under Grading System and V&VI Semesters of 2009 admission under Choice Based Credit Semester System for B.Sc Electronics and Communication Course/Programme will be framed and communicated in due course.

7. Orders are issued accordingly.

Sd/-
REGISTRAR

To

The Principal,
Our College of Applied Science,
Thimiri, Kannur

Copy to:

1. The Examination Branch (through PA to CE)
2. The Chairman, Board of Studies in Electronics (Cd)
3. DR/AR I Acad 4. SF/DF/FC

Forwarded/By Order

SECTION OFFICER

**KANNUR UNIVERSITY**

**(Abstract)**

***B.Sc. Electronics and Communication*** Course/Programme- ***Scheme and Syllabus*** for III Year (2008 admission) and ***V & VI Semesters (2009 admission)***- implemented-Orders issued.

ACADEMIC BRANCH

U.O.No.Acad/C2/8966/2008(1) K.U.Campus, Dated,21-06-2010.

Read:-1.U.O. No.Acad/C2/8966/2008 dated 23-11-2009.

2. Minutes of the meeting of the Board of Studies in Electronics (Cd) held on 10-06-2010.

3. Letter dated, 10-06-2010 from the Chairman, Board of Studies in Electronics (Cd).

**O R D E R**

1. The Scheme and Syllabus of I & II year of B.Sc Electronics &Communication Course (2008 admission) and I to IV Semesters of B.Sc Electronics &Communication Programme of 2009 admission were implemented in this University as per paper read (1) above.

2. The Board of Studies in Electronics (Cd),vide paper read (2) above has recommended and finalised the scheme and syllabus of B.Sc Electronics & Communication Course/Programme (III year-2008 admission) & (V&VI Semesters-2009 admission) for implementation.

3.The Chairman, Board of Studies in Electronics(Cd),has forwarded the finalised scheme and syllabus of B.Sc Electronics and Communication Course/Programme (III year-2008 admission) and (V&VI Semesters-2009 admission), for implementation, vide paper read (3) above.

4. The Vice Chancellor, after considering the matter in detail, and in exercise of the powers of the Academic Council as per section 11 (1) of Kannur University Act 1996 and all other enabling provisions read together with, has accorded sanction to implement the recommendations of the Board of Studies in Electronics(Cd),in finalizing the scheme and syllabus of B.Sc Electronics and Communication Course/Programme(III year-2008 admission) and (V&VI Semesters-2009 admission).

5. The following orders are therefore issued in this regard:

(*i) The Scheme and Syllabus of B,.Sc Electronics and Communication Course (III year) under Grading System is implemented for 2008 admission.*

***(ii) The Scheme and Syllabus of B.Sc Electronics and Communication Programme (V& VI Semesters) under Choice based Credit Semester System is implemented with effect from 2009 admission.***

***(iii)The rest of the*** *Papers/****Courses for B.Sc Electronics and Communication*** *Course/* ***Programme will be the same as that of B.Sc Electronics*** *Course/****Programme of*** *2008 admission and* ***2009 admission*** *respectively.*

6. Orders are issued accordingly.

7. The Scheme and Syllabus of B.Sc Electronics and Communication Course/ Programme for III year (2008 admission under Grading System) and V&VI Semesters (2009 admission under Choice Based Credit Semester System) are appended.

Sd/-

REGISTRAR

To

The Principal,

Our College of Applied Science, Thimiri, Kannur

Copy to:

1. The Examination Branch (through PA to CE)
2. The Chairman, Board of Studies in Electronics (Cd)
3. DR/AR I Acad 4. SF/DF/FC

Forwarded/By Order

SECTION OFFICER

*Appendix to U.O No Acad/C2/8966/2008(1) dated 21-06-2010.*

# K A N N U R  U N I V E R S I T Y

**SCHEME (full)**

**&**

**SYLLABUS**

**FOR**

**UNDERGRADUATE PROGRAMME**

**IN**

# ELECTRONICS & COMMUNICATION

## CORE COURSES (V&VI Semesters)

## CHOICE BASED CREDIT SEMESTER SYSTEM

## w.e.f 2009 ADMISSION

## Scheme Core (Electronics & Communication) w.e.f 2009 admission

| No | Semester | Course Code | Title of the Course | Hours/ Week | Credit |
|---|---|---|---|---|---|
| 1 | I | 1B01ELE | Methodology and Theory of Electronic devices | 2 | 2 |
| 2 | I | 1B01PELE | Electronic Devices Lab | 2 | 1 |
| 3 | II | 2B02ELE | Electronic Circuits | 2 | 2 |
| 4 | II | 2B02PELE | Electronic Circuits Lab | 2 | 1 |
| 5 | III | 3B03ELE | Digital Electronics | 3 | 3 |
| 6 | III | 3B03PELE | Digital Electronics Lab | 2 | 1 |
| 7 | IV | 4B04ELE | Analog Integrated Circuits | 3 | 3 |
| 8 | IV | 4B04PELE | Analog Integrated Circuits Lab | 2 | 1 |
| 9 | V | 5B05ELE | Network Theory | 3 | 3 |
| 10 | V | 5B06ELE | General informatics and Informatics specific to Electronics | 3 | 3 |
| 11 | V | 5B07ELC | Radiation & Propagation | 3 | 3 |
| 12 | V | 5B08ELC | Microprocessors & Microcontrollers | 3 | 3 |
| 13 | V | 5B08PELC | Microprocessor & Microcontrollers Lab | 4 | 2 |
| 14 | V | 5B09ELE | Electronic Communication I | 3 | 3 |
| 15 | V | 5B09PELE | Communication System Lab | 4 | 2 |
| 16 | VI | 6B10ELE | Electro Magnetic Theory | 3 | 3 |
| 17 | VI | 6B11ELE | Digital Signal Processing | 3 | 3 |
| 18 | VI | 6B12ELE | Microwave techniques and Radar | 3 | 3 |
| 19 | VI | 6B13ELE | Electronic Communication II | 3 | 3 |
| 20 | VI | 6B14ELC | Digital Communication | 3 | 3 |
| 21 | VI | 6B14PELC | Digital Communication Lab | 4 | 2 |
| 22 | VI | 6B15ELE | Project Work | 4 | 4 |

*There shall be theory and Practical examinations at the end of each semester. The Practical examination of Odd semesters shall be conducted internally and the Practical examination for Even semesters shall be conducted by the University.*

**Semester : 5** **Hrs/Week :3**
**Core course** **Credits : 3**

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## 5B05ELE - NETWORK THEORY

**Aim of the Course**

To equip the students with basic knowledge in the Network theory

**Objectives of the Course**

- To learn the basics of Networks, Fourier series, Network theorems

**Course Outline**

**Module I** Basic circuit elements & wave forms – voltage & current sources – dependent sources - Kirchhoff's laws - series & parallel network – node & mesh analysis
Network theorems: superposition theorems – reciprocity theorems - Thevnin's - Norton's theorem (Millmar's theorem) – maximum power transfer theorem.

**Module II** Transient and steady state Analysis: Time constant - sinusoidal steady state analysis – reactance – impedance – Admittance – Analysis of RC & RLC circuit – Q factor & Bandwidth - concept of fitter.

**Module III** Periodic and aperiodic wave forms – types of signals – Fourier representation of signals – Fourier transform – Laplace transform – properties – applications of Laplace transform.

**Module IV** Two port networks: Admittance parameters – impedance parameters – hybrid parameters – transmission parameters - relationship between parameter sets - attenuator – Lattice type – insertion loss.
Network function: Poles & zeros – pole zero plot - time domain behavior & transient response from pole zero plot - response due to sinusoidal input – magnitude & phase plot – Bode plots-stability - Routh Horvitz criteria of stability.

**Text books**

1. Network system – Roy Chowdhary

**Reference books**

1. Network theory – Van Valkenbug
2. Network, line & field - Ryder (PHI)

**Semester : 5** **Hrs/Week :3**
**Core course** **Credits : 3**

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## 5B06ELE – GENERAL INFORMATICS AND INFORMATICS SPECIFIC TO ELECTRONICS

**Aim of the Course**

To update and expand basic informatics skills and attitudes relevant to the emerging knowledge society and also to equip the students to effectively utilize the digital knowledge resources for their chosen courses of study.

**Objectives of the Course**

- To review the basic concepts & functional knowledge in the field of informatics.
- To review functional knowledge in a standard office package and popular utilities
- To create awareness about nature of the emerging digital knowledge society
- To create awareness about social issues and concerns in the use of digital technology
- To create awareness about major informatics initiatives in India and Kerala.
- To impart skills to enable to students to use digital knowledge resources in learning.

**Course Outline**

**MODULE I : OVERVIEW OF INFORMATION TECHNOLOGY** Features of the modern Personal Computer and peripherals, Computer Networks & Internet, Wireless Technology, Introduction to Mobile Phone Technology, Introduction toATM, Purchase of technology, license, guarantee, warrantee, Overview of Operating System & Major Application Software.

**MODULE II : KNOWLEDGE SKILLS FOR HIGHER EDUCATION** Data, Information and Knowledge, Knowledge Management- Internet as a Knowledge Repository, Academic Search Techniques, Creating your Cyber presence, Case Study of Academic web sites, Open Access initiatives, Open Access Publishing Models. Basic Concepts of IPR, Copy rights and Patents, Plagiarism, Introduction to use of IT in teaching and learning, case study of educational softwares. Academic services-INFLIBNET, NICNET, BRNET,

**MODULE III : SOCIAL INFORMATICS** IT & Society- Issues and concerns- Digital divide, IT & development, the free software debate, IT Industry: new opportunities and new threats, Cyber ethics, Cyber crime, Security**,** Privacy issues, Cyber laws, cyber addictions, Information overload, Health issues- guide lines for proper usage of computers, internet and mobile phones. E-wastes and green computing, Impact of IT on language & culture:localization issues- Unicode- IT and Regional Languages

**MODULE IV : IT APPLICATIONS** e-Governance applications at National and State level, IT for National Integration, Overview of IT application in Medicine, Healthcare, Business, Commerce, Industry, Defense, Law, Crime Detection Publishing, Communication, Resource Management, Weather forecasting, Education, Film and Media, It in service of disabled, Futuristic IT- Artificial Intelligence, Virtual reality, Bio-computing.

**MODULE V : STREAM-SPECIFIC/SUBJECT- SPECIFIC MODULES** Introduction to LaTex – Files – Text Modes – Commands for Text Mode – Lists – Centering and Underlining – Spacing – Tables – Sectioning and Cross – References – Commands for Math Mode – Numbered Equations – Subscripting and Superscripting – Text in Math Mode – Special Symbols. Introduction to MATLAB – MATLAB Characteristics – MATLAB Preliminaries – Rules on Variable and Function Names – Special Characters – Basic Arithmetic Operators – Elementary math Intrinsic Functions – File Types.

**Text Books**


1) Technology in Action, Pearson
2) V. Rajaraman, Introduction to Information Technology, Prentice Hall
3) Alexis Leon & Mathews Leon, Computers Today, Leon Vikas, Rs. 180
4) Hunt, Lipsman, Rosenberg, A Guide to Matlab, Cambridge


**References**


1) Greg Perry, SAMS Teach Yourself Open Office.org, SAMS
2) Alexis & Mathews Leon, Fundamentals of Information Technology, Leon Vikas
3) George Beekman, Eugene Rathswohl, Computer Confluence, Pearson Education
4) Barbara Wilson, Information Technology: The Basics, Thomson Learning
5) Ramesh Bangia, Learning Computer Fundamentals, Khanna Book Publishers
6) John Ray, 10 Minute Guide to Linux, PHI, ISBN 81-203-1549-9

**Semester : 5** **Hrs/Week :3**
**Core course** **Credits : 3**

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## 5B07ELC – RADIATION & PROPAGATION

**Aim of the Course**

To equip the students with a basic knowledge in radio wave propagation

**Objectives of the Course**

- To learn the basics of antenna
- To familiarize the students with different types of antennas
- To learn the fundamentals of radio wave propagation

## Course Outline

**Module I: Antenna fundamentals**

Source of radiation - power radiated from a current element- radiation from a half dipole - antenna parameters, patterns - radiation intensity – beam area - beam efficiency- directivity-gain-effective aperture-effective height-self impedance-mutual impedance-antenna theorem-recopricity theorem-Babiuets theorem.

**Module II: Antenna arrays**

Linear antenna arrays-two element array-amplitude and phase characteristics- N element array

**Module III: Special Antennas**

V and Rhombic arrays-folded dipole antenna-broad band antenna-Yagi antenna-Parabolic reflector antenna-micro strip antenna.

**Module IV: Radio wave propagation**

Ground wave propagation - space wave-surface wave-ionospheric waves – ionospheric propagation –ionospheric reflection- critical frequency-actual height and virtual height.

**Text books**

1. Jordan and Balmain - Electro magnetic waves and radiation system.
2. John D.Krais - Antenna theory
3. Collin RE - Antennas and Radio propagation

**Semester : 5** **Hrs/Week :3**
**Core course** **Credits : 3**

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## 5B08ELC – MICROPROCESSORS & MICROCONTROLLERS

**Aim of the Course**

To equip the students with the basic hardware of computers

**Objectives of the Course**

- To learn the basics of Microprocessor and Microcontroller initiated operations
- To learn Assembly Language Programming techniques

## Course Outline

**Module I**

Micro processors-Introduction to 8085microprocessors initiated operation and bus organization-internal data operation-8085 registers- externally initiated operation-memory organization-mapping and types-types of I/O addressing-memory mapped I/O-functional block-pin diagram-instructions and timing-instruction classification.

**Module II**

Programming and Architecture- Data transfer operation-logical operation-instruction format-simple programmes-instruction timing and operation status- instruction set of 8085-programming technique-looping-16bit arithmetic instruction-memory related arithmetic instruction-rotate-compare instruction counters and time delays-stack and sub routine –interrupt- simple illustrative programmes.

**Module III**

8085 peripherals and 8086 architecture-introduction to programmable peripheral devices (8255A, 8254, 8257, RS232) - overview of interfacing-introduction to 8086 - 8086 architecture - addressing models.

**Module IV**

Intel 8051microcontroller- architecture-ports-timers-interrupts-instruction set – programming.

**Text books**


1. Ramesh Goanker - 8085 – Architecture programming & technique
2. Douglas V Hall - Microprocessors & Interfacing - Programming & Hardware
3. Liu.Y & Vibson - Micro computer system – The 8086/8088 family Architecture Programming & Design –PHI
4. Kenneth J. Ayala - The 8051 microcontroller Architecture, programming & application
5. Mohammad Ali Maszidi - The 8051 microcontroller & embedded system
6. M. Rafiquezzman - New Processor & Microcomputer Based system Design, CRC press.
7. John Utter Bra - 8086/8088 family design, Programming & Interfacing

**Semester : 5** **Hrs/Week :4**
**Core course** **Credits : 2**

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## 5B08PELC - MICROPROCESSOR & MICROCONTROLLER LAB

1. Data transfer using direct and indirect addressing.
2. Block data transfer
3. Addition-8bit and 16bit
4. Substract-8bit and 16bit
5. Multiplication
6. Division
7. Array addition
8. Logic operation-AND, OR, NOT
9. Binary to decimal and decimal to binary
10. Binary to BCD and BCD to binary
11. Largest and smallest from a set of numbers
12. Sorting (ascending and descending)
13. BCD addition and subtraction
14. Up/Down counter
15. Square wave generation
16. Stepper motors interfacing
17. Traffic light interfacing
18. Data acquisition using microcontrollers
19. Stepper motor control using microcontrollers

**Semester : 5** **Hrs/Week :3**
**Core course** **Credits : 3**

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## 5B09ELE - ELECTRONIC COMMUNICATION I

**Aim of the Course**

To equip the students with basic knowledge in Communication systems

**Objectives of the Course**

- To learn the basics of modulation basics of AM, FM, and PCM
- To learn the Digital modulation techniques

**Module I** Introduction – Messages & signals – Elements of communication systems – Modulation – Need for modulation- Amplitude modulation –Side band- AM signals & spectra, power relations, product modulator, single sideband AM –AM generation – High level & low level AM transmitters - AM receivers - Super heterodyne receivers –SSB generator balanced modulator -SSB transmitters –SSB receivers.

**Module II** Frequency modulation -FM & PM signals – spectra – Band with – narrow band & wide band FM – generation – direct FM – VCO – phase modulator – indirect FM – demodulation of FM- balanced discriminator, de- emphasis & pre–emphasis – FM transmitter & receivers – FM stereo transmission & reception.

**Module III** Sampling – Aliasing - PAM, PWM, PPM – concept of FDM & TDM, pulse code modulation – quantization – generation & reconstruction – companding, concept of ASK, FSK, PSK, DPSK.

**Module IV** Introduction to Antennas- Radiation mechanism– elementary doublet, folded dipole, Antenna gain & resistance – directional antennas – dipole Arrays, Yagi- Uda antenna

**Text books**

1. Electronic communication – Kennedy
2. Monochrome & color television – R.R .Gulathi

**Reference**

1. Electronic communication - Ruddy & Coolen
2. Antenna & wave propagation - K.D. Prasad

**Semester : 5** **Hrs/Week :4**
**Core course** **Credits : 2**

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## 5B09PELE - COMMUNICATION SYSTEM LAB

1. AM generation
2. AM demodulation
3. Frequency response of IF amplifier
4. Mixer
5. Frequency modulation
6. Frequency demodulation
7. Balanced modulator
8. PAM
9. PAM demodulator
10. PWM
11. PWM demodulator
12. PPM
13. PPM demodulator
14. TDM.

**Semester : 6** **Hrs/Week :3**
**Core course** **Credits : 3**

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# 6B10ELE - ELECTRO MAGNETIC THEORY

**Aim of the Course**

To equip the students with basic knowledge in E.M.Theory which is important in the field of communications.

**Objectives of the Course**

- To learn the Electrostatics, Magnetostatics and Electrodynamics
-

**Module I** Concept of Circuit & Fields, Vector Analysis, Physical interpretation of gradient, Divergence & curl, integral theorems & comparison.

**Module II lectrostatics :** Introduction, fundamental relations of electro static field – Gauss's law - special Gauss surfaces – the potential function, divergence theorem – Poisson's & Lap lace's equation.

**Magnetostatics :** Biot – Savart law, force between two current carrying coils – Magnetic fiux density, Magnetic field intensity, Intensity of Magnetisation - Ampere's circuit theorem – Lorent's force- Magnetic vector potential –Boundary conditions for magnetic fields.

**Module III Electrodynamics:** Faradays law of induction – modified Amperes law – Maxwell's equation – wave equation – solutions of wave equation in free space –pointing vector- electromagnetic energy –Boundary conditions.

**Module IV : Radiation & propagation of Radio waves:** Radiation of electromagnetic fields – polarization –isotropic radiator –plane waves – electromagnetic spectrum – propagation of waves in free space – Ground wave propagation – sky wave- ionospheric propagation- critical frequency & maximum usable frequency – skip distance.

**Text books**

1) Electromagnetic waves & radiating systems – Jordan & Balmier -PH (New edition)

**Reference**

1) Fundamentals of Electrodynamics- Grifith (IV Edition)
2) Fundamental of electronic waves – Hugh Hildeeth skilling. Ane books
3) Fundamental of electromagnetics – Micah
4) Engineering electromagnetics- Haytt
5) Electromagnetic field theory fundamentals – BhagGuru & Hussein Hiziroglu- Cambridge.

**Semester : 6** **Hrs/Week :3**
**Core course** **Credits : 3**

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# 6B11ELE - DIGITAL SIGNAL PROCESSING

**Aim of the Course**

To equip the students with basic knowledge in DSP

**Objectives of the Course**

- To learn the basics signals and analysis, Fourier transforms, digital filter design etc

**Module I Introduction :** Signals & systems -Analog, discrete & digital signals – concept of signal processing –Applications – comparison of Analog & digital signal processing**.**Fourier representation of analog & digital signals – Review of Laplace transform, Fourier transform, Z transform & their properties - discrete time sequences – time domain & frequency domain representation. **Analysis discrete time system :** Discrete time system – linear systems - time invariant systems - response of linear time invariant systems – convolution – stability & causality considerations – FIR systems – I I R systems – frequency responses.

**Module II Discrete Fourier transform & Fast Fourier transform :** Introduction – Discrete Fourier series - discrete Fourier transform of finite duration sequences – properties of DFT – circular convolution - computation of DFT.
**Fast Fourier transform :** FFT Algorithms - general computational considerations – decimation in time & decimation in frequency algorithms – Radix 2 – FFT algorithms, quantization errors.

**Module III Realization of digital systems :** Recursive & non recursive systems – block diagrams & signal flow graphs – realization of IIR filters - direct form realization – cascade & parallel form realization – realization of FIR filters.

**Module IV Digital filter design :** IIR & FIR filters –design consideration – design of IIR filters – impulsive invariant transform – Bilinear transformation - digital Butter worth filters – design examples –design of FIR filters, windowing – hamming & hanning windowing.

**Text books**
1. Digital signal processing – Nagurkani
2. Digital signal processing – Rameshbabu

**References**
1. Digital signal processing - Salai Vahanan
2. Signals & systems – Sanjay Sharma.

**Semester : 6** **Hrs/Week :3**
**Core course** **Credits : 3**

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# 6B12ELE - MICROWAVE TECHNIQUES AND RADAR

**Aim of the Course**

To equip the students with basic understanding of Microwave and Radar Engineering

**Objectives of the Course**

- To learn the basics of Micro waves and RADAR

**Course Outline**

**Module-I** Frequency spectrum ,Microwave bands, Applications of microwaves in different fields, wave guides – different types, transmission lines, types- parallel, co- axial, strip, optical & microwave guides, TE, TM & TEM waves, cut off frequency, phase & group velocities, Characteristics impedance, H- plane, E –plane & Magic Tees.

**Module II** Directional couplers, Isolators, circulators, Multicavity Klystron, reflex Klystron, Magnetrons, TWT – working principle & applications.

**Module III** Schottky diodes, point contact diodes, Varactor diodes, concept of parametric amplifier, IMPATT, TRAPATT & GUNN devices –Applications, Microwave antennas- (parabolic, lense, horn, slot).

**Module IV** Basic principle, fundamentals, performance factors, pulsed radar, Antennas & scanning, display methods, pulsed radar systems, MTI recons, CW Doppler radar, CW radar.

**Text books**

1. Electronic communication system – Kennedy
2. Fundamental of Microwave engineering – Collins

**References**

1. Electronic communication, Roddy & Coolen,
2. Electronic & radio engineering, Terman
3. Principles of communication systems, Taub & Schilling

**Semester : 6** **Hrs/Week :3**
**Core course** **Credits : 3**

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# 6B13ELE - ELECTRONIC COMMUNICATION II

**Aim of the Course**

To equip the students with detailed knowledge in Communication Channels, transmitters and receivers.

**Objectives of the Course**

- To learn the basics of Communication channels, transmitters, receivers

**Course Outline**

**Module I : Optical fiber communication** Optical fibers – structures & wave guiding fundamentals, fiber types – step index fiber structure - ray optics representation – wave equation for step index fiber, graded index structure - modes in graded index fibers optical communication & block diagram – overview attenuation – attenuation units - scattering & absorption losses – core & cladding losses – fiber materials & properties .

**Module II : Television Broadcasting** Elements of television systems – scanning - composite video signals – camera tubes – different types – principles of operation – picture tubes – vestigial side band - TV broadcasting –TV receivers –TV transmitters – sound & picture signal transmission - TV receivers – color Television, color TV camera –luminance signal - color picture tubes -Basic principle of color picture transmission & reception – concept of PAL systems.

**Module III : Satellite communication** Orbits – station keeping – altitude - transmission path – path loss – noise considerations – satellite systems- saturation flux density – isotropic radiated power multiple access method, concept of C band satellite receiving systems – Basic functions of various units -specification.

**Module IV** Noise – Frequency domain representation – source of noise –Thermal noise – shot noise - concept of noise band – width, noise figure - noise temperature – concept of information entropy – information rate – Shannon's thermos – signal to noise ratio.

**Text books**


1. Electronic communication S/m – Kennedy
2. Monochrome of color Television - R.R Gulathi
3. Satellite communication – Dr. B.C Agarwall
4. Optical fiber communication – Keiser.

**Semester : 6** **Hrs/Week :3**
**Core course** **Credits : 3**

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# 6B14ELC – DIGITAL COMMUNICATION

**Aim of the Course**

To equip the students with basic knowledge in Communication systems

**Objectives of the Course**

- To learn the basics of modulation PCM, PAM, PWM and PPM
- To learn the Digital communication techniques

**Module I**

Block diagram of digital communication system-source coding and channel coding –digital and analog sources-sampling theorem for low pass and band pass signal

**Module II**

Pulse coded modulation (PCM)-pulse amplitude modulation (PAM)-pulse width modulation (PWM)-pulse position modulation (PPM)-delta modulation.

**Module III**

Communication over band limited channels-pulse shaping -ISI- Nyquist criterion for zero ISI - eye diagram-equalization-adaptive equalization.

**Module IV**

Modulation schemes-coherent binary schemes-ASK, FSK,PSK, MSK-Coherent M – arrays schemes- M array orthogonal signaling - probability of error for different schemes.

**Text books**

1. Simon Haykin - Communication System
2. B P Lathi - Modern digital and analog communication - Oxford University

**Semester : 6** **Hrs/Week :4**
**Core course** **Credits : 2**

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## 6B14PELC - DIGITAL COMMUNICATION LAB

1. Delta Modulation and Demodulation

2. PCM generation

3. Generation of FSK signals

4. A/D converter

5. D/A converter

6. Pulse width modulation

7. Pulse position modulation

8. Pulse amplitude modulation

**Semester : 6** **Hrs/Week :4**
**Core course** **Credits : 4**

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## 6B15ELE – PROJECT WORK

**Aim of the Course**

To equip the students to carry out major research oriented project independently.

**Objectives of the Course**

- To learn to design new circuits according to the need and trouble shooting

**Course Outline**

Useful projects should be produced. Students are advised to search for better projects. Mere reproduction of available circuits may invite minimum credits. Projects must include electronic hardware and the demonstration is compulsory.

**Sd/-**
**Dr.K.P.Santhosh,**
**Chairman,BOS Electronics(Cd)**

**Reg.No……..** **Code No.**
**Name…….**

**Fifth Semester B.Sc Degree Examination**
**Electronics / Electronics & Communication**

**5B05ELE – NETWORK THEORY**

Time : 3 Hours Maximum Weightage : 30

**Section A**

(Answer all questions. Each question carries a weightage 1)

1. a) A periodic signal f(X) can be equated to……, the time period is given as P
   b) The period of cos nx and sin nx is ……..
   c) If r(t) is a ramp signal , then for $(t \geq 0)$ , r(t)=……..
   d) Laplace transform of $t^n$ is given by…….

2. a) Inverse Laplace transform of $s / (s^2 + a^2)$ is given by……..
   b) Two resistors R1 and R2 are connected in series and a voltage V is applied across it. The voltage drop across R2 is given by the formulae……..
   c) Thevinin's theorem states that any linear dc circuit can be replaced by an equivalent circuit consisting of one voltage source in …….with one resistance.
   d) Opposition to passage of AC due to capacitance and inductance is called……

3. a) In impedance parameters $Z_{11}$ is termed as ……..
   b) In admittance parameters $Y_{12}$ is termed as …….
   c) Transmission parameters are otherwise called……..
   d) In hybrid parameters $Y_{21}$ is termed as …….

**Section B**

(Answer any 9 questions. Each question carries a weightage 1)

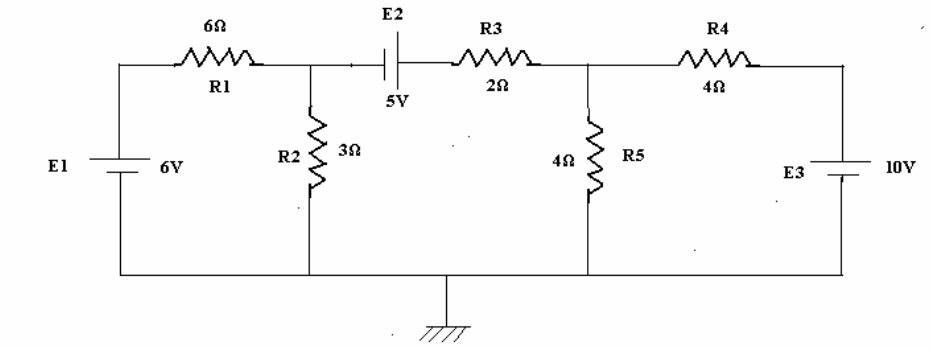
4. Explain various types of signals.
5. List two properties of Laplace transform.
6. Find the Laplace transform of $\cos^2 2t$
7. Mention various types of dependent sources. Draw the symbols.
8. State Miller's theorem.
9. State maximum power transfer theorem
10. Define bandwidth of filters
11. Draw the equivalent circuit for hybrid parameters
12. Define poles and zeros of network function
13. Deduce an expression for the current in an inductive circuit
14. Explain about impulse function
15. Explain how time behaviour can be obtained from the pole-zero plot of a network

**Section C**

(Answer any 5 questions. Each question carries a weightage 2)

16. Find the Fourier series expression of $( \pi - x^2)/4 , 0 < x < 2\pi$
17. State and explain Norton's Theorem

18. Find the branch currents in the circuit shown in below, using Nodal analysis

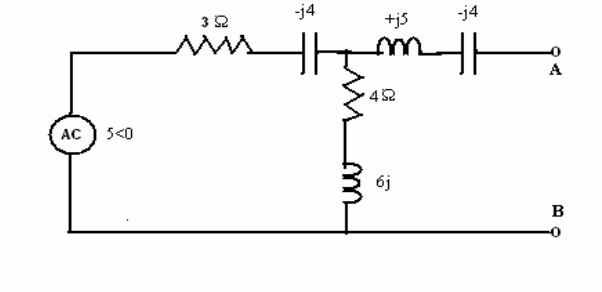



19. Derive the expressions for Y-parameters
20. Derive the expressions for Z-parameters in terms of hybrid and transmission parameters
21. Explain various types of filters
22. Analyze whether the system with the following characteristic equation is stable or not.
    $S^2+2S^5+8S^4+12S^3+20S^2+16S+16=0$

**Section D**

(Answer any 2 questions. Each question carries a weightage 4)

23. Find Thevinin's equivalent circuit across AB in the following circuit,




24. Explain in detail the attenuator, its units and classification
25. Determine the stability of a system using Routh's criterion. Its characteristic equation is
    $s^6+2s^5+8s^4+12s^3+16s+16 = 0$

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**Fifth Semester B.Sc Degree Examination**
**Electronics / Electronics & Communication**
**5B06ELE– GENERAL INFORMATICS & INFORMATICS SPECIFIC TO ELECTRONICS**

Time : 3 Hours Maximum Weightage : 30

**Section A**

(Answer all questions. Each question carries a weightage 1)

1. a) Raw facts and figures are known as ----------
   b) Cyber ethics means----------
   c) Informatics consist of----------

2. a) Meaningful data is known as----------
   b) Open source software means----------
   c) Operating system is a---------- between user and computer.
   d) ATM stands for----------

3. a) e-governance means---------
   b) MRI stands for----------
   c) ----------is an example of web browser.
   d) MATLAB is a----------

**Section B**

(Answer any 9 questions. Each question carries a weightage 1)

4) Define IPR
5) What are the different types of networks?
6) Describe wireless technology.
7) What do you mean by academic websites?
8) What do you mean by copyright?
9) Define information overload.
10) What do you mean by green computing?
11) Define artificial intelligence.
12) What is bio-computing?
13) What is a LaTex?
14) Define LAN & WAN.
15) What is the difference between system software & application software?

**Section C**

(Answer any 5 questions. Each question carries a weightage 2)

16) What do you mean by knowledge management?
17) Explain the characteristic features of information.
18) Discuss the functions of an operating system.
19) Discuss the significance of IT in teaching and learning.
20) What do you mean by data encryption?
21) What do you mean by cyber crime?
22) Explain the different types of operating system.

**Section D**

(Answer any 2 questions. Each question carries a weightage 4)

23) Discuss the scope of IT in the medical field.
24) Describe the significance & features of e-governance.
25) Explain the various features of MATLAB.

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**Fifth Semester B.Sc Degree Examination**
**Electronics & Communication**
**5B07ELC– RADIATION & PROPAGATION**

Time : 3 Hours Maximum Weightage : 30

**Section A**

(Answer all questions. Each question carries a weightage 1)

1) a) The absorption that occurs in the region where the wave is bent is called-----
   b) ---------- is a critical factor in determining the sensitivity and signal- to- noise ratio of a receiving system
   c) The radiation pattern of a similar array of non directive or isotropic elements is known as ----------
   d)The ratio of the gain to the directivity is the ----------

2) a )The antenna used for the application of passive remote sensing is known as ----------
   b) The relative permittivity of an ionized gas in the absence of an external magnetic field is ----------
   c)Extended range of tropospheric propagation is known as ----------
   d)The refraction of a radio wave in the atmosphere occurs because of ----------

3) a)The idealized isotropic antenna has the lowest possible directivity----------
   b)Write the Maxwells equation?
   c) Write the full form of LUHF
   d) For propagation in a homogeneous medium having constants the scalar wave equation is ----------

**Section B**

(Answer any 9 questions. Each question carries a weightage 1)

4) Explain the term radiation pattern
5) What you meant by virtual height?
6) Define beam width?
7) What is duct propagation?
8) What is pattern multiplication?
9) What is a short dipole?
10) Define maximum radiation intensity?
11) Define affective height?
12) Write a short note on Horn antenna?
13) What is Friis transmission formula?
14) Define Maximum Usable Frequency(MUF)
15) Explain the term power gain?

**Section C**

(Answer any 5 questions. Each question carries a weightage 2)

16) Write a note on VHF and UHF antenna?
17) Explain the features of horn antenna. Also give the applications.
18) Explain folded dipole antenna with the necessary sketches.
19) Briefly explain the basic characteristics of microstrip antennas.
20) Explain the factors affecting the wave propagation.

21) Briefly explain ionospheric propagation
22) State and explain Babinets principle in antennas.

**Section D**

(Answer any 2 questions. Each question carries a weightage 4)

23) Explain the design procedure for helical antenna in the axial mode. Describe the modes of propagation.
24) Explain Yagi-Uda antennas in detail.
25) Explain the principles of pattern multiplication with example.

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**Fifth Semester B.Sc Degree Examination**
**Electronics & Communication**
**5B08ELC– MICROPROCESSORS & MICROCONTROLLERS**

Time : 3 Hours Maximum Weightage : 30

**Section A**

(Answer all questions. Each question carries a weightage 1)

1) a) A number that contain 3 one bits is said to have ----------parity.
   b) Hexadecimal data are represented in hexadecimal form or in a code called ----------
   c) The personal computer system addresses ----------bytes of I/O space
   d) What is the ASCII code for the enter key.
2) a) the stack memory is addressed by a combination of the -------- segment plus offset.
   b) Which flag bit controlls the INTR pin on the micro processor----------?
   c) The first modern computer was called ----------
   d) A computer M is equal to ---------- k bytes.
3) a) The world first microprocessor was----------
   b) The first 16 bit microprocessor was ----------
   c) Memory above the first 1M byte is called ---------- memory.
   d) ---------- is the controlling element in a computer system.

**Section B**

(Answer any 9 questions. Each question carries a weightage 1)

4) Write a short note on RS.232
5) Define T state
6) How a typical instruction is fetched and executed by 8085
7) Explain about the instruction CMC
8) What is a flag?
9) What are the advantages of microprocessor based systems
10) Define Machine cycle
11) What are buffers and latches?
12) List any five major points of comparison between microprocessors and micro controllers.
13) What are the different types of registers used in 8051?
14) Describe 8051 data types
15) Draw the block diagram of 8254

**Section C**

(Answer any 5 questions. Each question carries a weightage 2)

16) With the aid of block diagram briefly explain the architecture of 8085
17) Explain the different addressing modes of 8051
18) Write a program to convert hexa decimal number to octal
19) Differentiate between I/O mapped I/O and memory mapped I/O
20) What is interrupt? How it is classified and explains the operation of interrupt in processor?
21) Explain different applications of micro controllers.
22) Explain various data transfer instructions of 8051 microcontroller with suitable examples.

**Section D**

(Answer any 2 questions. Each question carries a weightage 4)

23) How the 8085 signals are classified in 8085 pin configuration. Explain each signal in detail.
24) Draw the internal architecture block diagram of the 8051 microcontroller and explain the various blocks.
25) Explain how instructions are classified in 8085 with an example.

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**Fifth Semester B.Sc Degree Examination**
**Electronics / Electronics & Communication**
**5B09ELE – ELECTRONIC COMMUNICATION I**

Time : 3 Hours Maximum Weightage : 30

**Section A**

(Answer all questions. Each question carries a weightage 1)

1. a) Modulation in excess of _____ percent produces distortion.
   b) In SSB-SC transmission, bandwidth required is _____ of that required for normal AM transmission
   c) The most commonly used filter in SSB generator is_____ ?
   d) In communication system noise is most likely to affect the signal at _____?
2. a) A pre-emphasis circuit provides extra noise immunity by _____
   b) An FM signal with a deviation δ is passed through a mixer and has its frequency reduced five fold. The deviation in the output of the mixer is…….
   c) The modulation index of an FM transmission can never _____ its deviation ratio.
   d) The FM frequency remains _____?
3. a) Quantizing noise occurs in ……..?
   b) The biggest disadvantages of PCM is ……?
   c) The most common modulation system used for telegraphy is ……..
   d) FSK is a system of…… modulation

**Section B**

(Answer any 9 questions. Each question carries a weightage 1)

4. What are the different needs for modulation?
5. How can we use a transistor to obtain a amplitude modulated wave.
6. Derive the frequency spectrum of a AM wave.
7. Explain the circuit that can be used to suppress the carrier signal in an AM wave.
8. Explain any one circuit that can be used for unwanted sideband suppression.
9. Explain vestigial side band transmission.
10. Derive the equation for a FM wave modulation index.
11. Explain the Armstrong method for FM generation.
12. Explain Noise figure.
13. Define polarization with diagram?
14. Compare ASK, FSK, PSK.
15. Define amplitude modulation & modulation index?

**Section C**

(Answer any 5 questions. Each question carries a weightage 2)

16. Explain with the aid of wave forms, how a grid modulated class C amplifier generates AM.
17. Explain with wave forms how a suitable train of current pulses fed to a tuned amplifier will result in a AM output wave.
18. Explain PWM with relevant diagrams.
19. Explain how carrier recovery takes place in ASK demodulator
20. What are the basic properties of ionospheric layers?
21. Derive maximum usable frequencies (MUF) and secant law
22. Explain DPSK with relevant diagrams

**Section D**

(Answer any 2 questions. Each question carries a weightage 4)

23. Explain with neat diagram, the working of a balanced modulator and super hetero dyne receiver
24. Explain about FM transmission and reception
25. Explain, with suitable diagram, yagi-uda antenna, directional antennas & resonant antennas.

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**Sixth Semester B.Sc Degree Examination**
**Electronics / Electronics& Communication**
**6B10ELE – ELECTRO MAGNETIC THEORY**

Time : 3 Hours Maximum Weightage : 30

**Section A**

(Answer all questions. Each question carries a weightage 1)

1. a) Poisson's equation in vaccum is called …… equation.
   b) The unit of electric susceptibility is ……..
   c) Gauss theorem relates surface integral to …….. integral
   d) Stoke theorem relates line integral to ……integral.
2. a) The value of permeability is given by ……
   b) Biot savarts law indicates the …….. strength at any point.
   c) Magnetic flux density over a closed path is ……
   d) Relation between magnetic flux and induced voltage is given as …….
3. a) Isotropic antenna is a ……antenna.
   b) The wavelength of the dipole antennae is ……
   c) The current fed to the elements in a broad side array antenna is ……
   d) Power radiated per unit area in any direction is given by……..

**Section B**

(Answer any 9 questions. Each question carries a weightage 1)

4. Explain the force on a moving charge.
5. Explain the force on a differential current element.
6. Explain B H M.
7. Explain hysteresis.
8. Explain Amperes work law
9. State and explain Maxwell's first law.
10. State and explain Maxwell's fourth law
11. What is the physical interpretation of gradient?
12. What is the physical interpretation of divergence?
13. State and Explain stokes theorem.
14. What do you mean by effective length of an antenna?
15. Explain gain of an antenna.

**Section C**

(Answer any 5 questions. Each question carries a weightage 2)

16. Explain polarization of a wave.
17. Derive the Poisson and Laplace equations
18. Derive an expression for the force between two current carrying conductors
19. State and Explain pointing theorem.
20. Write a note on Hall effect
21. Derive the relation between E and H for a uniform planar wave
22. Briefly explain the directivity of an antenna.
23.

**Section D**

(Answer any 2 questions. Each question carries a weightage 4)

24. Derive the divergence and curl of a unit volume in spherical and cylindrical coordinate systems.
25. Derive a relation between electric displacement and displacement density.
26. Derive the Maxwell's equation in integral, derivative forms and in statement forms

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**Sixth Semester B.Sc Degree Examination**
**Electronics / Electronics & Communication**
**6B11ELE – DIGITAL SIGNAL PROCESSING**

Time : 3 Hours Maximum Weightage : 30

**Section A**

(Answer all questions. Each question carries a weightage 1)

1. a) A system is said to be _____if it obeys the principle of superposition.
   b) If X(Z) is the Z-transform of x(n),the Z-transform {nx(n)} is _____.
   c) The discrete time version of ramp function is defined by_____.
   d) A system is said to be ____if the output does not depends on future inputs & outputs.
2. a) Define DFT of a discrete time sequence.
   b) For a 32 point sequence x(n), in the direct computation of DFT ,X(k) the number of complex multiplications required for each value of k is _
   c) Draw the basic butterfly structure in Radix-2 DIT-FFT algorithm
   d) In an LTI system if input has N1 samples and impulse response has N2 samples then the output will have _____samples.
3. a) Define recursive system.
   b) What are the basic elements used for the realization of filters?
   c) Write general equation, which represent a FIR system.
   d) An LTI system is unstable if the impulse response is_____.

**Section B**

(Answer any 9 questions. Each question carries a weightage 1)

4. What is down sampling?
5. Define a signal
6. Define FIR system
7. What is an energy system?
8. Define IDFT.
9. What is phase factor or twiddle factor?
10. What is DIT radix -2 FFT?
11. Define a recursive and non recursive system
12. How will you choose the order N for a butter worth filter.
13. What is bilinear transformation?
14. What is the relation between digital & anlog frequency in impulse invariant transformation?
15. What are the advantages & disadvantages of digital filter?

**Section C**

(Answer any 5 questions. Each question carries a weightage 2)

16. Compare analog, discrete and digital signals.
17. Determine the system is linear or not. $y(n)=x(n)+1/x(n-1)$
18. Perfome circular convolution of the two sequences $x_1(n)=\{2,1,2,1\}$ $x_2(n)=\{1,2,3,4\}$
19. Compare the DIT and DIF radix -2 FFT.
20. An LTI system is described by the difference equation $y(n)=a1y(n-1)+x(n)+b1x(n-1)$. Realize it in direct form – I structure and convert to direct form –II structure.
21. Compare IIR and FIR filters.

22. Given that $H_a(S) = 1/(S+1)$. By impulse invariant methods obtain the transfer function and difference equation of digital filter.

**Section D**

(Answer any 2 questions. Each question carries a weightage 4)

23. An 8 point sequence is given by x(n)={2,2,2,2,1,1,1,1}. Compute 8 point DFT of x(n) by Radix-2 DIT-FFT algorithm.

24. Obtain the cascade form realization of the LTI system governed by the équation y(n)=(-3/8)yn-1)+(3/32)y(n-2)+(1/64)y(n-3)+x(n)+3x(n-1)+2x(n-2)

25. Convert the analog filter with system function $H_a(S)$ into digital filter using bilinear transformation . $H_a(S)=(S+0.3)/(S+0.3)^2+16$

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**Sixth Semester B.Sc Degree Examination**
**Electronics / Electronics & Communication**
**6B12ELE – MICROWAVE TECHINQUES AND RADAR**

Time : 3 Hours Maximum Weightage : 30

**Section A**

(Answer all questions. Each question carries a weightage 1)

1. a) The lowest TM mode in a rectangular waveguide of cross –section a x b with a>b will be_____
   b) What is the reflection coefficient of a transmission line with a VSWR of 2?
   c) In E plane Tee, output in the two arms are _____ degree out of phase.
   d) Which transmission line is ideal for handling high power?
2. a) Which mechanism is used in a parabolic reflector in order to allow the feedback to be placed at a convenient point?
   b) _____microwave diode is suitable for very low power oscillations only.
   c) The abbreviation TRAPPAT stands for_____.
   d) Which diode is used for electronic tuning at microwave frequency?
3. a) Which modulation technique is used in A - Scope display?
   b) A system that gives the angular position of the target accurately is said to be_____ in that angle.
   c) The maximum range of a radar is proportional to the square root of the _____area of the antenna
   d) In a CW doppler radar, which component is used to provide isolation between the transmitter and receiver?

**Section B**

(Answer any 9 questions. Each question carries a weightage 1)

4. What are the advantages of microwaves in communication?
5. Define TEM, TE, TM waves.
6. Write the general wave equations.
7. Define stub matching.
8. Write short notes on microstrip lines
9. Write short notes on impedance matching.
10. What is a magic Tee? Explain.
11. Give the application of a TWT.
12. Why do we use strapping in a magnetron
13. Explain the VI characteristics of a tunnel diode.
14. What are the applications of varacter diodes?
15. What do you mean by the power range equation of radar?

**Section C**

(Answer any 5 questions. Each question carries a weightage 2)

16. Explain the construction and working of schottky barrier diode.
17. Explain the working of TRAPATT diodes
18. Explain mode jumping in magnetron
19. Give the physical interpretation of phase and group velocity.
20. Explain the working of the multi cavity klystron
21. Explain the Modulators used in Radar systems.
22. Explain CW Doppler Radar.

**Section D**

(Answer any 2 questions. Each question carries a weightage 4)

23. Describe the structure of TWT and its characteristics; then explain how it works.
24. Explain about different types of microwave antennas.
25. With a neat block diagram, explain MTI radar.

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**Sixth Semester B.Sc Degree Examination**
**Electronics / Electronics & Communication**
**6B13ELE – ELECTRONIC CIOMMUNICATION II**

Time : 3 Hours Maximum Weightage : 30

**Section A**

(Answer all questions. Each question carries a weightage 1)

1. a) _____is the principle behind Optical fibre communication.
   b) PIN photo diodes have the advantage of small value of the _____capacitance.
   c) Ruby lasers are usually excited by a _____ flash lamp.
   d) The unit of luminous flux is_____
2. a) A color burst has a frequency of _____MHz
   b) The aspect ratio for a standard 625 –B system is _____
   c) Y signals are also called _____
   d) The number of frames per second in TV System in India is _____
3. a) A satellite orbitis _____ if the orbit plane coincides with the reference plane of the primary body.
   b) The equipment that carries out modulation and demodulation is called _____
   c) The most important sourcs of noise in the receiver is the _____in its pre amplifier
   d) The Synchronous satellite used for communication are widely called _____Satellites.

**Section B**

(Answer any 9 questions. Each question carries a weightage 1)

4. Differentiate between step index and graded index fiber.
5. Explain Scattering and absorption losses
6. Explain Thermal noise and shot noise.
7. Explain the concept of noise band width.
8. State Shannon's theorem.
9. Give wave equation for step index fibre
10. Explain cladding losses
11. Give properties of fibre material
12. Give basic principle of colour picture transmission
13. Give notes on scanning
14. Give basic principle of colour picture reception
15. What is saturation flux density

**Section C**

(Answer any 5 questions. Each question carries a weightage 2)

16. Explain an image Orthicon Camera tube.
17. Give notes on vestigial side band transmission. Also give notes on demerits of VSB transmission
18. With simple block diagram explain a monochrome TV transmitter.
19. Explain different types of orbit in satellite Communication
20. Explain the concept of C band satellite receiving system.
21. Write a short note on Thermal noise and shot noise.
22. Explain the concept of noise band width

**Section D**

(Answer any 2 questions. Each question carries a weightage 4)

23. Explain Optical Communication System with neat block diagram.
24. Explain different types of orbits and Path losses in Satellite communication.
25. Explain Source of noise and signal to noise ratio.

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**Sixth Semester B.Sc Degree Examination, March 2010**
**Electronics & Communication**
**6B14ELC– DIGITAL COMMUNICATION**

Time : 3 Hours Maximum Weightage : 30

**Section A**

(Answer all questions. Each question carries a weightage 1)

1) a) The error probability of MSK is given by----------
   b) PSK is demodulated using ----------
   c) The compression or expansion of a signal in time is known as----------
   d) The process of reconstructing a continuous time signal from its sample is known as ------
2) a) The signal to noise ratio is defined as the ratio of-----
   b) The scheme of transmitting data by digitizing and then using pulse codes to transmit the digitize data is known as ----------
   c) The compressor and the expander together are called the ----------
   d) The QAM is also called ----------
3) a) The----------of a channel is the range of frequencies that it can transmit with reasonable fidelity
   b) The main reason for the superiority of digital systems over analogue one is ----------
   c) A digital message constructed with M signals is called ----------
   d) ---------- modifies the base band signal for efficient transmission.

**Section B**

(Answer any 9 questions. Each question carries a weightage 1)

4) What is meant by ISI?
5) What is quantization error?
6) Write a short note on adaptive equalization?
7) State sampling theorem?
8) What is companding?
9) What you mean by band width efficiency?
10) Give any two applications of digital communication?
11) What is the need for equalizer?
12) What is meant by ASK?
13) What are the advantages of PCM?
14) Define aliasing?
15) What is PWM?

**Section C**

(Answer any 5 questions. Each question carries a weightage 2)

16) Give a comparison between BPSK and BFSK?
17) Explain the disadvantages of delta modulation. How it can be overcome.
18) What are the advantages of digital communication when compared to analogue communication?
19) Derive the expression for probability error of BFSK?
20) Write a short note on M-ary QAM?
21) Compare the power spectra of binary PSK and FSK signals?
22) With neat diagram explain coherent MSK transmitter and receiver?

**Section D**

(Answer any 2 questions. Each question carries a weightage 4)

23) Derive the requisite criterion for zero ISI?
24) a) What is the advantage of MSK over QPSK?
    b) Explain the coding of the MSK with relevant equations and diagram?
25) Discuss the detection of PSK signals and derive expression for its probability of error?