

328712 (28)

BE (7th Semester)

Examination, Nov.-Dec., 2021

Branch : Et & T

**MICROWAVE COMMUNICATION &
ENGINEERING**

Time Allowed : Three Hours

Maximum Marks : 80

Minimum Pass Marks : 28

- Note :**
- (i) Part (a) in each question is compulsory.
 - (ii) Attempt any two parts from b, c & d.
 - (iii) Assume suitable data wherever necessary.
 - (iv) Answer should be brief and to the point.

328712 (28)

P.T.O.

(2)

- Q. 1. (a) Define skip distance. 2
- (b) Derive an expression for field strength of tropospheric wave. 7
- (c) What is an elevated duct? Explain ground based duct propagation. 7
- (d) A T.V. transmitter antenna has a height of 144 meter and the receiving antenna has a height of 25 meters. What is the maximum distance through which the TV signal should be received by space wave propagation? 7
- What is the radio horizon in this case? 7

(3)

Q. 2. (a) What is the effect on an electron that enters the buncher gap, when the potential across the grids is at zero volts ? 2

(b) Derive expression for four propagation constant which represent four different mode of wave propagation of the helical Travelling Wave Tube (TWT). 7

(c) Obtain expression for the relationship between the repeller voltage (V_R) and number of cycle (n) required for oscillation for a given beam voltage V_0 . 7

(4)

(d) A four-cavity Klystron amplifier has the following parameters : 7

Beam Voltage ; $V_0 = 20$ KV.

Beam Current ; $I_0 = 2$ A

Operating frequency ; $f = 9$ GHz.

dc charge density ; $\rho_0 = 10^{-6}$ c/m³

RF charge density ; $\rho = 10^{-8}$ c/m³

Velocity perturbation ; $v = 10^5$ m/s

Determine :

- (i) The dc electron velocity.
- (ii) The dc phase constant.

(5)

(iii) Plasma frequency.

(iv) Reduced plasma frequency for $R = 0.5$

(v) The beam current density.

(vi) The instantaneous beam current density.

Q. 3. (a) What is parametric amplifiers? 2

(b) With suitable diagram, explain how GUNN diode can be used as an oscillator and amplifier. 7

(c) State the difference between IMPATT and TRAPATT. 7

(d) Explain operation and characteristics of Tunnel diode. 7

(6)

Q. 4. (a) Differentiate between an E plane tee and an H plane tee. 2

(b) Explain the action of isolator and circulator using ferrites. 7

(c) Explain two hole directional coupler and derive its S-matrix. 7

(d) Imagine that a source is connected to arm 'P' and arm 'S' is match terminated. Arm 1 and 2 are terminated in reflection coefficients of 0.2 and 0.3 respectively.

What is VSWR seen by the source? 7

(7)

Q. 5. (a) What is the drawback of filter design by image parameter method ? 2

(b) Explain the process of filter design by the insertion loss method. 7

(c) Design a band pass filter having a 0.1 dB Chebyshev response with $N = 3$. The centre frequency is 2 GHz, the bandwidth is 200 MHz and impedance is 50Ω .

The element values for low pass prototype circuit are given as : 7

(8)

$$g_1 = 1.0315$$

$$g_2 = 1.1474$$

$$g_3 = 1.0315$$

$$g_4 = 1.000$$

(d) Explain wave analysis of periodic structures.

7



328714 (28)

BE (7th Semester)

Examination, Nov.-Dec., 2021

Branch : Et & T

SATELLITE COMMUNICATION

Time Allowed : Three Hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all questions. Part (a) of each question

is compulsory. Attempt any two parts from (b),

(c) & (d).

(2)

Q. 1. (a) What is the basic difference between active and passive satellite systems ? 2

(b) Explain as to how the location of satellite in an orbit is carried out with respect to earth ? What are direct and retrograde orbits ? Also explain the ascending, descending node, right ascension and nodal regression. 7

(c) Explain as to how does the solar eclipse affect the working of a communication satellite ? Mention the duration and the month when the eclipse effects are maximum. 7

(3)

- (d) Consider two earth stations A and B with longitudes at 60°W and 90°W respectively and latitudes at 30°N and 45°N respectively. They are communicating with each other via a geostationary satellite located at 105°W . Find the total delay in sending 500 kilo bits of information from one station to the other if the transmission speed is 10 Mbps. 7

(Assume satellite orbital radius = 42164 km and earth's radius = 6378 km)

- Q. 2. (a) What is baseband analog signal and its frequency spectrum ? 2

(4)

(b) What is the system noise temperature ?

How does it affect the C/N and G/T

ratios ? 7

(c) How does the non-linear behaviour of a

TWTA affect the operational characteristics

(C/N) of a satellite link ? What are the

intermodulation products and how are

these generated with TWTAs ? 7

(d) For a 60 channel FDM system with a

maximum baseband frequency of $f_m =$

252 kHz and a specified top-channel

signal-to-noise ratio $S/N = 52$ dB. Find out

the bandwidth. The FDM multi-channel

rms frequency deviation is 546 kHz. Also,

(5)

find out the FDM multichannel loading factor, test tone rms frequency deviation and C/N ratio. The improvement in emphasis and psophometric weighting is around 6.5 dB. 7

Q. 3. (a) What are the overheads in TDMA frame ? 2

(b) What is meant by TDMA frame acquisition and frame synchronization ? What is frame delay ? How does it help in carrying out TDMA frame acquisition and frame synchronization techniques ? 7

(c) What is satellite switching ? Discuss the operation of a typical SS-TDMA system.

(6)

How is SS-TDMA different from a beam hopping TDMA ? 7

(d) Calculate the voice channel capacity for INTESAT system frame in which : 7

Total frame length = 120,832 symbols

Frame period = 2 ms

No. of traffic burst / frame = 14

No. of reference burst / frame = 2

Guard interval = 103 symbols.

Preamble for reference burst = 288

symbols

Preamble for traffic burst = 280 symbols.

Voice channel bit rate = 64 kbps

and QPSK modulation is used.

328714 (28)

(7)

Q. 4. (a) What is the telemetry, tracking and command subsystem? 2

(b) What is the propulsion sub-system? Explain its constituent and their function. Which is the most popular propellant being used? 7

(c) What is the communication subsystem? Explain the construction of a repeater telling the difference between a simple repeater and a regenerative repeater. 7

(d) What do you mean by the reliability, mean time before failure, effective failure rate as applied to satellite subsystem and components? Explain the 'bath tub' curve. 7

(8)

- Q. 5. (a) What is a TVRO system? 2
- (b) What are the equipments that an earth station requires? Explain their design requirements. 7
- (c) Explain with suitable diagram the working of various antenna subsystems to be used in earth stations. Give antenna requirements for large and small earth stations. 7
- (d) What is meant by tracking and pointing? Explain its significance and the technique as to how these are achieved? 7

Printed Pages-- 5

Roll No.

328731(28)

**B. E. (Seventh Semester) Examination,
Nov.-Dec. 2021**

(New Scheme)

(ET&T Engg. Branch)

**MICROWAVE COMMUNICATION and
ENGINEERING**

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

***Note : Part (a) of each unit is compulsory. Attempt
any two parts from (b), (c) and (d) from
each unit.***

Unit-I

1. (a) What is the function of slow wave structure in TWT? 2
(b) Explain reason of failure of conventional tubes at
microwave frequencies. 7

328731(28)

PTO

[2]

(c) Describe the two cavity Klystron amplifier with neat diagram. Also explain velocity modulation and bunching process. 7

(d) A Reflex Klystron has the following parameters :
 $V_0 = 800$ volt, $L = 1.5$ mm, $Rsh = 15k \Omega$, $F = 9$ GHz. 7

Calculate :

- (i) Repeller voltage for $1\frac{3}{4}$ mode.
- (ii) Direct current necessary to give microwave gap voltage of 200 volt.
- (iii) Efficiency.

Assume $\beta = 1$ and for $X' = 1.841$, $J_1(X') = 0.582$

Unit-II

- 2. (a) What are the differences between linear beam tubes and crossed field tubes? 2
- (b) Derive an expression for Hull cut-off voltage and Hull cut-off magnetic flux density for cavity magnetron. 7

328731(28)

[3]

(c) Derive an expression for power output and efficiency of forward cross field amplifier. 7

(d) A pulsed cylindrical magnetron is operated with the following parameters : 7

Beam current = 27 amp.

Anode voltage = 26 k volt

Magnetic flux density = 0.336 Wb/m³

Radius of cathode cylinder = 5 cm

Radius of anode cylinder = 10 cm

Calculate :

- (i) The angular frequency
- (ii) The cut-off voltage
- (iii) The cut-off magnetic flux density

Unit-III

- 3. (a) What are the advantages of JFET over BJT? 2
- (b) With the help of schematic diagram explain how PIN diode used as : 7
 - (i) Switch

328731(28)

PTO

[4]

- (ii) Phase shifter
- (iii) Amplitude modulation
- (c) What are MESFET? Explain the construction, operation, performance characteristics and their applications. 7
- (d) Explain the principle of operation for Tunnel diode with the help of energy band diagram. 7

Unit-IV

- 4. (a) Which material is used in Gunn diode and why? 2
- (b) Explain the operation of IMPATT diode and compare with TRAPATT diode. 7
- (c) Explain various operating modes of a Gunn diode. 7
- (d) Explain parametric up converter and parametric down converter. 7

Unit-V

- 5. (a) Differentiate between an E-plane tee and H-plane tee. 2

[5]

- (b) Derive the scattering matrix of E-plane Tee. 7
- (c) Explain the microwave bench setup with its block diagram. Describe Bolometer method of power measurement. 7
- (d) Draw the schematic diagram of magic tee. Derive its s-matrix explain working. 7

Printed Pages – 3

Roll No. :

328732(28)

B. E. (Seventh Semester) Examination, Nov.-Dec. 2021

(New Scheme)

(Et&T Engg. Branch)

COMPUTER NETWORKS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all the questions. Part (a) of each question is compulsory and is of 2 marks. Part (b), (c) and (d) are of 7 marks. Attempt any two of them.

Unit-I

1. (a) What are the types of transmission modes? 2
- (b) Elaborate Bus, Ring, Star and Mesh topologies and compare them alongwith required diagram. 7

[2]

- (c) Explain Full Duplex transmission in EIA-232 D, DET to DCE Interface. 7
- (d) Discuss various types of the signal encoding techniques used in computer networks. Elaborate Unipolar and Polar Line Coding schemes with their waveforms. 7

Unit-II

2. (a) What is Bit Stuffing? 2
- (b) Explain the mechanism of Go Back N. Compare its performance with selective Reject ARQ system. 7
- (c) What are the types of frames used in HDLC? Draw the frame format of each frame. 7
- (d) How CRC helps in error control? Give an example to show the mechanism used by sender and receiver to calculate CRC and detect error. 7

Unit-III

3. (a) Name few IEEE standards involved in project 802. 2
- (b) Discuss the implementation of IEEE 802.3 with its MAC mechanism i.e. CSMA/CO. 7

[3]

- (c) Draw the architecture of wireless protocol IEEE 802.11 with its MAC mechanism 7
- (d) Explain Token Ring Protocol or FDDI in detail. 7

Unit-IV

4. (a) Write two differences between IPV4 and IPV6. 2
- (b) Draw IPV4 Header and explain its fields in detail. 7
- (c) What is TCP? Draw TCP header and explain its function at transport layer. 7
- (d) Elaborate the functions of Repeater, Hub, Bridge and Router. 7

Unit-V

5. (a) What is FTP? 2
- (b) Explain the working of ICMP, ARP and RARP. 7
- (c) Discuss the architecture of ATM. 7
- (d) Name the three layers of ATM and explain any one Application Adaptation Layer (AAL) 7

Printed Pages – 3

Roll No. :

328733(28)

**B. E. (Seventh Semester) Examination,
Nov.-Dec. 2021**

(New Scheme)

(Electronics and Telecommunication Engg. Branch)

WIRELESS COMMUNICATIONS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

***Note : Part (a) of each question is compulsory.
Attempt any two parts from part (b), (c) and
(d) of each question. Part (b), (c) and (d)
from all questions carry seven marks each.
And part (a) of each question carry two
marks.***

Unit-I

1. (a) Define wireless communication.

2

328733(28)

PTO

[2]

- (b) Explain 4G mobile cellular communication system. 7
- (c) Give all the technical details of 3G mobile cellular communication system. 7
- (d) Explain the working of Paging system with necessary block diagram. 7

Unit-II

- 2. (a) What do you mean by cell in mobile communication? 2
- (b) Describe cell splitting in detail for the improvement in the capacity of the cellular system. 7
- (c) Explain channel assignment strategies. 7
- (d) What is the need of hand-off? Give the details of its mechanism. 7

Unit-III

- 3. (a) Write the full form of IMEI number. 2
- (b) Describe the difference between VLR and HLR. 7
- (c) Explain the mapping of GSM layer onto OSI layers. 7

[3]

- (d) Explain the architecture of GSM. 7

Unit-IV

- 4. (a) Acronym DS-SS & FH-SS stands for what? 2
- (b) Describe the constant envelop modulation with merits and demerits. 7
- (c) Describe M-array PSK with suitable expression. 7
- (d) Explain GMSK transmitter and receiver with block diagram and expression. 7

Unit-V

- 5. (a) What is scattering? 2
- (b) For wireless communication what is mean by interleaving and diversity? 7
- (c) Describe free space propagation model with expression. 7
- (d) Explain three basic propagation mechanism reflection, diffraction and scattering. 7

Printed Pages -- 4

Roll No.

328734(28)

B. E. (Seventh Semester) Examination,

Nov.-Dec. 2021

(New Scheme)

(Electronics & Telecommunication Branch)

MANAGEMENT CONCEPTS & TECHNIQUES

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all questions. Part (a) of each unit is compulsory and attempt any two parts from (b), (c) and (d).

Unit-I

1. (a) State difference between Co-ordination & Co-operation. 2

[2]

- (b) What are the functions of Management? Discuss in details. 7
- (c) What is Delegation of Authority? List its features. Also explain Centralization & Decentralization Authority. 7
- (d) Discuss the role of planning in modern business organization. What are the steps involved in planning process? 7

Unit-II

2. (a) Define Human Resource Management. 2
- (b) What is free rein Leadership? Make a distinction between autocratic & democratic leadership. 7
- (c) Explore sources of conflicts in an organisation. 7
- (d) What is the importance of training for an organization? Discuss the various methods of training. 7

Unit-III

3. (a) What do you understand by B2B marketing? 2

328734(28)

[3]

- (b) What is Marketing Environment? Differentiate between Micro & Macro Environment. 7
- (c) Mention & explain the 'Four Ps' of Marketing Mix. 7
- (d) What do you mean by analysis of Financial Statement? Briefly explain the importance of ratio analysis. 7

Unit-IV

4. (a) Define Maintenance Management. 2
- (b) What are the objectives of & functions of Material Management? 7
- (c) What are the objectives of plant layout? What are the different types of plant layout? 7
- (d) What is PERT? What are its main characteristics? 7

Unit-V

5. (a) Define Sole Proprietor. 2
- (b) Differentiate between Public Ltd. & Private Companies. 7

328734(28)

PTO

[4]

- (c) What are the factors affecting choice of Business Organisation? 7
- (d) Write short notes on : 7
- (i) Clubs & Society
 - (ii) Partnership Agreement

Printed Pages – 3

Roll No. :

328741(28)

B. E. (Seventh Semester) Examination,

Nov.-Dec. 2021

(New Scheme)

(Et&T Engg. Branch)

DIGITAL CIRCUIT DESIGN with VERILOG HDL

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

***Note : Part (a) of each question is compulsory.
Attempt any two parts from (b), (c) and (d)
of each question.***

Unit-I

1. (a) Define and declare a module in Verilog. 2
- (b) Write notes on System Task and Compiler Directives. 7

328741(28)

PTO

[2]

- (c) Explain the lexical conventions of Verilog. 7
- (d) Differentiate between Verilog and VHDL. Explain the design flow of any digital IC. 7

Unit-II

2. (a) State two procedural constructs of behavioural modelling in Verilog. 2
- (b) What is the difference between blocking and non blocking assignment? Show it with example. 7
- (c) Explain the different types of modelling in Verilog. 7
- (d) Write short note on different operators and operands used in Verilog. 7

Unit-III

3. (a) Differentiate between Tasks & functions. 2
- (b) What are Nets data types that can be used to model physical connection in Verilog? 7
- (c) Write the Verilog code for 2 : 4 decoder and 4 : 2 encoder in behaviour modelling. 7

[3]

- (d) Write Verilog code for BCD to 7 segment display code converter using CASE statement. 7

Unit-IV

4. (a) Write the code for D flip flop. 2
- (b) Write a verilog code for BCD counter. 7
- (c) Model a 4 bit linear feedback shift register using Verilog HDL. 7
- (d) Write Verilog code for JK flip flop. 7

Unit-V

5. (a) What is one hot encoding? 2
- (b) What are two types of state machine for designing FSM? Differentiate between them. 7
- (c) Write all design steps necessary to design a state machine. Show it with an example. 7
- (d) Explain Dice game with block diagram. 7

Printed Pages – 3

Roll No. :

328743(28)

B. E. (Seventh Semester) Examination, Nov.-Dec. 2021

(New Scheme)

(Et&T Engg. Branch)

ROBOTICS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt part (a) of all question is compulsory. Attempt any two part (b), (c) and (d).

Unit-I

1. (a) What is a Robot? 2
- (b) Explain the anatomy of three different types of robots with neat sketches. 17

[2]

- (c) What are the Asimov's Law's of Robotics? 7
- (d) Explain future prospects and Notations in robotics. 7

Unit-II

- 2. (a) What is Mapping? 2
- (b) Explain concept of Inverting a Homogeneous Transform. 7
- (c) Explain Rotational Matrices used in robotics. 7
- (d) Explain role of co-ordinate frames in robotics. 7

Unit-III

- 3. (a) Give three kinds of sensor used in robotic vision. 2
- (b) Discuss Industrial application of Vision-Controlled Robotic system. 7
- (c) Explore Architecture of Robotic Vision System in detail. 7
- (d) Discuss overview of Robotic Vision-Object Trading and Image processing software. 7

Unit-IV

- 4. (a) What is Joint Actuators? 2

[3]

- (b) Give brief overview of singularity approach on control manipulators. 7
- (c) Explain Interfacing Force/Torque sensor in detail. 7
- (d) Explain types of arms used and configurations with actual robot manipulators. 7

Unit-V

- 5. (a) Give the robot safety. 2
- (b) Explain role for robotic in sustainable development. 7
- (c) Discuss robotic for assembly, inspection and maintenance about space macro facilities. 7
- (d) Give application of Non-Industrial robot. 7

328744(28)

B. E. (Seventh Semester) Examination,

Nov.-Dec. 2021

(New Scheme)

(Et&T Engg. Branch)

RADAR and NAVIGATIONAL AIDS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Part (a) of each question is compulsory and carries 2 marks. Part (b), (c) and (d) carry 7 marks. Attempt any two parts from (b) (c) and (d).

Unit-I

1. (a) State nominal frequency range of X and K band,
(b) Derive the Radar range equation. Explain the factor

[2]

that affect the Radar range equation.

- (c) A guided missile tracking radar has the following specifications. Transmitted power 400 kW, Pulse Repetition Frequency 1500 pps, Pulse width $0.8 \mu\text{s}$. Determine (i) Unambiguous range (ii) Duty cycle (iii) Average Power (iv) Suitable bandwidth of Radar.
- (d) Describe briefly the behaviour of the Radar cross section (in microwave region) of a raindrop and a large aircraft with respect to its dependence on frequency.

Unit-II

2. (a) Define Blind speed.
- (b) How Delay Line canceller works? Explain with help of example.
- (c) With help of block diagram, explain principle of Conical Scan.
- (d) What are the advantages of Simultaneous lobing over Lobe switching. And describe its principle.

328744(28)

[3]

Unit-III

3. (a) Define Evaporation Duct.
- (b) Explain scattering from the round earth surface.
- (c) Write short notes on Cosmic noise and Anthropogenic noise.
- (d) Write short notes on following :
- (i) Radar Siting
- (ii) Faraday Rotation of Polarization

Unit-IV

4. (a) Define Directive Gain.
- (b) What are the functions of Radar antenna. Explain principle of Cassergain feed antenna.
- (c) Explain electronically steered phased array antenna with its advantages and disadvantages.
- (d) Write short notes on Cosecant square antenna and Radome.

328744(28)

PTO

[4]

Unit-V

5. (a) What is the function of Duplexer in Radar Receiver.
- (b) With help of neat sketch, explain the working of Muticavity Klystron.
- (c) Write short notes on Radar Display (i) A scope (ii) PPI display (iii) RHI display
- (d) Find out the Receiver Noise Figure of N networks in cascade.

Printed Pages – 4

Roll No. :

328746(28)

**B. E. (Seventh Semester) Examination,
Nov.-Dec. 2021**

(New Scheme)

(Et&T Engg. Branch)

NEURAL NETWORK and FUZZY LOGIC

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all questions. Part (a) of each questions is compulsory. Attempt any two parts from (b), (c) and (d) of each question.

Unit-I

1. (a) What is artificial neural network?

2

[2]

- (b) Differentiate between single layered and multi layered feed forward network. 7
- (c) Explain the basic architecture of neural network. How does neuron is modeled? 7
- (d) "Neural network is helpful in achieving the goal of artificial intelligence." Justify this statement with proper examples. 7

Unit-II

2. (a) What is memory based learning? 2
- (b) What is the basic difference between supervised and unsupervised learning? Give examples. 7
- (c) What is self organizing map? Explain the Kohonen self organizing maps. 7
- (d) What is synaptic dynamics? Explain the hebbian method of teaming. 7

Unit-III

3. (a) List the limitations of perceptrons. 2

[3]

- (b) Explain the back propagation algorithm of multi layered perceptron. 7
- (c) Explain the delta learning rule. 7
- (d) What is Adalines and Madalens algorithm give its application also. 7

Unit-IV

4. (a) What is phonetic type writer? 2
- (b) Explain the application of neural network in speech recognition. 7
- (c) Explain the hard written character recognition of neural network. 7
- (d) How one can recognize a specific pattern using neural network? Explain. 7

Unit-V

5. (a) Explain Fuzzy graph with an example. 2
- (b) What is the necessity of de-fuzzification process and how it is done? 7

[4]

- (c) Explain the operation of the Fuzzy logic control with process interference block. 7
- (d) Write short notes on : 7
- (i) Adaptive neuro fuzzy information system
 - (ii) Fuzzy associative memories