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M.Sc. (Part – I) (Semester – I) Examination, 2014
ELECTRONICS (Communication Science)
Mathematical Techniques (Paper – I)

Day and Date : Monday, 21-4-2014
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

- Instructions :** 1) Q. 1 and Q. 2 are **compulsory**.
2) Answer **any three** questions from Q. 3 to Q. 7.
3) **All** questions carry **equal** marks.

1. A) Select the correct alternative : 8

1) If the eigen values of a 3x3 matrix A are 2, 5, 6 then, the eigen values of A² are _____

- a) 2, 5, 6 b) 4, 5, 6 c) 2, 25, 6 d) 4, 25, 36

2) $L^{-1} \left\{ \frac{1}{(s-3)^2 + 16} \right\} =$ _____

- a) $\frac{e^{3t}}{4} \sin 4t$ b) $\frac{e^{-3t}}{4} \sin 4t$ c) $e^{3t} \cos 4t$ d) $e^{-3t} \cos 4t$

3) The function $f(z) = (x + ay) + i (bx + cy)$ is analytic if , _____

- a) $a = 1, b = 2, c = 3$ b) $a = -b, c = 1$
c) $a = b = c = 1$ d) None of these

4) The conditions for expansion of a function in a Fourier series are known as _____

- a) Harmonic b) Riemann conditions
c) Periodic d) Dirichlets conditions

P.T.O.



5) If $f(z)$ is analytic and its partial derivatives are continuous throughout some simply connected region, then for every closed path C within this

$$\oint_C f(z) dz = \underline{\hspace{2cm}}$$

- a) $2\pi i$ b) 1 c) -1 d) 0

6) The differential equation $M(x, y) dx + N(x, y) dy = 0$ is exact if _____

- a) $\frac{\partial M}{\partial y} \neq \frac{\partial N}{\partial x}$ b) $\frac{\partial M}{\partial x} \neq \frac{\partial N}{\partial y}$ c) $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$ d) $\frac{\partial M}{\partial x} = \frac{\partial N}{\partial y}$

7) $L\{\cos 3t\} = \underline{\hspace{2cm}}$

- a) $\frac{3}{s^2+9}$ b) $\frac{s}{s^2+9}$ c) $\frac{3}{s^2-9}$ d) $\frac{s}{s^2-9}$

8) Gaussian distribution function is given by

- a) e^{ix^2} b) $Ne^{-\alpha x^2}$ c) $\cos \alpha x$ d) $\sin \alpha x$

B) State **True** or **False** :

6

1) If zero is one of the eigen value of matrix A , then A is singular.

2) $\frac{1}{(s+1)^2}$ is the Laplace transform of te^{-t} .

3) A function $\phi(x, y)$ having continuous partial derivatives of the first and second order is called harmonic function if $\nabla^2\phi \neq 0$.

4) If the complex Fourier transform of $f(x)$ is $F(s)$, then the complex Fourier transform of $f(x/2)$ is $\frac{1}{2} F(2s)$.

5) The set of all solutions of an n^{th} order linear homogeneous differential equation forms an n -dimensional vector space.

6) A vector space is said to be n -dimensional if it contains precisely n linearly independent vectors.



2. Write short notes on :
- a) Properties of matrices 4
 - b) Cauchy integral formula 5
 - c) Types of homogeneous and non-homogeneous differential equations. 5
3. a) Find Fourier series to represent $f(x) = |\sin x|$ for $-\pi \leq x \leq \pi$. 8
- b) Find the eigen values and eigen vectors of the matrix $\begin{bmatrix} 1 & 0 \\ 2 & -1 \end{bmatrix}$. 6
4. a) Using Laplace transform solve $(D^2 + D - 2)x = 2(1 + t - t^2)$, given that $x = 0, Dx = 3$, for $t = 0$. 8
- b) Show that $u = e^x \cos y$ is harmonic and find the corresponding conjugate function. 6
5. a) The vertical motion of a particle of mass m on a spring with spring constant K is described by the following differential equation $my'' = -ky + mg$ with $y(0) = y_0$ and $y'(0) = 0$. Solve this equation for the position of the particle as a function of time. 8
- b) Using Parsevals identity, prove that 6
- $$\int_0^\infty \frac{dt}{(p^2 + t^2)(q^2 + t^2)} = \frac{\pi}{2pq(p+q)}$$
6. a) Solve $x(x^2 + 2y^2) dx + y(2x^2 + y^2) dy = 0$. 6
- b) Find the Fourier transform, $F(k)$ of the Gaussian distribution function, $f(x) = Ne^{-\alpha x^2}$, where N and α are constants. 8
7. a) Classify the singularities and calculate the residue for $f(z) = \frac{1}{(z^2 + a^2)^2}$ (where $a > 0$). 8
- b) Find the inverse Laplace transform of $\frac{2s^2 - 6s + 5}{s^3 - 6s^2 + 11s - 6}$ 6
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**M.Sc. (Part – II) (Sem. – III) Examination, 2014
ELECTRONICS (Communication Science)
Paper No. – XI : Digital Communication**

Day and Date : Friday, 25-4-2014
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- N.B. :** 1) Q. (1) and Q. (2) are **compulsory**.
2) Answer **any three** questions from Q. 3 to Q. 7.
3) **All** questions carry **equal** marks.

1. A) Select correct alternatives :

6

- 1) Nit is a unit of information when amount information is calculated with base of the logarithm is
 - a) 2
 - b) 10
 - c) natural
 - d) none of these
- 2) Systems using signal dependent step sizes are called
 - a) PCM
 - b) DM
 - c) ADM
 - d) DPCM
- 3) The average information content per symbol is also called
 - a) source entropy
 - b) time averaging
 - c) ensemble average
 - d) statistical average
- 4) Which of the following gives maximum probability of error ?
 - a) FSK
 - b) PSK
 - c) DPSK
 - d) ASK
- 5) With minimum distance 5
 - a) error cannot be detected
 - b) single error detected
 - c) single error corrected
 - d) double error corrected
- 6) Costas loop is a method for
 - a) frame synchronization
 - b) symbol synchronization
 - c) carrier synchronization
 - d) none of these



- B) State **True** or **False** : 8
- 1) Highly probable message contains little information.
 - 2) All stationary process are always ergodic.
 - 3) A device commonly used for recording undesirable bit strings is called a scrambler.
 - 4) The probability of error for M-array FSK decreases as M decreases.
 - 5) A specified sequence used for frame synchronization is called guard bits.
 - 6) The non-coherent ASK receiver is more complex than the coherent receiver.
 - 7) The random noise occurs when the step size is too large relative to the local slope characteristics of the input waveform.
 - 8) The cyclic codes are a subclass of linear block codes.

2. Write short notes :
- a) Uniform and non uniform quantization. 5
 - b) Differential Phase Shift Keying (DPSK). 5
 - c) Burst error and Random error correcting codes. 4
3. a) Explain different properties of Random process. 8
 b) Compare PCM Vs analog modulation. 6
4. a) A discrete source transmits messages x_1, x_2 and x_3 with the probabilities 0.3, 0.4 and 0.3. The source is connected to the channel given in figure 1. Calculate all entropies. 8

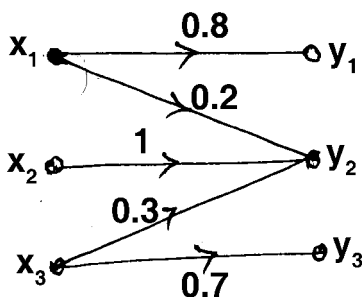


Figure 1.

- b) Explain the generation and detection of PSK. 6



5. a) Apply the Huffman coding procedure for the following message ensemble for $M = 2$.
- $[X] = [x_1 \quad x_2 \quad x_3 \quad x_4 \quad x_5 \quad x_6 \quad x_7]$
- $[P] = [0.4 \quad 0.2 \quad 0.12 \quad 0.08 \quad 0.08 \quad 0.08 \quad 0.04]$ **8**
- b) Explain the characteristics of 'Eye diagram'. **6**
6. a) With suitable example explain the significance of syndrome error detection technique. **8**
- b) Differentiate discrete and continuous random variables. **6**
7. a) The generator polynomial of a (6, 3) cyclic code is $g(x) = 1 + x^2$. Find all the codewords of the code. **8**
- b) What is entropy ? Explain its characteristics. **6**
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M.Sc. (Part – II) (Electronics – Communication Science) (Sem. – IV)
Examination, 2014
Paper – XIII : BROADBAND COMMUNICATION

Day and Date : Tuesday, 22-4-2014

Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- Instructions:** 1) Q. No. 1 and 2 are **compulsory**.
2) Answer **any three** questions from Q. No. 3 to Q. No. 7.
3) **All** questions carry **equal** marks.

1. A) Select correct alternative. (1×6=6)

- 1) Basic access consist _____ channels.
a) 2B+D b) 30 B + D c) 23 B + D d) B + D
- 2) Reference point between TEZ and TA is referred as _____
a) S b) R c) T d) U
- 3) LAPD data link protocol is used for
a) control signaling b) packet switching
c) telemetry d) all
- 4) X.25 has _____ layers.
a) 3 b) 2 c) 4 d) 7
- 5) Length of DLCI is determined by _____ bits.
a) FCS b) GFC c) EA d) None
- 6) In ATM _____ are provided for purpose of user – user, user – network or network – network information transfer.
a) VPI b) VCI c) VCC d) VPC

B) State **true** or **false**. (1×8=8)

- 1) I.600 series is recommended for maintenance principle.
- 2) ISDN has 4 layered protocol architecture.
- 3) Interworking between ISDNs requires only use of ISDN number.

P.T.O.



- 4) SONET and SDH are compatible versions for BISDN.
- 5) HEC field is used for both error control and synchronisation.
- 6) Videotex is an example of messaging services.
- 7) ATM switch interface performs optical to electrical signal conversion.
- 8) Frame relay eliminates overheads of X.25.

2. Write short notes on.

- | | |
|------------------------|---|
| a) ISDN Architecture | 5 |
| b) Frame relay | 5 |
| c) Functional grouping | 4 |
-
- | | |
|--|---|
| 3. a) Explain ISDN protocol at user-network interface. | 8 |
| b) List principles of ISDN. | 6 |
-
- | | |
|--|---|
| 4. a) Explain structure of I series recommendation for ISDN. | 8 |
| b) Explain analog and digital switching in ISDN. | 6 |
-
- | | |
|--|---|
| 5. a) Explain addressing techniques in ISDN. | 8 |
| b) Write short note on system hierarchy with respect to SONET. | 6 |
-
- | | |
|---|---|
| 6. a) Explain ATM protocol architecture. | 8 |
| b) Write a short note on B-ISDN physical layer. | 6 |
-
- | | |
|--|---|
| 7. a) Explain performance aspects of buffering in ATM switching. | 8 |
| b) Briefly write about matrix type of switch used in ATM. | 6 |
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M.Sc. (Part – II) (Semester – IV) Examination, 2014
ELECTRONICS (Communication Science)
Mobile Communication (Paper – XIV)

Day and Date : Thursday, 24-4-2014
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- Instructions:** 1) Q (1) and Q (2) are **compulsory**
2) Answer **any three** Questions from Q. 3 to Q. 7.
3) **All** Questions carry **equal** marks.

1. Objective questions : 14
- A) Choose the correct alternatives : 8
- 1) In GSM the Downlink frequency band is
a) 890-915 MHZ b) 935-960 MHZ c) 890-935 MHZ
 - 2) In GSM the frequency spectrum is partitioned into _____ carriers.
a) 122 b) 124 c) 126
 - 3) In CDMA cellular system the chip rate is about
a) 1.23 MHZ b) 1.32 MHZ c) 1.34 MHZ
 - 4) An advantage of the _____ is that a call communication link uses only one channel at any moment.
a) Hard handoff b) Soft handoff
c) Softer handoff d) Intra-cell handoff
 - 5) In mobile-IP, which of the following is a router that maintain a list of registered mobile nodes in a visitor list.
a) Foreign Agent (FA)
b) Home Agent (HA)
c) Both (a) and (b)



- 6) The extension needed for internet to support the mobility of Host is
- a) DHCP
 - b) Mobile IP
 - c) HIPERLAN
 - d) LAN
- 7) Bluetooth Range is
- a) 100 m
 - b) 10 m
 - c) 110 m
 - d) 50 m
- 8) HIPERLAN stand for
- a) High Performance Local Area Network
 - b) High Interface Local Area Network
 - c) Higher Interface Local Area Network

B) State the following statement is **True** or **False** :

6

- 1) Access Point (AP) Acts as a switch to wire or wireless network.
- a) True
 - b) False
- 2) Mobile node is a router than can change its point of attachment to internet using mobile IP.
- a) True
 - b) False
- 3) Home Agent provide service to Mobile IP.
- a) True
 - b) False
- 4) DHCP is based on Client/Server Model
- a) True
 - b) False
- 5) TCP is used to resolve congestion in network
- a) True
 - b) False
- 6) Theoretical Cell Structure in cellular communication is pentagonal
- a) True
 - b) False

2. Attempt **any three** :

14

- a) Explain with neat diagram the wireless communication.
- b) Explain Infrared Radio Transmission.
- c) Explain the advantage and disadvantage of wireless LAN.
- d) Explain GPRS system.



- 3. a) Explain the forward link and reverse link structure in IS-95 CDMA system ? **10**
b) Explain the GSM Frames. **4**
 - 4. a) Explain the architecture of IEEE 802.11 based on infrastructure and Ad-hoc network ? **8**
b) Explain the following terms with respect to mobile transport layer : **6**
 - i) Indirect TCP
 - ii) Mobile TCP.
 - 5. a) Explain the different functions and services of WATM ? **8**
b) Write a short note on HIPERLAN. **6**
 - 6. a) Explain the various circuit switched data services and packet switched data services on cellular network. **8**
b) Write a note on cellular system operation and planning. **6**
 - 7. a) Explain how the network over come the congestion by using fast and selective retransmission and recovery for TCP ? **8**
b) Write a note on DHCP ? **6**
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M.Sc. (Part – II) (Sem. – IV) Examination, 2014
ELECTRONICS (Communication Science) (Paper – XV)
Fiber Optic Communication

Day and Date : Saturday, 26-4-2014

Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- Instructions:** 1) *Q. 1 and 2 are compulsory.*
2) *Answer **any three** questions from Q. No. 3 and Q. No. 7.*
3) *All questions carry **equal** marks.*

1. Objective questions. 14
- A) Select correct alternatives. 6
- 1) What can be used to extend transmission distance of fiber optic systems ?
- a) Electro-optical repeaters b) Optical fiber amplifiers
c) Coaxial cable d) Both a) and b)
- 2) Optical fibers are made of
- a) Glass coated with plastic b) Ultrapure glass
c) Plastic d) All of these
- 3) The input power to a optical cable is 1mW. The cable's loss is 20 dB. What is output power, assuming there are no other losses ?
- a) 1.1 mW b) 0.05 mW
c) 0.01 mW d) 0.001 mW
- 4) Light emission from an LED is modulated by
- a) voltage applied across the diode
b) current passing through the diode
c) illumination of diode
d) all of the above



5) The attenuation in optical fiber is calculated as, $\alpha_{dB} =$ _____

a) $20 \log \frac{P_i}{P_o}$

b) $10 \log \frac{P_i}{P_o}$

c) $10^{\frac{P_i}{P_o}}$

d) $\log \frac{P_i}{P_o}$

Where P_i – input power and P_o – output power in optical fiber.

6) The numerical aperture for optical fiber in air is $NA =$ _____

a) $\sin \theta_a$ b) $n_0 \sin \theta_a$ c) $\frac{n_0}{n_1} \sin \theta_a$ d) none

Where θ_a – acceptance angle, n_0 and n_1 are refractive index for air and fiber core respectively ?

1. B) Whether following statements are **true** or **false**.

8

- 1) A fusion splicer requires a welder to heat fibr ends.
- 2) Impact ionization phenomenon occures in Avalanche photodiode.
- 3) In LASER, light is produced by spontaneous emission.
- 4) Extended beam connectors is type of joints.
- 5) The requirement of detector is high fidelity.
- 6) LED's are more prefer device for analog transmission because of linearity.
- 7) Attenuation is power ratio of input power and output power.
- 8) Connectors are used to merge signals coming from many devices.

2. Write a note on :

14

- a) Ray theory of transmission. **5**
- b) Optical fiber as local access network. **5**
- c) Compare optical communication system with general communication system. **4**



- 3. Answer the following : 14
 - a) Explain the principle of optical detection. 8
 - b) Draw and explain surface emitting LED. 6

 - 4. Solve the following : 14
 - a) Derive the equation for mode theory. 8
 - b) When 3×10^{11} photons each with a wavelength of $0.85 \mu\text{m}$ are incident on a photodiode, on average 1.2×10^{11} electrons are collected at terminals of the device. Determine the quantum efficiency and responsivity of photo diode at $0.85 \mu\text{m}$. 6

 - 5. Answer the following : 14
 - a) Explain liquid phase technique for optical fiber preparation. 8
 - b) Explain V-Groove splice. 6

 - 6. Answer the following : 14
 - a) Using Ray theory of transmission, explain acceptance angle, critical angle, numerical aperture. 10
 - b) Explain weapon guidance system using optical fiber. 4

 - 7. Answer the following : 14
 - a) Explain phototransistor. 8
 - b) Explain semiconductor injection laser. 6
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**M.Sc. (Part – II) (Semester – IV) Examination, 2014
ELECTRONICS (Communication Science)
Communication Protocols (Paper – XVI)**

Day and Date : Tuesday, 29-4-2014
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- Instructions:** 1) Q. No. 1 and 2 are **compulsory**.
2) Answer **any three** questions from Q. No. 3 to Q. No. 7.
3) **All** questions carry **equal** marks.

1. A) Select the correct alternatives :

6

- 1) The important function of L2CAP layer in Bluetooth is _____
 - i) Multiplexing
 - ii) Segmentation and Reassembly
 - iii) QoS
 - iv) All of the above
- 2) Which of the following is not a limitation of AMPS in 1G wireless network ?
 - i) Low calling capacity
 - ii) Poor Privacy protection
 - iii) Limited Spectrum
 - iv) Wide coverage area
- 3) The traffic channel multi-frame structure consists of _____
 - i) 51 groups of frame
 - ii) 26 groups of 8 TDMA frames
 - iii) 1236 TDMA frames
 - iv) None of the above
- 4) Which state defines the position of MS to SGSN ?
 - i) Idle state
 - ii) Standby state
 - iii) Ready state
 - iv) None of the above
- 5) For the 3G UMTS the soft – handover procedure maintains _____
 - i) Signal Quality
 - ii) Mobility
 - iii) Sequence delivery of packets
 - iv) Channel characteristics
- 6) iGSM is _____
 - i) Value – added service
 - ii) CLN service
 - iii) WLAN service
 - iv) Wireless Local Loop



- B) State **true** or **false** : **8**
- 1) Maximum cable length supported in RS-232 standard is 10 feet.
 - 2) GPRS and EDGE is introduced in 1G.
 - 3) GSM can support roaming to users.
 - 4) Class A equipments handle voice calls and transfer the data at the same time, in the GPRS network.
 - 5) The MS is attached to the network in the standby state.
 - 6) RRM sub-layer is used to establish connection between the MSC and BSS in GSM architecture.
 - 7) Transport network layer allows communication between UTRAN and core network.
 - 8) IEEE 802.16 operates at 10-66 GHz frequency band.
2. a) What are the limitations of 1G cellular network ? **4**
 - b) Explain briefly Radio subsystem of GSM network architecture. **5**
 - c) Explain GGSN node of GPRS. **5**
 3. a) Describe the ground-reflection model. Derive the expression for path loss (P_L) in a two ray ground reflection model. **10**
 - b) Write a note on MSC in 2G NSS. **4**
 4. a) Discuss GPRS Attachment and Detachment procedures. **10**
 - b) Explain UMTS interfaces. **4**
 5. a) Draw and explain the UMTS network protocol architecture. **10**
 - b) Compare WIMAX and 3G. **4**
 6. a) Explain in detail CDMA IS – 95 systems. **10**
 - b) Explain briefly multi-frame structures of GSM. **4**
 7. a) Explain with suitable diagram the architecture of IEEE 802.16 standard. **10**
 - b) Write down the properties of DSR (Dynamic Source Routing) protocol. **4**
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M.Sc. – I (Semester – I) Examination, 2014
ELECTRONICS (Communication Science)
Introduction to MATLAB and LabVIEW (Paper – III)

Day and Date : Friday, 25-4-2014
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

- Instructions:** 1) Q. 1 and Q. 2 are **compulsory**.
2) Answer **any three** questions from Q. 3 to Q. 7.
3) **All** questions carry **equal** marks.

1. A) Select the correct alternative :

5

- 1) All MATLAB computations are done in _____ precision.
 - a) Single
 - b) Double
 - c) 8-bit
 - d) None of these
- 2) Explain the command “clear”
 - a) clears the command window
 - b) removes all variables
 - c) removes all compiled functions
 - d) clears the function specified
- 3) Lab VIEW communicated to your device through _____
 - a) NI_IMAQ
 - b) DAQ
 - c) Both a) and b)
 - d) None of above
- 4) Replace substring is used for _____
 - a) Inserts substring
 - b) Delete substring
 - c) Replace sub string
 - d) All of the above
- 5) Tools palette is available on _____ window.
 - a) Front panel
 - b) Block diagram
 - c) Both a) and b)
 - d) None of above



B) Fill in the blanks : 5

- 1) The branching control structure is _____ (if else/while)
- 2) The fundamental data type in MATLAB is _____ (array/integer)
- 3) A _____ data type is used for sorting dissimilar kinds of data.
(array/integer)
- 4) 'Unbundle by name' block is present in _____ function. (File/I/O/Cluster and variant).
- 5) An 8-bit unsigned integer representing gray scale values between _____ & _____ (- 256, + 256/0,255)

C) State **true** or **false** : 4

- 1) MATLAB is platform dependent.
- 2) Blank space cannot be include in MATLAB variable names.
- 3) Edit ICON is sub function of instrument I/O function in LabVIEW.
- 4) Wire types are same in 1D and 2D array for integer numeric data type input in LabVIEW.

2. Answer in brief :

- 1) Difference between function file and script file. 5
- 2) Explain case structure of LabVIEW. 5
- 3) Explain counter of DAQ devices. 4

3. a) What is cell array ? Explain how cell array can be created using different MATLAB command. 10

b) Describe different constant used in MATLAB. 4

4. a) Build the VI to generate two waveform at different amplitude and frequency. Compare it on same output window (XY-graph). 10

b) Explain the term Analog I/O of DAQ device. 4



5. a) Give the output of following commands : **10**
- i) `A=linspace(0,20,5);`
 - ii) `A=[1 2 3; 4 5 6; 7 8 9];`
`A(2, :) = [];`
 - iii) `A=eye(2);`
 - iv) `A=ones(2,4);`
 - v) `A=rand(2);`
- b) Describe assignment statement of MATLAB with suitable example. **4**
6. a) Give brief explanation of file I/O of VI's. **10**
- b) What is modular programming in LabVIEW. **4**
7. a) Write a script file for following :
- i) Find squares of number which are less than 100 using 'while'. **5**
 - ii) Input a number from user and find whether it is even or odd using 'if-else'. **5**
- b) How to launch DAQ assistant ? **4**
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M.Sc. (Part – I) (Semester – II) Examination, 2014
ELECTRONICS (Communication Science)
Paper – VI : Digital Design and VHDL Programming

Day and Date : Thursday, 24-4-2014
Time : 11.00 a.m to 2.00 p.m.

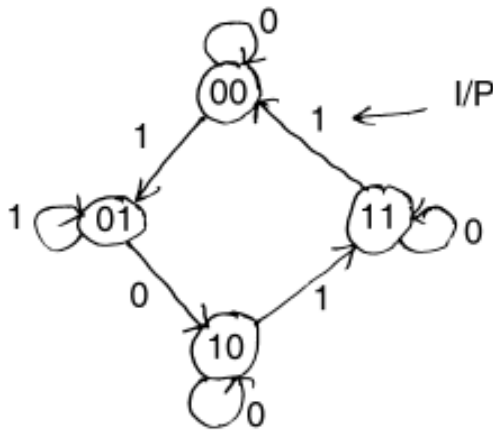
Total Marks : 70

- Instructions :** 1) *Q. 1 and 2 are compulsory.*
2) *Answer any three questions from Q. 3 to Q. 7.*
3) *All questions carry equal marks.*

1. Objective questions : **14**
- A) Choose correct alternative: **8**
- i) The half adder having
 - a) Two inputs and two outputs
 - b) Three inputs and two outputs
 - c) Two inputs and three outputs
 - d) Three inputs and three outputs
 - ii) A 3-bit Up-down counter counts from
 - a) 000 to 111
 - b) 111 to 000
 - c) 000 to 111 and 111 to 000
 - d) None of the above
 - iii) Sequence machines are implemented using
 - a) Counter
 - b) Multiplexer
 - c) Flip-flop
 - d) None of above
 - iv) A PAL has
 - a) Programmable AND
 - b) Programmable OR
 - c) Both a) and b)
 - d) None of above



- 3. a) Explain macrocell block diagram for CPLD. 8
- b) Write a VHDL code for comparator. 6
- 4. a) Design sequential circuit for given state diagram. 10



- b) Explain the concept of delta delay. 4
 - 5. a) Explain overloading in detail. 8
 - b) Design full subtractor. 6
 - 6. a) Design 3-bit Up-down synchronous counter. 8
 - b) Write VHDL code for full adder. 6
 - 7. a) Explain universal shift register. 8
 - b) Write VHDL code for D flip-flop with preset, clear and clock. 6
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**M.Sc. (Part – I) (Semester – II) Examination, 2014
ELECTRONICS (Communication Science) (Old) (Paper – VI)
Transmission Lines and Antennas**

Day and Date : Thursday, 24-4-2014
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

- Instructions:** 1) Q. 1 and Q. 2 are **compulsory**.
2) Answer **any three** from Q. 3 to Q. 7.
3) **All** question carries **equal** marks.

1. Objective questions : 14

A) Choose the correct alternative : 6

1) In rectangular wave guide, TE₁₀ mode is called as _____

- a) Domino's mode b) Domed mode
c) Dominant mode d) Facked mode

2) For free space, $\nabla \times \bar{E} =$ _____

- a) $\frac{\partial \bar{B}}{\partial t}$ b) $-\frac{\partial \bar{B}}{\partial t}$
c) $-\frac{\partial \bar{D}}{\partial t}$ d) $\frac{\partial \bar{D}}{\partial t}$

3) Index of reflection for medium, $\mu_r = 1$ is

- a) $\sqrt{\epsilon_r}$ b) $\sqrt{\mu_r}$
c) $\frac{1}{\sqrt{\epsilon_r}}$ d) $\frac{1}{\sqrt{\mu_r}}$

4) If medium is vacuum, the intrinsic impedance

- a) 130π b) 120π
c) 140π d) 160π



5) The directivity of an antenna is _____

- a) $\frac{\Omega_A}{4\pi}$ b) $\frac{\pi}{\Omega_A}$ c) $\frac{4\pi}{\Omega_A}$ d) $\frac{\Omega_A}{\pi}$

where Ω_A – Beam solid angle.

6) For air, $\bar{J} =$ _____

- a) zero b) $\sigma \bar{E}$ c) \bar{E} d) σ

σ -conductivity of media.

B) State **true** or **false** :

8

1) For lossless transmission line, characteristics impedance $Z_0 = \sqrt{\frac{L}{C}}$.

2) For harmonically varying field, $\nabla \cdot \bar{D} = -j\omega\rho_v$.

3) $\bar{E} = -\nabla \cdot V$. where \bar{E} -Electric field intensity,
V-Potential.

4) For air, conductivity $\sigma = 1$.

5) For no reflection, VSWR is one.

6) A short linear conductor is also called as short dipole.

7) The poynting vector $\bar{S} = \bar{E} \times \bar{H}$.

8) For loss less transmission line R and G are zero.

2. Attempt **any three** :

14

a) Explain Maxwells' equation for harmonically varying field.

4

b) Explain the terms – coaxial, two wire and strip transmission lines.

5

c) Explain briefly about retarded potential of an antenna.

5

d) Briefly write on group velocity.

4

3. Solve the following :

14

a) An air filled rectangular wave guide shown, operates in TE_{11} mode. Find :

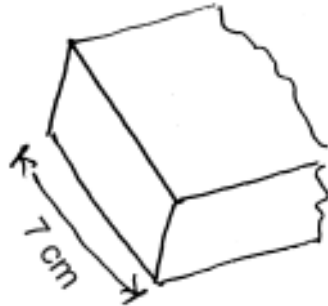
i) Cut off wave number

ii) Cut off frequency

iii) Phase velocity in a guide at a frequency of 5 GHz.



- iv) Guided wavelength at same frequency.
- v) Characteristics impedance (z_g) of guide at same frequency.



10

- b) Write a note on standing wave. 4
- 4. Answer the following : 14
 - a) Obtain the solution of wave equation in rectangular wave guide. 8
 - b) What is circuit theory ? Give relation between field and circuit theory with suitable example. 6
- 5. Solve the following : 14
 - a) What is short dipole antenna, obtain an expression for radiation resistance of short dipole antenna. 8
 - b) Explain the term : Basic antenna parameters. 6
- 6. Answer the following : 14
 - a) In case of transmission line prove $Z_0 = \sqrt{Z_{oc} \cdot Z_{sc}}$. 8
 - b) Write down the Maxwells' equation for free space. 6
- 7. Answer the following : 14
 - a) What is meant by phase velocity. Obtain index of refraction and phase velocity for distilled water has constants $\sigma \approx 0, \epsilon_r = 81, \mu_r = 1$. 8
 - b) Briefly explain the impedance of transmission lines and of media. 6



v) Using Runge Kutta method of order four, the value of $y(0.1)$ for $y' = x - 2y$, $y(0) = 1$, taking $h = 0.1$, is _____

- A) 0.813 B) 0.825 C) 0.0825 D) 0.0813

vi) Adams Bashforth Method is used for

- A) Solving integral equations B) Solving Differential equation
C) Evaluating integrals D) Differentiation

b) State **true** or **false**.

8

- i) To fit the equation $y = ab^x$ by least square principal, the number of normal equations are 3.
- ii) The Lagrange's interpolation formula is used for both equally spaced as well as unequally spaced data.
- iii) Using intermediate value theorem, the root of the equation $f(x) = 0$ lies between $[a, b]$ provided $f(a) \cdot f(b) > 0$.
- iv) Simpsons $3/8^{\text{th}}$ formula is obtained from Newton quotes formula by taking $n = 3$.
- v) Gauss-Jordan matrix inversion method is valid for only if the coefficient matrix "A" is singular.
- vi) Gauss-Jordan elimination method is generalisation of Gauss elimination method.
- vii) In Predictor-corrector methods four initial values may be found with the help of Runge-Kutta Method.
- viii) A random walk is a mathematical formalization of a path that consists of a succession of random steps.

2. Write short notes on :

- a) Write a note on Random Walks. 5
- b) State intermediate value theorem. And writes its use for solving equations. 4
- c) Explain Newton-Raphson method and derive its n^{th} iteration formula. 5

3. a) The following data are taken from the steam table :

6

Temperature T in °C :	140	150	160	170	180
Pressure kg f/cm² :	3.685	4.854	6.302	8.076	10.225

Find the pressure at temperature $t = 175^{\circ}\text{C}$.



b) Fit a curve $y = ab^x$ to the following data : 8

x :	2	3	4	5	6	8
y :	8.3	15.4	33.1	65.2	126.4	146

4. a) Solve for a positive root of $x \tan x = -1$ by Regula Falsi Method, starting with 2.5 and 3 correct to four decimal places. Also solve $x - \cos x = 0$ by bisection method. 10

b) Solve the following system of equations by Gauss elimination method 4

$$\begin{aligned}x + 4y + 9z &= 16 \\2x + y + z &= 10 \\3x + 2y + 3z &= 18\end{aligned}$$

5. a) Given $\frac{dy}{dx} = xy + y^2$ with $y(0) = 1$ find y at $x = 0.1, 0.2, 0.3$ by Runge Kutta Method of fourth order. Also find the y at $x = 0.4$ using Milne's method. 8

b) Solve the following system of equation by Gauss-Seidal method 6

$$\begin{aligned}30x - 2y + 3z &= 75 \\x + 17y - 2z &= 48 \\2x + 2y + 18z &= 30\end{aligned}$$

6. a) Use Gauss-Jordan Matrix inversion method to solve. 8

$$\begin{aligned}2x + 3y + z &= 9 \\x + 2y + 3z &= 6 \\3x + y + 2z &= 8\end{aligned}$$

b) Solve $\frac{dy}{dx} = 1 + y^2$ with $y(0) = 0$ find y at $x = 0.2$ by Taylor's series method. 6

7. a) Evaluate $\int_0^{\pi/2} \sin x dx$ by two and three point Gaussian quadrature formula. 6

b) Evaluate $\int_0^6 \frac{1}{1+x} dx$ using Simpson's one third and Simpson's three eighth rule. 8



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M.Sc. – I (Electronics) (Communication Science) (Semester – I)
Examination, 2014
Paper – II : INSTRUMENTATION

Day and Date : Wednesday, 23-4-2014
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. 1 and 2 are **compulsory**.
2) Answer **any three** questions from Q. 3 to Q. 7.
3) **All** questions carry **equal** marks.

1. A) Select the correct answer :

8

- 1) A moving iron ammeter coil has few turns of thick wire in order to have
 - a) High sensitivity
 - b) Effective damping
 - c) Low resistance and large current carrying capacity
 - d) Large scale
- 2) Which instrument has lowest resistance ?
 - a) Ammeter
 - b) Voltmeter
 - c) Frequency meter
 - d) Meggar
- 3) CRO uses :
 - a) Electrostatic deflection
 - b) Magnetic deflection
 - c) Electro-magnetic deflection
 - d) None of the above
- 4) Measuring range of voltmeter can be extended by using
 - a) High shunt resistance
 - b) High series resistance
 - c) Low shunt resistance
 - d) Low series resistance
- 5) LVDT is a _____ transducer.
 - a) Variable resistance
 - b) Variable self-inductance
 - c) Variable mutual inductance
 - d) Variable inductance
- 6) Change in voltage in Pizo-electric crystal is proportional to _____
 - a) Voltage sensitivity
 - b) Thickness of the crystal
 - c) Applied pressure
 - d) All of these
- 7) Practically VCO is used to produce _____ waveforms.
 - a) Sinusoidal
 - b) Square
 - c) Triangular
 - d) Both b) and c)
- 8) Which transducer convert heat energy into electrical energy ?
 - a) RTD
 - b) AD 590
 - c) Thermocouple
 - d) Thermistor



- B) Fill in the blanks : 6
- 1) _____ DVM is most accurate.
(Slope/Dual slope)
 - 2) _____ V to I converter is used for high current application.
(Grounded load/Floating load)
 - 3) Thermocouple requires _____ compensation for accurate measurement of temperature.
(Cold junction/Hot junction)
 - 4) Isolation amplifier eliminate measurement errors caused by _____
(Ground loops/Extended wire)
 - 5) Strain gauge is a _____ transducer.
(Passive/active)
 - 6) In practical applications _____ IC is used for VCO.
(566/555)
2. A) Explain the term active and passive transducers with examples. 5
 - B) Explain how humidity is measured using capacitive transducer. 4
 - C) Explain in brief basic principle of tachogenerator. 5
 3. A) Explain three op-amp instrumentation amplifier and obtain expression for gain. 8
 - B) Write a short note on DC amplifier. 6
 4. A) With neat circuit diagram explain peak detector circuit. 6
 - B) With schematic block diagram explain Lock-in amplifier in detail. 8
 5. A) With block diagram schematic explain the working of multimeter. 8
 - B) What is difference between dual beam and dual trace CRO. Is it possible to measure frequency using CRO ? Explain the procedure. 6
 6. A) Draw the circuit diagram of scaling amplifier and convert $-1V$ to $+1V$ to the range of $0V$ to $5V$. 8
 - B) What factors must be considered before selecting a transducer for an instrumentation system ? 6
 7. A) What are data acquisition system and what is the role in instrumentation ? 8
 - B) Discuss with neat circuit diagram V to I converter (Floating load) in detail. 6
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**M.Sc. (Part – I) (Semester – I) Examination, 2014
ELECTRONICS (Communication Science)
Communication Systems (Paper – IV)**

Day and Date : Monday, 28-4-2014
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

- Instructions :** 1) *Q. 1 and Q. 2 are compulsory.*
2) *Answer any three questions from Q. 3 to Q. 7.*
3) *All questions carry equal marks.*

1. Objective questions : 14
- A) Choose correct alternatives : 8
- 1) The following stage in a radio receiver provides the maximum image signal selectivity.
 - a) R. F. amplifier
 - b) I. F. amplifier
 - c) Audio amplifier
 - d) Frequency mixer
 - 2) FM discriminator changes the FM signal into
 - a) AM signal
 - b) FM signal
 - c) PM signal
 - d) None of these
 - 3) Sampling theorem finds application in
 - a) Amplitude modulation
 - b) Frequency modulation
 - c) PCM
 - d) None of these
 - 4) Frequency shift keying is basically a method involving
 - a) Amplitude modulation
 - b) Frequency modulation
 - c) Phase modulation
 - d) None of these



- 5) A scheme in which several channels are interleaved and then transmitted together is known as
- Frequency division multiplexing
 - TDM
 - A group
 - A super group
- 6) An on-line, real-time data transmission system is most likely to require a circuit that is
- Simplex
 - Semi duplex
 - Duplex
 - Time – shared
- 7) Quantization noise occurs in
- PPM
 - DM
 - TDM
 - AM
- 8) The most common modulation system used for telegraphy is
- Two-tone modulation
 - Pulse code modulation
 - Single tone modulation
 - Frequency – shift keying

B) State **true** or **false**./Fill in the blanks :

6

- Superheterodyne principle provides selectivity at IF stages.
- In AM, useful power is carried by carrier.
- The greater the modulation index the lesser the power of AM wave.
- In AM, bandwidth is _____ the audio signal frequency. (Same/ Twice)
- Delta modulation is a form of _____ (PCM/DM).
- A balanced modulator is associated with generation of _____ signal (SSB;SC/DSB;SC)

2. Write short notes :

14

- Comparison between PAM, PPM, PWN.
- What are the advantages of FM over AM ?
- Explain sampling theorem.

5

4

5



3. Answer the following : **14**
- a) With the help of a block diagram explain the working of a superheterodyne AM receiver.
 - b) Draw and explain the circuit of a balanced modulator.
4. Answer the following : **14**
- a) Discuss the frequency spectrum of an FM wave. What is Carson's rule ? **6**
 - b) Explain the block diagram of VCO. **8**
5. Answer the following : **14**
- a) Draw and explain working principle for delta modulation. **8**
 - b) Explain demodulation of PTM. **6**
6. Answer the following : **14**
- a) Draw and explain dual slope detector. **10**
 - b) Differentiate between DSB and SSB techniques. **4**
7. Answer the following : **14**
- a) What is meant by process gain, jam margin, J/S ratio and antijam margin ? Explain the importance of these parameters in spread spectrum communication systems. **8**
 - b) Explain the advantages and disadvantages of spread spectrum techniques. **6**
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**M.Sc. (Part – I) (Semester – II) Examination, 2014
ELECTRONICS (Comm. Science) (Paper – V)
Computational Methods and Programming**

Day and Date : Tuesday, 22-4-2014

Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

- Instructions :** 1) Attempt in **all five** questions.
2) Q. 1 and Q. 2 are **compulsory**.
3) Attempt **any three** questions from Q. 3 to Q. 7.

1. A) Choose the correct alternative :

8

i) If the stability factor is $g = 1 - j\omega \delta t$, the stability condition is _____

a) $1 - \delta t^2 \omega^2 \leq 1$

b) $1 + \delta t^2 \omega^2 \leq 1$

c) $1 - \delta t^2 \omega^2 \geq 1$

d) $1 + \delta t^2 \omega^2 \geq 1$

ii) The equation $\frac{dy}{dt} + 10y = 0$ represents an equation of _____

a) Exponential decay

b) Exponential growth

c) Oscillations

d) None above

iii) Damped harmonic oscillator obeys differential equation of the form _____

a) $a \frac{d^2y}{dx^2} - b \frac{dy}{dx} + cy = 0$

b) $a \frac{d^2y}{dx^2} - b \frac{dy}{dx} - cy = 0$

c) $a \frac{d^2y}{dx^2} + b \frac{dy}{dx} + cy = 0$

d) None of these

iv) Schmidt explicit formula is valid for _____

a) Any value of α

b) $0 < \alpha \leq 1$

c) $0 < \alpha \leq 1/2$

d) None of the above



v) If matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 5 \\ 0 & 0 & 3 \end{bmatrix}$ then the eigenvalues of A^{-1} are _____ ,
 _____ , _____

a) $1, 1/2, 1/3$

b) $1, 2, 3$

c) $2, 1/2, 3$

d) $1, 3, 1/2$

vi) In solving simultaneous equation by Gauss Jordan method the coefficient matrix is reduced to _____ form.

a) Null

b) Diagonal

c) Square

d) Hermitian

vii) If $K = 75$, the maximum value generated by the random function random (K) will be _____

a) 75

b) 76

c) 74

d) 750

viii) Which of the following equation is parabolic ?

a) $f_{xy} - f_x = 0$

b) $f_{xx} + 2f_{xy} + f_{yy} = 0$

c) $f_{xx} + 2f_{xy} + 4f_{yy} = 0$

d) None of the above

1. B) Fill in the blanks/state **true** or **false** :

6

i) The truncation error for the Euler's method is terms above _____ Taylor series expansion.

ii) Discretized form of second order derivative $\frac{d^2y}{dx^2}$ is _____

iii) For a growth equation, a more sensible condition would be the _____ in the solution does not grow.

iv) Monte-Carlo integration converge faster for dimension (d) $d = 4$.

v) Methods which generates random number, depend on a chaotic sequence.

vi) Hyperbolic and parabolic equations have at least one open boundary.



2. Attempt following : 14

i) Find the inverse of the matrix $\begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$.

ii) Explain the random number generators.

iii) Discuss Eulerian and Langrangian method.

3. a) What are partial differential equations ? Explain the classification of second order partial differential equation. Give one example of each type. 10

b) How the Jacobi method is implemented by Gauss-Seidel method ? 4

4. a) Discuss the effect of reduced step-size on Euler's method by giving suitable example. 10

b) Can you obtain eigen values and eigenvectors of an asymmetric matrix ? Justify your answer with the help of example. 4

5. a) Find the values of $u(x, t)$ satisfying the parabolic equation $\frac{\partial u}{\partial t} = 4 \frac{\partial^2 u}{\partial x^2}$ with boundary conditions $u(0, t) = 0 = u(8, t)$ and $u(x, 0) = 4x - \frac{1}{2}x^2$ at the points $x = i, i = 0, 1 \dots 7$ and $t = \frac{1}{8}j, j = 0, 1, 2, \dots 5$. 10

b) Explain the stability of Euler method. 4

6. a) Show that the Runge-Kutta method is stable for decay and oscillation equation but unstable for growth equation. Write down the algorithm for Runge-Kutta method. 10

b) Construct flow chart for Predictor-Corrector method. 4

7. a) Construct the advective equation from hyperbolic equations. Solve the advective equation by using a simple algorithm. Obtain the expression for amplification factor. 10

b) Comment on the conservative methods with respect to Maxwell's equations. 4



- 6) The periodic fluctuations of current passing through the n-type GaAs specimen was discovered by
- a) J.B. Gunn
 - b) B.C. Re Loach
 - c) R.C. Johnston
 - d) B.G. Cohen
- 7) If only the transverse magnetic field exists, the wave is called
- a) TE wave
 - b) TM wave
 - c) TEM wave
 - d) All of the above
- 8) In wave polarization
- a) the orientation of electric field changes
 - b) the orientation of magnetic field changes
 - c) the orientation of both electric and magnetic field change
 - d) none of the above

b) **True or false :**

6

- 1) In TM waves, there is no component of magnetic field in the direction of propagation.
- 2) The solution of Maxwell's equations involves three space variables in addition to the time variable.
- 3) A line terminated in its characteristic impedance has a standing wave ratio of unity.
- 4) In a two cavity klystron, the cavity close to the cathode is known as the buncher cavity.
- 5) The wave in the TWT is a propagating wave.
- 6) The Gunn diode is always operated in the negative resistance region.

2. Attempt **any three :**

14

- a) Discuss briefly the microwave spectrum.
- b) What is velocity modulation ? Explain.
- c) Write the basic concepts of open two-wire line.
- d) Explain the stripline shifters.



3. a) Derive the TM mode field equations in a rectangular waveguide. **10**
b) Give an account on boundary conditions. **4**
 4. a) With the diagram of a transmission line, derive equations for line impedance and admittance. **10**
b) Write a note on standing wave ratio. **4**
 5. a) Discuss in detail, the various coaxial and stripline components. **10**
b) Give an account on impedance matching. **4**
 6. a) With neat diagram, explain the construction and working of waveguide phase shifters. **8**
b) What are standard mismatches ? Explain. **6**
 7. a) Discuss in detail, the principle of operation, construction and working of reflex klystron. **10**
b) Give an account on circular waveguides. **4**
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M.Sc. – I (Semester – II) (Communication Science) Examination, 2014
ELECTRONICS
Paper – VIII : Microprocessors and Advanced Microcontrollers

Day and Date : Tuesday, 29-4-2014
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

- Instructions:** 1) Q. (1) and (2) are **compulsory**.
2) Answer **any three** questions from Q. 3 to Q. 7.
3) **All** questions carry **equal** marks.

1. A) Select the correct alternative :

8

- 1) In 8086 microprocessor one of the following statements is not true.
 - a) Coprocessor is interfaced in MAX mode
 - b) Coprocessor is interfaced in MIN mode
 - c) I/O can be interfaced in MAX / MIN mode
 - d) Supports pipelining
- 2) The _____ ensures that only one IC is active at a time to avoid a bus conflict caused by two ICs writing different data to the same bus.
 - a) control bus
 - b) control instructions
 - c) address decoder
 - d) CPU
- 3) Following instruction can be used to halt PIC.
 - a) HALT
 - b) RESET
 - c) Loop goto loop
 - d) a) and c)
- 4) To double the value in file using rotate left the number in file must be less than _____.
 - a) EF
 - b) FF
 - c) FE
 - d) None of these



- 3. A) Discuss register file structure and addressing modes with reference to PIC. **7**
 - B) What is the instruction pipelining in PIC ? **3**
 - C) Explain the nature of port B. What is use of TRISB ? How to turn on and off pull-ups ? **4**
 - 4. A) Explain watchdog timer feature of PIC. **6**
 - B) Discuss in brief architecture of PIC microcontroller. **8**
 - 5. A) Give the classification of instruction set of 8086 microprocessor. Explain each with example in brief. **10**
 - B) Write a program to add to 16 bit numbers. **4**
 - 6. A) Discuss the interrupt system of 8086. What is interrupt pointer ? **8**
 - B) Explain in brief BUS standards. **6**
 - 7. Write short notes on **any two** of the following : **14**
 - i) Numeric data processor.
 - ii) CCP modules of PIC.
 - iii) Maximum mode of 8086.
-



- v) The process of interchangeability of receiving and transmitting operations of antennas is known as
- | | |
|-----------------|----------------|
| a) Polarization | b) Efficiency |
| c) Reciprocity | d) Directivity |
- vi) The primary spread spectrum techniques used in cellular system and GPS for multiple access are
- | | |
|---------|---------|
| a) FHSS | b) TDMA |
| c) WLAN | d) MFSS |

b) State **true** or **false** :

8

- i) The global system for mobile (GSM) communications FDMA.
- ii) The hexagonal cellular system makes the hand off easier.
- iii) The distance from the transmitter to the point where the sky wave first returns to the earth is called for distance.
- iv) The phase shift of QPSK when symbol change occurs is $\pi/2$.
- v) Delta modulation slows down the data transmission rate.
- vi) DSBSC represents double side band suppressed carrier method of transmission.
- vii) Encryption always causes data compression.
- viii) Transmitted signal follows multiple paths due to reflections.

2. Write short notes on :

- | | |
|---|----------|
| a) Information measures and estimation. | 5 |
| b) Hand off strategies | 5 |
| c) Cordless telephone system. | 4 |

3. a) State Shanon's channel capacity theorem and explain its practical implications. **6**

- b) Why propagation losses indoors can be significantly higher compared to line-of-sight, or free space propagation ? Justify your answer with proper examples and state its effect on design considerations. **8**



- 4. a) Why direct conversion receivers are also known as homodyne receiver ?
State advantages and limitations of homodyne receivers compared to heterodyne receivers. **8**
 - b) State and explain main sources of degradation affecting the performance of mobile communication links. **6**
 - 5. a) Explain the DS spread spectrum technique. How does it improve the quality and security of communication ? **8**
 - b) State and explain the steps involved in assessment and qualification of a communication system design. **6**
 - 6. a) What are the parameters associated with mobile multipath channels ? Explain the fading effects due to the multipath time delay. **8**
 - b) Discuss Channel Assignment strategies in cellular mobile communication. **6**
 - 7. a) Explain the concept of Digital Subscriber Lines (DSL). State appropriate standards and design considerations. **8**
 - b) Compare the performance and uses of ASK, FSK and PSK. **6**
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**M.Sc. (Part – II) (Semester – III) Examination, 2014
ELECTRONICS (Communication Science)
Satellite Communication (Paper – X)**

Day and Date : Wednesday, 23-4-2014
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- Instructions :** 1) Q. 1 and 2 are **compulsory**.
2) Answer **any three** questions from Q. 3 to Q. 7.
3) **All** questions carry **equal** marks.

1. a) Objective questions :

8

Select correct alternatives :

- 1) Direction of satellite revolution is same then it is said to be
 - a) Prograde
 - b) Retrograde
 - c) Perigee
 - d) Apogee
- 2) Which of the following has largest traffic capacity ?
 - a) Communication sub-system
 - b) Power sub-system
 - c) Altitude and orbit control sub-system
 - d) None
- 3) Satellite multiple access techniques are
 - a) Frequency
 - b) Time
 - c) Space
 - d) All of the above
- 4) Small jet thrusters on a satellite are used to correct the satellite's
 - a) Orbit
 - b) Altitude
 - c) Attitude
 - d) Gratitude
- 5) To prevent excessive signal attenuation and noise in atmosphere, satellite angle of elevation should be less than
 - a) 6 degree
 - b) 90 degree
 - c) 45 degree
 - d) 5 degree



- 6) The co-ordinates to which earth station antenna must be pointed to communicate with satellite are called
- Latitude angle
 - Longitude angle
 - Look angle
 - North angle
- 7) The satellite system which provides global communication service is
- Intelsat
 - Iridium
 - Eulelsat
 - Both a) and b)
- 8) Free space path loss in dB is given as
- $(4\pi d/\lambda)^2$
 - $20\log(4\pi d/\lambda)$
 - $20\log(4\pi d/\lambda)^2$
 - None of these

b) State **True** or **False** :

6

- When the centrifugal and centripetal forces are equal, the satellite stays in the orbit.
- Tracking help for the determination of current orbit and position of spacecraft take place.
- Perigee is a point on the orbit that is farthest distance to the center of the earth.
- VSAT network make use of LEO satellite.
- Satellite DTH system operates mainly in C band.
- EIRP means effective isotropic radiated point.

2. Write a short note :

- Evolution of DTH services.
- Basic antenna used for satellite.
- LEO and MEO.

5

5

4



3. a) A satellite is in an elliptical orbit with a perigee of 1000 km and an apogee of 4000 km, using a mean earth radius of 6378.14 km. Find the period of the orbit in hours, min, seconds and eccentricity of the orbit. **10**
 - b) Explain the procedure of locating the satellite in the orbit. **4**
 4. a) What is system noise temperature ? How does it affect the C/N and G/T ratio ? **10**
 - b) Calculate the noise temperature of 4 GHz receiver system having the following gain and noise temperatures.
 $T_{in} = 25k, T_{rf} = 50k, T_m = 500k, T_{if} = 1000 k, G_{rf} = 23dB, G_m = 0dB, G_{if} = 30 dB.$ **4**
 5. a) With the help of block diagram explain telemetry, tracking and command (TT & C) sub system of satellite. **8**
 - b) List the advantages and disadvantages of satellite system. **6**
 6. a) Explain GPS position location principal with a block diagram. Explain working of GPS receiver. **8**
 - b) Explain what is DSS-CDMA. Explain the term DS-SS CDMA capacity. **6**
 7. a) What is meant by one way and two way implementation with respect to VSAT network architecture ? **8**
 - b) Explain in brief the block diagram of DBS-TV receiver. **6**
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