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6E1591

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B.Tech. VI Sem. (Main/Back) Examination, June - 2022
Electronics and Comm. Engg.
6EC3-01 Power Electronics

Time : 2 Hours **Maximum Marks : 80**
Min. Passing Marks : 28

Instructions to Candidates:

*Attempt **all five** questions from **Part A**, **four** questions out of **six** questions from **Part B** and **two** questions out of **three** from **Part C**.*

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination (As mentioned in form No. 205)

PART - A

(Answer should be given up to **25** words only)

All questions are **compulsory.** **(5×2=10)**

1. How are inverters classified?
2. Why forced commutation is necessary for chopper?
3. Explain the safe operating areas of an IGBT?
4. What are the differences between series inverter and parallel inverter?
5. What do you mean by commutation of SCR?

PART - B

(Analytical/Problem solving questions)

Attempt any **Four** questions. **(4×10=40)**

1. Explain the constructional details and working of MOSFET.
2. Explain pulse width modulation control technique of power factor improvement along with circuit diagram and waveform.

3. Explain the principle of operation of step - up chopper.

4. A buck boost convertor is operated from a 24V battery an supplies and average load current of 2A. Its switching frequency is 50 KHz. Neglecting diode and switch drop, determine :

   i. The peak to peak choke ripple current for the nominal supply voltage given that the choke value is 500 MH.

   ii. Range of duty cycle variation required to maintain the output voltage at 15V, given that the battery voltage ranges from 26 V in the fully charged state to 21 V in discharged state.

5. With the help of circuit diagram, explain the working of uninterruptible power supply.

6. The single phase half bridge inverter has a resistive load of 10 Ω and the center tap dc input voltage is 96 V. Compute.

   a. RMS value of the output voltage.

   b. RMS power consumed by the load.

   c. Fundamental power consumed by load.

   d. Fundamental component of output voltage waveform.

   e. First five harmonics of the output voltage waveform.

PART - C

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any **Two** questions. **(2×15=30)**

1. Explain the basic idea of speed control of three phase induction motors using voltage and frequency control methods.

2. a. Explain the working of SCR on the basis of two transistor analogy?
   b. In brief, explain turn - on and turn - off switching characteristics of IGBT.

3. a. A full wave full converter is having RE load (R=1000 Ω , E= 50 V). Determine the current through 100 Ω load, if the thyristors are triggered at 30°. The converter is connected to a 20V, 50 Hz source.
   b. Explain the working principle of single phase half wave bridge converter.

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B.Tech. VI Sem. (Main/Back) Examination, June - 2022
Electronics & Comm. Engg.
6EC 4-02 Computer Network

Time : 3 Hours **Maximum Marks : 120**
Min. Passing Marks : 42

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**, **five** questions out of **Seven** from **Part B** and **Four** questions out of **Five** from **Part C**.*

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

PART - A

(Answer should be given up to 25 words only)

All questions are **compulsory** **(10×2=20)**

1. Define computer network.
2. Define Node.
3. What is Router.
4. Write short note on HUB.
5. Differentiate LAN and WAN.
6. Differentiate Internet and Intranet.
7. What is DNS.
8. What is Multiple Access.
9. Define packet switching.
10. What is Remote procedure call.

PART - B

(Analytical/Problem solving questions)

Attempt any **Five** questions **(5×8=40)**

1. Discuss how files are distributed in peer to peer applications.
2. Draw a neat sketch and explain the TCP segments and its services.

3. Explain the concept of multicasting and stastical multicasting in detail.
4. Explain the working procedure of leaky bucket algorithm.
5. Explain the main functions of application layer in detail.
6. Differentiate between flow control and error control.
7. Write and explain multiple access protocols in detail.

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any **Four** questions **(4×15=60)**

1. Explain procedure for **(3×5)**
   a. Pure Aloha.
   b. CSMA/CD.
   c. Ethernet.
2. Describe internetworking connecting devices in reference to Various layers in detail. **(15)**
3. Write difference between static and dynamic routing and also explain dijkstra routing algorithm. **(15)**
4. Obtain the steady state probabilities of birth death process. Also draw and explain the transition graph. **(15)**
5. Explain following in detail. **(3×5)**
   a. IEEE 802 standards.
   b. Issues in Resource allocation.
   c. Broadcast and Multicast Routing.

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6E1593

B.Tech. VI Sem. (Main/Back) Examination, June - 2022
Electronics & Comm. Engg.
6EC 4-03 Fiber Optics Communications

Time : 3 Hours **Maximum Marks : 120**
Min. Passing Marks : 42

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**, **five** questions out of **Seven** from **Part B** and **Four** questions out of **Five** from **Part C**.*

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

PART - A

(Answer should be given up to 25 words only)

All questions are **compulsory** **(10×2=20)**

1. What is Dispersion?
2. What is splicing in fiber?
3. Explain the term Responsivity of photodiode.
4. Explain Quantum limit?
5. What is the object of optical Amplifiers?
6. Give any two applications of LASER in optical communication.
7. Why a Graded index fiber with a parabolic index profile is preferred?
8. Explain power penalties on behalf of optical sources?
9. What do you mean by signal degradation on optical fiber?
10. Give one merit and demerit of LED structure.

PART - B

(Analytical/Problem solving questions)

Attempt any **five** questions. **(5×8=40)**

1. Describe the following characteristics of LASER :
   a. Noise.
   b. Reliability.
   c. Frequency chirp.
   d. Threshold current temperature dependence.

2. Explain the concept of self - phase modulation and Group velocity dispersion.
3. Explain coupled mode Analysis of directional couplers of optical switches?
4. Describe the different types of optical fibers used in fiber optics communcations. Also explain propogation of light in a cylindrical dielectric Rod.
5. Describe the structure and working of APD with the help of suitable diagram. Write advantages and disadvantages of APD over Pin diode?
6. Explain fiber Raman Amplifier with neat diagram? Also explain what is the need of optical Amplifier.
7. Explain degradation of signal due to dispersion and Attenuation in optical fiber.

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any **Four** questions **(4×15=60)**

1. Describe the wavelength divison multiplexing (WDM) and compare with dense wavelength division multiplexing (DWDM).
2. What is need of Optical Time Domain Reflectometry (OTDR) in optical fiber communication? Explain the process of fault location identification with neat diagram.
3. Describe the common LED structure for optical fiber communication. Also give their merits and demerits.
4. What is the objective of optical Amplifiers? Explain Erbium doped fiber Amplifier (EDFA) with neat diagram.
5. What are the Materials Require for Manufacturing the optical fiber? Also explain modal Analysis of a step Index fiber.

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B.Tech. VI Sem. (Main/Back) Examination, June - 2022
Electronics & Comm. Engg.
6EC 4-04 Antennas and Propagation

Time : 3 Hours **Maximum Marks : 120**
Min. Passing Marks : 42

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**, **five** questions out of **Seven** from **Part B** and **Four** questions out of **Five** from **Part C**.*

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

PART - A

(Answer should be given up to 25 words only)

All questions are **compulsory** **(10×2=20)**

1. What is the radiation resistance of half wave dipole antenna?
2. Draw the structure of 3 - elements Yagi - Uda antenna and give the dimensions and spacing between the elements in terms of wavelength.
3. If the noise figure of the antenna at room temperature is 2dB. What is the effective noise temperature?
4. State Huygen's principle.
5. Write the importance of radiation resistance of an antenna.
6. What is the significance of aperture of the antenna?
7. Calculate the radiation resistance of a $\lambda/10$ wire dipole in free space.
8. The radiation resistance of an antenna is $72\,\Omega$ and loss resistance is $8\,\Omega$. What is the directivity in dB if the power gian is 16?
9. State Babinet's principle applied to slot antennas.
10. What is binominal array? What are the disadvantage of binominal array?

PART - B

(Analytical/Problem solving questions)

Attempt any **Five** questions **(5×8=40)**

1. Derive the term "directivity gain". Derive the relation between the gain of an antenna and the antenna aperture.
2. Using reciprocity principle, show that the radiation pattern of an antenna is same in both transmit and receive mode.
3. Discuss the properties of linear broadside array.
4. With the help of neat diagrams explain the principle of radiation mechanism in Antennas.
5. Explain the working principle of a helical antenna in normal mode?
6. Find the directivity, efficiency and effective area of an antenna if its $R_r = 80\Omega$, $R_l = 10\ \Omega$. The power gain is 10 dB and antenna operates at a frequency 100 MHz.
7. Derive the design equations of a horn antenna.

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any **Four** questions **(4×15=60)**

1. Discuss in detail about the structure of atmosphere and the different modes of propagation.
2. Explain the radiation mechanism of a microstrip antenna with suitable illustrations. With suitable figures explain the various feed techniques.
3. Derive the expression for the array factor of a inear array of four isotropic element spaced $\lambda/2$ apart fed with signals of equal amplitude and phase. Obtain the directions of maxima and minima.
4. Explain in detail about log periodic antennas. What is the need for feeding from end with shorter dipoles and the need for tranposing the lines? Also discuss the effects of decreasing α.
5. Explain the principle of parabolic reflector antenna and discuss different types of feed used with neat diagram.

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B.Tech. VI Sem. (Main/Back) Examination, June - 2022
Electronics & Comm. Engg.
6EC 4-05 Information Theory and Coding

Time : 3 Hours **Maximum Marks : 120**
Min. Passing Marks : 42

Instructions to Candidates:

Attempt all ten questions From Part A, five Questions out of seven from Part B and four questions out of five from Part C .

Schematic diagram must be shown wherever necessary. Any data you feel missing suitably be assumed and states clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

PART - A

(Answers should be given up to 25 words only)

All question are compulsory. **(10×2=20)**

1. An alphabet set contains three letters, A, B,C transmitted with probabilities of $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{4}$. Find Entropy.
2. Explain the physical significance of entropy in information theory?
3. What is the difference between block codes and convolution codes?
4. What is the principle of data compression?
5. What is the capacity of the channel having infinite bandwidth?
6. State the channel coding theorem for a discrete memoryless channel.
7. What is meant by cyclic codes?
8. Define mutual information.
9. What do you meant by generator matrices of the cyclic codes?
10. What do you meant by matrix description of cyclic codes?

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PART - B

Attempt any Five questions: **(5×8=40)**

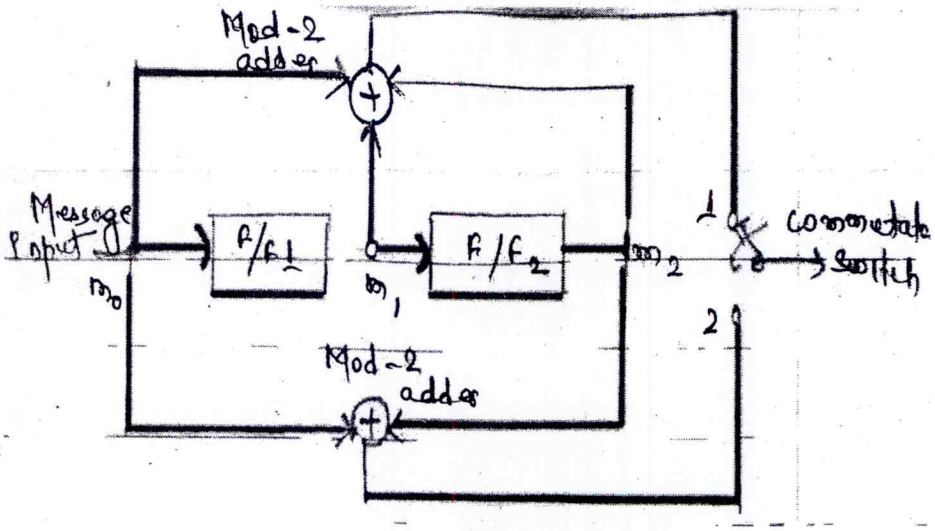
1. For systematic rate ½ convolutional code n = 2, k=1 and the constraint length k = 2; parity bit is generated by the mod-2 sum of the SR output as, P = x+1 that is $g(1,1)=(1,1)$.

   i) Draw the figure of convolutional encoder and decoder.

   ii) Find out the output message string (10110...)

   iii) Draw static diagram.

2. The convolutional encoder shown below has the following two generator sequences each of length 3. $\{g_0^{(1)}, g_1^{(1)}, g_2^{(1)}\}=(1,1,1)$ and $(g_0^{(2)}, g_1^{(2)}, g_2^{(2)})=(1,0,1)$ obtain the encoded sequence for the input message $(m_0, m_1, m_2, m_3, m_4)=(10011)$.



3. For a systematic linear block code, the three parity check digits C_4,C_5 and C_6 are given by:

   $C_4 = m_1 \oplus m_2 \oplus m_3$

   $C_5 = m_1 \oplus m_2$

   $C_6 = m_1 \oplus m_3$

   a) Construct generator matrix

   b) construct code generated by this matrix.

   c) Determine error detecting probability.

   d) Prepare decoding table.

   e) Decode the received word 101100 and 000110.

4. A DMS x has five symbols x_1, x_2, x_3, x_4 and x_5 with $P(x_1)=0.4, P(x_2)=0.19, P(x_3)=0.16$, $P(x_4)=0.15, P(x_5)=0.1$.

   a) Calculate and construct shannon:find code for x and efficiency of the code.

   b) Repeat for the Huffman code and compare the results.

5. Comment on the cyclic coding technique. Simplify the expression according to the cyclic code operations: $(1+x^n)^3$. Also factorize the expression : $1+x+x^2+x^3$.

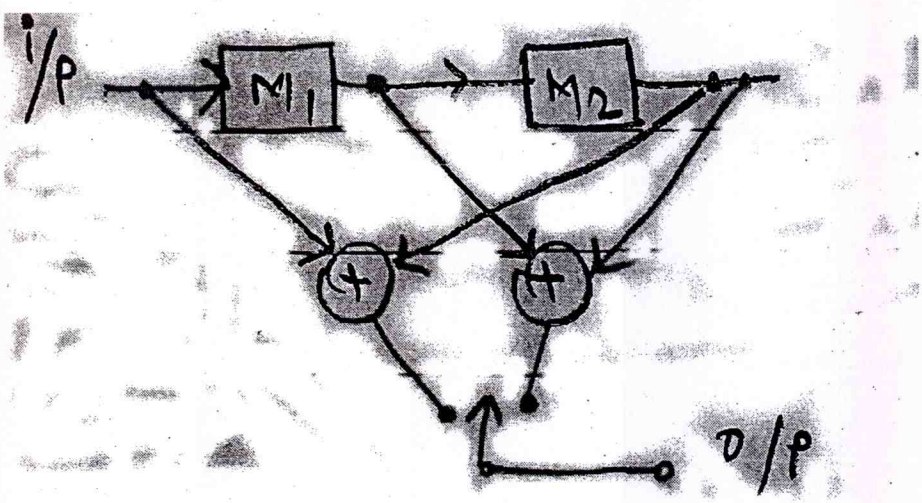
6. Design a Huffman code for the following alphabet and find the average code word length, efficiency and redundancy $A=\{a,b,c,d,e,f,g\}$, $P_A=(0.46,0.26,0.12,0.06,0.05,0.03,0.02)$

7. Define channel capacity theorem and Shannon limit. Discuss Bandwidth S/N trade off.

PART - C

Attempt any four questions. **(4×15=60)**

1. Draw Trellis diagram for convolutional codes(blocks having usual meaning) as shown in the diagram below. Trace the path for received bits are 10 00 10 00 00 and point out the discrepancies.



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2. The generators matrix of a linear binary code is

a) $G=\begin{bmatrix}0&0&1&1&1&0&1\\0&1&0&0&1&1&1\\1&0&0&1&1&1&0\end{bmatrix}$

i) Express G in symmetric form.

ii) Determine the parity check matrix for the code.

iii) Construct syndrome table.

iv) Determine minimum distance of the code.

b) Write the steps to compute the checksum in CRC code. Calculate CRC for the frame 110101011 and generators polynomial x^4+x+1 and write the transmitted frame.

3. a) A channel has a bandwidth of 5 KHz and a signal to noise power ratio is 63. Determine the bandwidth needed if the S/N power ratio is reduced to 31. What will be the signal power.

b) The parity check matrix of a $(7,4)$ linear code is as follows:

$$H=\begin{bmatrix}1&1&1&0&1&0&0\\1&1&0&1&0&1&0\\1&0&1&1&0&0&1\end{bmatrix}$$

Calculate the syndrome vector for single bit error.

4. For a $(7,4)$ cyclic code the generating polynomial $g(x)=1+x+x^3$. Find the code word if data word is

a) 0011

b) 0100

Show that how cyclic code is decoded to get a word for previous case a and b respectively.

5. a) A binary $(18,7)$ code exists that can correct up to three errors. Can this be correct upto to four errors?

b) Give applications and use of viterbi decoding algorithm.

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B.Tech. VI sem(Main/Back)Exam June 2022
PCC/ PEC Electronics & Comm. Engg.
6EC 5-11 Introduction to MEMS
6E1596

Time: 3 Hours **Maximum Marks: 120**
Min. Passing Marks: 42

Attempt all ten questions from Part A, five question out of seven from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1 Nil 2. Nil

Part A (Answer should be given up to 25 words only)
All questions are compulsory

Q. 1	Comment about the historical development in MEMS technology.	[2]
Q.2	What types of magnetic materials are used in MEMS?	[2]
Q.3	State about a commercial product which uses MEMS technology.	[2]
Q.4	What are the common methods of ICs and MEMS fabrication?	[2]
Q.5	What is silicon anisotropic etching?	[2]
Q.6	What is Hookes's Law?	[2]
Q.7	What do you mean by wafer bonding?	[2]
Q.8	Define Poisson effect.	[2]
Q.9	Differentiate between stress and strain.	[2]
Q.10	Why doping is used in the fabrication of MEMS?	[2]

10 x 2 = 20

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Part B(Analytical/Problem solving questions)
Attempt any Five questions

Q.1 Explain the need of photolithography in MEMS design. [8]

Q.2 Define the relationship between Young's Modulus and Poisson's Ratio. And also explain the future scope of MEMS. [8]

Q.3 Discuss about components of the microsystem in detail. [8]

Q.4. Describe the Stress-Strain relationship for isotropic materials. [8]

Q.5 Derive the mathematical equation for bending. [8]

Q.6 Describe the LIGA process in detail with the help of a suitable diagram. [8]

Q.7 Explain oxide growth process for silicon with relevant figures. [8]

5 x 8 =40

Part C(Descriptive/Analytical/Problem Solving/Design questions)
Attempt any four questions

Q. 1 Describe the need of etching in MEMS design and also derive the mathematical expression for pure beam bending. And also describe the concept of bending stress for MEMS devices. [15]

Q.2 Formulate the element equation for a finite element analysis using the Galerkin method in conjunction with the modified heat conduction equation for solids in sub micrometer scale. [15]

Q.3 How MEMS works as a micro sensor and micro actuator? And what are the applications of micro electro mechanical systems? [15]

Q.4 Compare in detail the various sacrificial surface micromachining also explain bulk micromachining. [15]

Q.5 Describe the following: [15]

(i) Isotropic Etching.

(ii) Modeling of coupled electromechanical systems.

4 x 15 = 60

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6E1597

B.Tech. VI Sem. (Main/Back) Examination, June - 2022
Electronics & Comm. Engg.
6EC 5-12 Nano Electronics

Time : 3 Hours **Maximum Marks : 120**
Min. Passing Marks : 42

Instructions to Candidates:

Attempt all ten questions From Part A, five Questions out of seven from Part B and four questions out of five from Part C .

Schematic diagram must be shown wherever necessary. Any data you feel missing suitably be assumed and states clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

PART - A

(Answers should be given up to 25 words only)

All question are compulsory. **(10×2=20)**

1. What are nanomaterials?
2. Explain the concept of modulation doping.
3. Define any two characteristic lengths associated with nano electronic devices.
4. Quantum dots are considered as artificial atoms. Justify.
5. What are finfets.
6. Explain different types of multiple quantum well.
7. What are meso structures.
8. What are Band structure.
9. List out limits to scaling.
10. Define the term Degeneracy.

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions: **(5×8=40)**

1. What is the probability that a particle found between 0.49 and 0.51 L in a 1D box of length L for n = 1.
2. Discuss in brief, band theory of solids.
3. Explain schrodinger equation.
4. Explain working principle of nano scale MOSFETS.
5. Give the structure & working pattern of Graphene.
6. Suppose a metallic quantum dot of shape similar to a feat circular disk of radius R parallel to an infinite metal plane, at a distance L from the plane. Show that in order to observe single electron effects at room temperature, the radius of the dot should be of the order of few nanometers. Take as value of E_r the relative dielectric constant of silicon.
7. What do you mean by zone folding.

PART - C

(Descriptive/Analytical/Problem solving/Design Questions))

Attempt any Four questions. **(4×15=60)**

1. a) Illustrate the principle of operation of Resonant Tunnelling diode. **(8)**
   b) What do you mean by atomistic simulation. **(7)**
2. Explain the concept of coulomb blockade. Obtain the conditions to be fulfilled to observe single electron effect. **(15)**
3. Write a short note on :
   a) Vertical MOSFETS.
   b) CMOS scaling. **(15)**
4. Discuss kronig-penny model of nanotechnology and tis practical implications. **(15)**
5. a) Explain the concept of particle in a box. **(7)**
   b) Explain the system integration limits. **(8)**
