6E7151

Total No. of Questions : 22 Total No. of Pages : 04

Roll No. : .....

6E7151

B.Tech. VI-Sem. (Main) Exam. - 2024

Electronics and Communication Engineering

6EC3-01 Power Electronics

EC, EI

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions 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. ..... 2. .....

PART-A **[10×2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Differentiate between power MOSFET and IGBT.

Q.2. Explain the forward conduction mode of SCR.

Q.3. What is meant by the input power factor in a controlled rectifier?

Q.4. Explain the drawback of half-bridge inverter. Explain how this drawback can be overcome.

Q.5. Illustrate the basic principle of DC-DC buck converter.

Q.6. What is meant by a step-up chopper? State the various assumptions made.

Q.7. Explain duty cycle in step-up chopper operation.

Q.8. What is the principle of operation of Inverter?

Q.9. What is the basic difference between SCR and GTO?

Q.10. What do you mean by reversible choppers?

PART-B [5x4=20]

(Analytical/Problem-solving questions)

Attempt any five questions

Q.1. Justify with the relevant diagram that higher the gate current, lower is the forward break-over voltage of SCR.

Q.2. A single-phase half-wave SCR circuit feeds power to the R load. Draw waveforms for source voltage, load voltage, load current and voltage across the SCR for a given firing angle. Derive an expression for average and RMS load voltages in terms of source voltage and firing angle.

Q.3. A single phase 230 volt, 1 kW heater is connected across a single phase 230 volt, 50 Hz supply through an SCR. For firing angle delays of 45° and 90°. Calculate the power absorbed in the heater element.

Q.4. A step-up chopper has an input voltage of 220 V, and an output voltage of 660 V. If the conducting time of the thyristor chopper is 100 μs, compute the pulse width of the output voltage. In case, the output voltage pulse width is halved for constant frequency operation, find the average value of the new output voltage.

Q.5. Explain the working of Uninterruptible Power Supply with suitable diagrams.

Q.6. Explain the PWM Control of Voltage Source Converter with necessary diagram.

Q.7. Discuss the V- I characteristics of SCR with three relevant modes of it.

PART-C [3x10=30]

(Descriptive/Analytical/Problem-Solving/Design questions)

Attempt any three questions

Q.1. A single-phase full wave-controlled rectifier circuit feeds power to the RL load. Draw waveforms for source voltage, load voltage, load current and voltage across the SCR for a given firing angle α. Derive an expression for average and RMS load voltages in terms of source voltage and firing angle.

Q.2. For a three-phase 120° mode bridge inverter feeding a star-connected resistive load. Draw the waveforms of output line voltages and obtain the Fourier series for the line voltage and RMS value of nth harmonic line voltage.

Q.3. Discuss the basic idea of speed control of three phase induction motors using voltage and frequency control methods with necessary diagrams.

Q.4. Explain the working of Flyback Converter with relevant waveforms in detail.

Q.5. Describe the working of three phase fully controlled bridge converter in the rectifying mode for firing angle of 30°.

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Total No. of Questions : 22 Total No. of Pages : 04

Roll No. : .....

6E7152

B. Tech. VI-Sem. (Main/Back) Exam. 2024

ELECTRONICS & COMMUNICATION ENGINEERING

6EC 4-02 Computer Network

Time : 3 Hours Maximum Marks : 70

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions 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. ..... 2. .....

PART-A **[10×2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Discuss Little's formula.

Q.2. Differentiate packet switching and circuit switching.

Q.3. Discuss briefly about the utility of HTTP Protocol.

Q.4. Write briefly about network layer's main task.

Q.5. State clearly about the use of medium access control protocols.

Q.6. State the key features of Ethernet.

Q.7. What do you understand by Resource Allocation in transport layer?

Q.8. Draw the frame format of IPv4 protocol.

Q.9. Write briefly about SDN.

Q.10. Discuss use of Fragmentation and reassembly in internet based communication.

PART-B [5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1. Differentiate congestion control and routing algorithms.

Q.2. Discuss HDLC Protocol by drawing its frame format and different types of 8-bit control fields associated with frames.

Q.3. Discuss fair queuing and weighted fair queuing used in ATM networks.

Q.4. Discuss any one congestion control algorithm by drawing its flow chart.

Q.5. Write briefly about the network connection devices and state their specific use.

Q.6. Draw ATM frame architecture and discuss it briefly.

Q.7. Draw the frame format of IEEE 802.5 token Ring protocol and discuss it.

PART-C [3×10=30]

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

Q.1. Show the address aggregation of a network for multiple blocks of an organization with following scenario :

(i) Assigned ID of organization is 160.70,14.X

(ii) Organization contains four blocks

(iii) Individual blocks need 120, 37, 49 and 40 addresses

Draw the suitable diagram by using switch/router to show the internet connectivity of the organization.

Q.2. Show the transmission of packets between Tx. node A and Rx. node B in Go Back-5 sliding window protocol with the following condition :

(i) Packets from both the nodes A and B are of similar size.

(ii) Time out interval is zero second

(iii) Finitely small transmission delay between Tx. and Rx. Nodes

Show the transmission when ACK of packet no. 2 is lost and packet no. 5 received with error.

Q.3. In an M/M/m queuing system, derive the expression to calculate the average no. of packets in the queue and average waiting time of a packet in the system

Q.4. Discuss briefly about 1-persistent, p-persistent and non-persistent CSMA protocols and differentiate them.

Q.5. Discuss the following terms in the context to data communication :

(a) Broadcast Routing

(b) Virtual Circuit Network

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6E7153

Total No. of Questions : 22 Total No. of Pages : 04

Roll No. : .....

6E7153

B.Tech. VI-Sem. (Main / Back) Exam. - 2024

ELECTRONICS AND COMMUNICATION ENGG.

6EC4-03 / Fiber Optics Communications

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates :

Note : Attempt all 10 questions from Part-A, 05 questions out of 07 questions from Part-B and 03 questions out of 05 questions 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. ..... 2. .....

PART-A **[10x2=20]**

(Answer should be given up to 25 words only)

All question are compulsory

Q.1. State the requirements that are to be met in selecting materials for optical fibers.

Q.2. What do you mean by pulse broadening in optical fiber ?

Q.3. Give the names of materials used for fabrication of optical fibers.

Q.4. Define the relative refractive index difference for an optical fiber and show how it may be related to the numerical aperture.

Q.5. What is quantum efficiency ?

Q.6. What is source to fiber power launching ?

Q.7. What is non-linear scattering ? Write the names of two non-linear scattering.

Q.8. What do you mean by modulation of LED ?

Q.9. Define spectral width, group velocity and group delay.

Q.10. What do you mean by model noise in optical fiber and how it may be avoided.

PART-B **[5x4=20]**

(Analytical/Problem Solving questions)

Attempt any five questions

Q.1. Briefly explain the different mode of fiber characteristics and draw their refractive index profile.

Q.2. Draw the neat diagram of the experimental setup for the measurement of dispersion and explain it.

Q.3. A step index fiber has a NA of 0.17 and core diameter of 100 μm. Determine the normalized frequency parameters of the fiber when light of wavelength 0.85 μm is transmitted through it.

Q.4. An APD has quantum efficiency of 40% at 1.3 μm . When illuminated with optical power of 0.3 μW at this wavelength, it produces an output photocurrent of 6 μA, after avalanche gain. Calculate the multiplication factor of diode.

Q.5. Draw the schematic diagram of DWDM and explain its working.

Q.6. Explain the factors contributing dispersion and types of dispersion in detail.

Q.7. Explain the working principle of EDFA amplifier.

PART-C **[3x10=30]**

(Descriptive/Analytical/Problem Solving Design/Questions)

Attempt any three questions

Q.1. Optical power of 5m W launched into an optical fiber at a distance of 10 km gives an output power of 4m W. Find the attenuation of fiber per km. What power should be launched into the fiber if 100 μm of power is required at a distance of 80km ?

Q.2. What are the necessary conditions for LASER action ? Define threshold condition of LASER diode.

Q.3. Discuss with the aid of suitable diagrams, the following techniques of mechanical splicing and coupling :

(i) Spring Groove Splice

(ii) Fusion Splice

(iii) Lansing Schemes

Q.4. What is meant by OTDR ? Discuss with the aid of diagram, how this method may be useful in field measurement ? In addition, mention the merits of this technique.

Q.5. What are Homo-junction and Hetero-junctions ? Draw schematic and explain the working of double Hetero-structure edge-emitting LED.

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6E7154

Total No. of Questions : 22 Total No. of Pages : 04

Roll No. : 21ETCEC001

6E7154

B.Tech. VI-Sem. (Main / Back) Exam. - 2024

ELECTRONICS AND COMM. ENGG.

6EC4-04 Antennas and Propagation

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates :

Note : Attempt all 10 questions from Part-A, 05 questions out of 07 questions from Part-B and 03 questions out of 05 questions 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. ..... 2. .....

PART-A **[10x2=20]**

(Answer should be given up to 25 words only)

All question are compulsory

1. Draw the E-plane radiation Pattern of a dipole antenna.

2. If a 20 meter length dipole antenna working at 10 MHz frequency them find its electrical length.

3. Write 2 application of a smart Antenna.

4. Write the relation between gain and directivity of an antenna.

5. State the reciprocity property of an antenna.

6. Write the name two feeding method used in Microstrip antenna.

7. Give one example of a linear and non-linear array of antenna.

8. Write the upper limit of frequency used in ground wave propagation.

9. Write one difference between a grounded and ungrounded antenna.

10. If the total radiated power from an antenna is 100 wats then calculate its average radiation intensity.

PART-B **[5x4=20]**

(Analytical/Problem Solving questions)

Attempt any five questions

1. Find the current required to radiate a power of 100 watt at 100 MHz from a 0.01 meter Hertzian dipole.

2. Define following antenna Parameter :

   (i) Front to Back ratio (FBR)

   (ii) Antenna beam width

3. Calculate the efficiency and radiated power form a dipole antenna. Assume its fending source has source resistance 50 Ω, conducting loss of antenna is 5 milliwatt, feeling current is 20 MA.

4. Explain the working of V-antenna. How it will give unidirectional radiation pattern ?

5. Design a Broad Side antenna array of 4-element at 10 MHz. frequency. Also draw its radiation Pattern.

6. Explain the working of Log-Periodic antenna. Also discuss why it called Broadband antenna.

7. What is Beamforming Concept ? Explain its fixed and variable weight concept.

PART-C **[3x10=30]**

(Descriptive/Analytical/Problem Solving Design/Questions)
Attempt any three questions

1. Derive the expression of far field Electric field from a short current element. Ass-Assure the current element is placed along Z-axis. Also discuss the near field and far field from an antenna.

2. What is corner reflector and Parabolic disc reflecting used in radiating antenna. Also discuss How the radiation Pattern Modify by These reflector when used as receiving antenna ?

3. Draw the resultant radiation Pattern from a two element array having identical radiator speed $\lambda / 4$ a part and current in one radiator lags behind other by 90°.

4. Define the Maximum useable and critical frequency in wave pro Pagation. If the critical frequency for larger E and F is found 2.5 MHz and 8.5 MHz respectively then find the electron density for these layer.

5. Explain the Woodward-Lawson Method of antenna design.

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6E7156

Total No. of Questions : 22 Total No. of Pages : 04

Roll No. : 21ETCEC006

6E7156

B.Tech. VI-Sem. (Main) Exam. 2024

ELECTRONICS AND COMM. ENGINEERING

6EC5-11 Introduction to MEMS (El.-II)

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates :

Note : Attempt all 10 questions from Part-A, 05 questions out of 07 questions from Part-B and 03 questions out of 05 questions 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. ..... 2. .....

PART-A **[10x2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. State the difference between MEMS and microsystem.

Q.2. What is actuator?

Q.3. Explain Poisson effect.

Q.4. What is the importance of Young Moculus of elasticity?

Q.5. What is Epitaxy? State the difference between homo and hetro epitaxy?

Q.6. What is the use of photoresist in Lithoraphy?

Q.7. Which PVD techniques mostly used for metal contacts fabrication and why?

Q.8. What is the different types of printing in Lithography?

Q.9. Why silicon is used commonly as substrate for MEMS?

Q.10. Which etchants are commonly used to etch silicon?

PART-B **[5x4=20]**

(Analytical/Problem solving questions)

(Attempt any five question)

Q.1. Describe the role of sacrificial layers in surface micromachining with figures. Give examples of two sacrificial materials used in micro system fabrication.

Q.2. What is the importance of Miller Indices during etching? Explain briefly.

Q.3. What are the different technique to deposit silicon dioxide? Explain any one of them in detail.

Q.4. What is elastic and plastic deformation? Explain using suitable diagam.

Q.5. Write a brief note on finite element method for analysis.

Q.6. What is the importance of vacuum during MEMS fabrication? Explain briefly.

Q.7. How SnO_2 thin film can be fabricated using dc sputtering system? Explain in detail.

PART-C [3x10=30]

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

Q.1. Explain with figures, the steps in surface micro machining. Discuss the various fabrication challenges associated with surface micromachining.

Q.2. Explain the modelling of coupled electromechanical system.

Q.3. What is the advantage of LIGA process over other micro machining technique? Explain with block diagram the steps in LIGA process.

Q.4. (a) State the difference between isotropic and anisotropic etching using suitable examples.

(b) What is Wafer bonding? Explain briefly.

Q5. Write short notes on the following :

(i) Linear thermal expansion

(ii) Deep reactive ion etching (DRIE)

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6E7190

Total No. of Questions : 22 Total No. of Pages : 04

Roll No. : 21ETCEC006

6E7190

B.Tech. VI-Sem. (Main/Back) Exam. - 2024

Electronics and Communication Engg.

6EC 4-05 5 G Communication

Time : 3 Hours Maximum Marks : 70

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions 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. ..... 2. .....

PART-A **[10×2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Define the main differences between 4G LTE and 5G NR technologies.

Q.2. What are the key requirements that drive the need for 5G communication?

Q.3. Explain the concept of spectrum sharing in the context of 5G networks.

Q.4. What is the significance of small cell deployments in 5G?

Q.5. Describe OFDM and its role in 5G technology.

Q.6. How does NOMA differ from traditional multiple access techniques?

Q.7. What are the challenges associated with millimeter-wave communications in 5G?

Q.8. Briefly explain the concept of network slicing in 5G.

Q.9. What is the purpose of beamforming in 5G networks?

Q.10. How does D2D communication enhance 5G network performance?

PART-B **[5×4=20]**

(Analytical/Problem solving questions)

Attempt any five questions

Q.1. Discuss the propagation scenarios and challenges in 5G channel modeling.

Q.2. Analyze the impact of interference management on the performance of a 5G network.

Q.3. Compare and contrast the RAN architectures in 4G and 5G

Q.4. Evaluate the performance benefits of using Massive MIMO in 5G networks.

Q.5. Assess the role of SDN and NFV in achieving E2E network slicing.

Q.6. Discuss the potential of 5G technology in transforming vehicular communication.

Q.7 Explain the importance of radio resource management in mobile broadband D2D communication.

PART-C [3×10=30]

(Descriptive/Analytical/Problem Solving/ questions)

Attempt any three questions

Q.1. Provide a detailed overview of the evolution from 3G to 5G, including the advancements in LTE and LTE-A Pro.

Q.2. Describe the physical layer design considerations for 5G, including channels, signals and frame structure.

Q.3. Discuss the deployment scenarios for small cells in 5G and their performance analysis.

Q.4. Explain the modulation and access techniques used in 5G, such as FBMC and OFDMA.

Q.5. Detail the design and challenges of millimeter-wave communications, including beam-forming and mobility management.