

6E7151	Roll No. _____	[Total No. of Pages : 2]
	6E7151	
	B.Tech. VI-Sem. (Main/Back) Examination, April/May - 2026 Bio Medical Engineering 6BM3-01 Power Electronics BM, EC	

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).

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory.

(10×2=20)

1. Explain the concept of power electronics.
2. What is converter? Explain with example.
3. What is barrier potential? How are depletion layer and barrier potential affected by temperature?
4. How is the magnitude of breakdown voltage effected if a junction has highly doped?
5. What is rectifiers? What is meant by n-pulse rectifiers?
6. What is thyristor? What are the modes of operation of thyristor?
7. Justify the statement, "Higher the gate current, lower is the forward break-over voltage".
8. Are the turn-on and turn-off times of a thyristor constant?
9. Give four applications of phase-controlled rectifiers.
10. What is a DC chopper? Write the types of choppers.

PART - B
(Analytical / Problem Solving Questions)

Attempt any Five questions.

(5×4=20)

1. Describe the structural features of power diode. How do these differ from signal diodes?
2. Describe the principle operation of DC chopper. Also derive an expression for its average output voltage.
3. What are line-commutated inverters? How do they operate? Explain the line-commutated and force-commutated inverters?
4. Power flow from 1-phase source to load R can be controlled through the use of a thyristor. Discuss why this method of power flow control is called phase-controlled converter.
5. What are the importance of di/dt and dv/dt rating during the turn-on process of thyristor?
6. Snubber circuit for an SCR should primarily consist of capacitor only? But in actual practice, why a resistor is used in series with the capacitor?
7. R, L and C in SCR circuit meant for protecting against dv/dt and di/dt are 4Ω , $6\mu H$ and $6\mu F$, respectively. If the supply voltage to the circuit is 300V, calculate permissible maximum values of dv/dt and di/dt .

PART - C
(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Three questions.

(3×10=30)

1. Describe the different modes of operation of a thyristor with the help of its static V-I characteristics.
2. A single-phase half-wave SCR circuit feeds power to a resistive load. Draw waveform for source voltage, load voltage, load current and voltage across the SCR for a given firing angle α . Obtain the average and rms load voltages in terms of source voltage and firing angle.
3. What is meant by step-up chopper? Explain the principle operation of step-up chopper. Sketch the input voltage, input current, output voltage and output current waveforms. State the various assumptions made. How can a step-up chopper be used for the regenerative braking of DC motor.
4. Define the following terms: i) Firing Angle, ii) Local Hot Spot Formation, iii) Latching and Holding current iv) Thyristor Protection
5. A thyristor controlling the power in a load resistance R_L . The supply voltage is 220V dc and the specified limits for di/dt and dv/dt for the SCR are $50A/\mu s$ and $300V/\mu s$ respectively. Determine the values of the di/dt inductance and the snubber circuit parameters R_s and C_s . In case thyristor circuit is operated at a frequency of 1000Hz, find power loss in the snubber circuit and power rating of snubber resistor.

6E7152	Roll No. _____	[Total No. of Pages : 2]
	6E7152	
	B.Tech. VI-Sem. (Main/Back) Examination, April/May - 2026 Electronics and Communication Engineering 6EC4-02 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).

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory.

(10×2=20)

1. Discuss utility of routers in Computer Networks.
2. Write the names of the parameters A,B,C and D in a queuing model A/B/C/D.
3. Write briefly about ALOHA.
4. What do you mean by multicast routing?
5. Briefly describe the services provided by the Network layer.
6. Discuss briefly about DNS.
7. What do you mean by packet switching?
8. Explain the term "Buffering".
9. Write Little's formula and discuss it.
10. Differentiate between Adaptive and Non-adaptive routing algorithm.

PART - B
(Analytical / Problem Solving Questions)

Attempt any Five questions.

(5×4=20)

1. Draw the header of transmission control protocol and discuss it.
2. Discuss use of fragmentation and reassembly in internet based communication.
3. Discuss HTTP briefly.
4. Differentiate between virtual circuit and datagram networks.
5. Draw the OSI reference model and discuss briefly the working of each layer.
6. What is the difference between delivery of a frame in a data link layer and delivery of a frame in the network layer? Tabulate the difference by naming the associated protocols also.
7. Draw the protocol header of IPv6 protocol. Discuss header details of this protocol.

PART - C
(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Three questions.

(3×10=30)

1. What do you understand by congestion control algorithms? Draw the flow diagram of token bucket algorithm and discuss its congestion control mechanism.
2. Draw a diagram of a network in which four subnets are connected with each other through a network router. Each subnet contains four hosts which are connected to the router through a hub or switch. Four subnet ID's are represented as 170.40.32.X, 170.40.64.X, 170.40.96.X and 170.40.128.X.
3. Draw the diagram representing M/M/m queuing system. Write the flow balance relation for first three nodes and calculate the probability of having zero packets in the system.
4. Draw the header and discuss about IEEE 802.3 Ethernet protocol.
5. Discuss about various types of CSMA protocols.

6E7153	Roll No. _____	[Total No. of Pages : 2]
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	B.Tech. VI-Sem. (Main/Back) Examination, April/May - 2026 Electronics and Communication Engineering 6EC4-03 Fiber Optics Communications	

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).

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory.

(10×2=20)

1. State the requirements that are to be met in selecting materials for optical fibers.
2. What do you mean by pulse broadening in optical fiber.
3. Give the names of materials used for fabrication of optical fibers.
4. Define the relative refractive index difference for an optical fiber and show how it may be related to the numerical aperture.
5. What is quantum efficiency?
6. What is source to fiber power launching?
7. What is non-linear scattering? Write the names of two non-linear scattering.
8. What do you mean by modulation of LED?
9. Define spectral width, group velocity and group delay.
10. What do you mean by modal noise in optical fiber & how it may be avoided.

PART - B
(Analytical / Problem Solving Questions)

Attempt any Five questions.

(5×4=20)

1. Briefly explain the different mode of fiber characteristics and draw their refractive index profile.
2. Draw the neat diagram of the experimental setup for the measurement of dispersion and explain it.
3. A step index fiber has a NA of 0.17 and core diameter of $100\mu\text{m}$. Determine the normalized frequency parameters of the fiber when light of wavelength $0.85\mu\text{m}$ is transmitted through it.
4. An APD has quantum efficiency of 40% at $1.3\mu\text{m}$. When illuminated with optical power of $0.3\mu\text{W}$ at this wavelength, it produces an output photocurrent of $6\mu\text{A}$, after avalanche gain. Calculate the multiplication factor of diode.
5. Draw the schematic diagram of DWDM and explain its working.
6. Explain the factors contributing dispersion and types of dispersion in details.
7. Explain the working principal of EDFA amplifier.

PART - C
(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Three questions.

(3×10=30)

1. Optical power of 5mW launched into an optical fiber at a distance of 10km gives an output power of 4mW . Find the attenuation of fiber per km. What power should be launched into the fiber if $100\mu\text{W}$ of power is required at a distance of 80km .
2. What are the necessary conditions for LASER action? Define the threshold condition of LASER diode.
3. Discuss with the aid of suitable diagrams, the following techniques of Mechanical Splicing & coupling:
 - i) Spring Groove Splice;
 - ii) Fusion Splice;
 - iii) Lansing Schemes
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.
5. What are Homo-junction and Hetro-junctions? Draw schematic and explain the working of double Hetro-structure edge-emitting LED.

6E7154	Roll No. _____	[Total No. of Pages : 2]
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	B.Tech. VI - Sem. (Main/Back) Examination, April/May - 2026 Electronics and Communication Engineering 6EC 4-04 Antennas and Propagation	

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).

PART - A

(Answer should be given up to 25 Words only)

All questions are compulsory.

(10×2=20)

1. What factors affect antenna gain and antenna bandwidth.
2. Briefly explain any two applications of Yagi - Uda antenna.
3. Explain Babinet's principle.
4. Give the Key-points consider for designing microstrip patch antenna.
5. What do you mean by antenna array. Explain it.
6. Write key points of design concept of smart antenna.
7. Explain feeding technique of antenna.
8. What is the relationship between antenna gain and directivity.
9. What do you mean by far-field range.
10. Give the formula for effective aperture of antenna with diagram.

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions.

(5×4=20)

1. With the help of diagram, explain radiation pattern of antenna.
2. Calculate the directivity a broad side stacked antenna of height 10.5 mtr and Length 21 mtr in dB, if the operating frequency $f = 3.5\text{GHz}$.
3. For a mobile communication over a height of 120km via ionosphere layer with $N_{\text{max}} = 2.22 \times 10^5$ electrons/ m^3 , the maximum frequency estimated to be is 6.5 KHz. Find the optimum working frequency, critical frequency and elevation angle of beam and path range.
4. A thin dipole antenna is $t/15$ long. If its loss resistance is 1.5Ω . Find radiation resistance and efficiency.
5. Explain the mechanism of Radio wave propagation.
6. Design a three element Yagi-Uda antenna to operate at a frequency of 172 MHz.
7. Explain the method of polarization measurement of an antenna.

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions.

(3×10=30)

1. If the phase difference $\delta = -90^\circ$, A uniform linear array consists of 16 isotropic point sources with a spacing of $\lambda/4$, calculate
 - a) Directivity
 - b) Effective aperture
2. A transmitting antenna carries current of 20A (rms) at a frequency of 170KHz and produces a field strength of 1.8 mV/m at a distance of 20km. Estimate the effective height of the antenna.
3. With the help of suitable diagram, explain working of log-periodic antenna. Also explain different practical application of the antenna.
4. Using suitable materials, explain the design procedure of microstrip antenna. Also explain the application of microstrip antenna with proper selection of substrate.
5. Compare micro-strip antenna with smart antenna. Also explain the benefits of smart antenna over micro-strip antenna. With the help of concept and beam - forming.

6E7156	Roll No. _____	[Total No. of Pages : 3]
	6E7156	
	B.Tech. VI - Sem. (Main/Back) Examination, April/May - 2026 Electronics and Communication Engineering 6EC 5-11 Introduction to MEMS (EI-11)	

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).

PART - A

(Answer should be given up to 25 Words only)

All questions are compulsory.

(10×2=20)

1. Draw the general block diagram of MEMS.
2. Write two difference between thin and thick film.
3. Write the full form of LIGA.
4. Give two example of bulk micromachining.
5. Write the Hooke's law.
6. Write two advantage of piezoelectric actuator.
7. Write the name of two types of bonding used in wafer fabrication.
8. Define the scaling effects in MEMS.
9. Write two potential application of MEMS in medical.
10. How the total energy defined in MEMS based actuator.

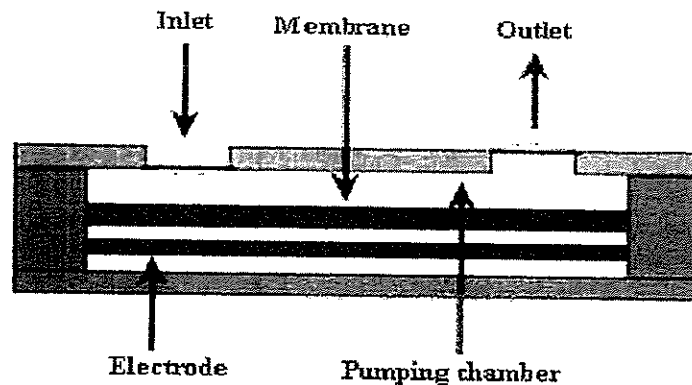
PART - B

(Analytical/Problem solving questions)

Attempt any Five questions.

(5×4=20)

1. Compare the surface micromachining with bulk micromachining in terms of:
 - a) Application
 - b) Quality and
 - c) Time taken and cost
2. What are the different methods of thin film deposition? Explain the Physical Vapor Deposition (PVD) in detail.
3. Explain all steps of fabrication, followed in achieving following micro pump MEMS structure



4. Write the potential application of MEMS in biomedical and imaging.
5. Explain
 - a) Poisson effect and
 - b) Finite element method of analysis in MEMS.
6. How the quality of following fabrication process are measured?
 - a) Oxidation
 - b) Deposition and
 - c) Machining
7. Explain the difference between isotropic and anisotropic etching. Also discuss the suitable etching method for achieving anisotropic etching.

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Three questions.

(3×10=30)

1. Explain the working of following etching process
 - a) Wet etching
 - b) Plasma etching and
 - c) Deep Reactive Ion Etching (DRIE)Also discuss their application area.
 2. Write the name of suitable material used for
 - a) Reactant gases used in plasma etching
 - b) Solutions for gold and copper deposition
 - c) Inert gases for RF sputtering.
 3. Explain the working of
 - a) Thermal actuator and
 - b) Piezoelectric actuatorAlso compare their performances and working voltage.
 4. Explains the CVD and PECVD for layer deposition? Also compare these two methods in respect of uniformity and speed of deposition.
 5. Explain following fabrication process in detail
 - a) Hot Embossing
 - b) Anode Bonding
 - c) Laser machining
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6E7190	Roll No. _____	[Total No. of Pages : 2]
	6E7190	
	B.Tech. VI - Sem. (Main/Back) Examination, April/May - 2026	
	Electronics and Communication Engineering	
	6EC4-05 5G Communication	
	EC, IT	

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).

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory.

(10×2=20)

1. Write the full form of LTE and LTEA?
2. What is MIMO system?
3. Define principle of OFDM.
4. What do you mean by Beam forming?
5. What are the challenges in 5G modeling?
6. What are the available bands at the mmWave and THz spectrum?
7. Think of a city with many Wi-Fi hotspots to ensure constant connectivity, in this instance, how the continuous connection will be ensured?
8. If a person's mobile phone was designed to work with 4G technologies, what will happen when a 5G network is rolled out in their area?
9. What is Network Slicing?
10. What is multi-hop?

PART - B

(Analytical / Problem Solving Questions)

Attempt any Five questions.

(5×4=20)

1. What are the potential solutions of Small Cell deployment for various conditions?
2. How does massive MIMO and beam forming reduce 5G signal degradation?
3. Write the Comparison between 5G and 4G (LTE).
4. What are the main difference between OFDM and OFDMA.
5. Define the terms of mobility management and handover in 5G.
6. What are the requirement of channel modeling?
7. What is smart antenna? Write the name of any two smart antennas used in 5G.

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Three questions.

(3×10=30)

1. Summarize the Road map of the evolution of cellular technology, highlighting the representative applications, from 3G to 5G.
 2. Write features of multiple accesses techniques: FBMC and NOMA.
 3. What are the main difference between D2D and M2M type communications?
 4. Analyze the mmWave channel measurements efforts for various environments.
 5. Draw and explain the 5G core network system architecture.
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