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/μ s and 300V/μs 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

6E7153

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 100μm. Determine the normalized frequency parameters of the fiber when light of wavelength 0.85μm is transmitted through it.

4. An APD has quantum efficiency of 40% at 1.3μm. When illuminated with optical power of 0.3μW at this wavelength, it produces an output photocurrent of 6μA, 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 100μm 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

6E7154

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 = 3.5GHz.
3. For a mobile communication over a height of 120km via ionosphere layer with $N_{max} = 2.22 \times 10^5$ 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)**

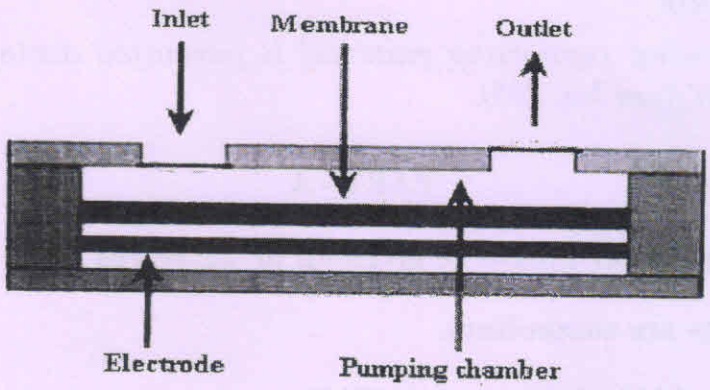
1. Draw the general block diagram of MEMS.
2. Write two difference between thin and thick film.
3. Write the full form of LIGA.
4. Give two example of bulk micromachining.
5. Write the Hooke's law.
6. Write two advantage of piezoelectric actuator.
7. Write the name of two types of bonding used in wafer 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 actuator

   Also 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

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-hope?

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.

6E1591

Roll No. _____ [Total No. of Pages : 2

6E1591

B.Tech. VI-Sem. (Back) Examination, April/May - 2026
Electronics & Comm. Engg.
6EC 3-01 Power Electronics
EC, EI

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 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. **(5×2=10)**

1. What is the main difference between a power Diode and a signal Diode?
2. Discuss the primary functions of a power converter in a circuit.
3. Describe the basic function of a chopper.
4. Write the advantage of using chopper for DC motor speed control.
5. Explain main difference between a VSI and CSI. (Voltage Source Inverter and Current Source Inverter).

PART - B

(Analytical / Problem Solving Questions)

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

1. Discuss the speed control of 3 - ϕ Induction motors using voltage control method.
2. How to speed control of a DC motor using a phase - Controlled converter, draw neat circuit diagram.
3. Explain the working principle of SCR with V-I characteristics, also write the application of SCR.
4. Draw the circuit diagram and wave form of voltage source inverter (VSI) with working principle.
5. What is the principle single - phase full bridge converter, explain working with neat diagram.
6. Explain the working principle of a step up and step down chopper with circuit diagram and applications.

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

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

1. What is converter? Explain Fly back, Boost, and Buck-Boost Converter, with neat diagram and wave form.
2. Describe the structure, operation and switching characteristics of an IGBT. Compare it with power transistor in terms of efficiency.
3. Write short note on :
   a) SMPS
   b) UPS
   c) GTO

6E1596

Roll No. _____ [Total No. of Pages : 2

6E1596

B.Tech. VI-Sem. (Back) Examination, April/May - 2026
Electronics & Comm. Engg.
6EC 5-11 Introduction to MEMS

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 questions from Part B and Four 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. Define Stress and Strain in the context of solid mechanics.
2. State Hooke's Law and write its basic mathematical expression.
3. What do you understand by the "Poisson effect"?
4. Briefly define "Scaling Effects" in micro-systems.
5. Name any two common deposition techniques used in MEMS fabrication.
6. Expand the term LIGA. What is its primary use?
7. What is a "sacrificial layer" in micromachining? Give one example of a material used for it
8. Define "Stiction". Why is it a problem in MEMS?
9. Mention the primary difference between Isotropic and Anisotropic etching.
10. What is Wafer Bonding? List any one type of wafer bonding technique.

PART - B

(Analytical / Problem Solving Questions)

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

1. Provide a brief overview of the Finite Element Method (FEM). Why is FEM necessary for modeling Coupled Electromechanical Systems?
2. Discuss the bending of micro-beams. Briefly explain how energy methods can be applied to analyze structures in MEMS.

3. With the help of a simple case study, explain the working principle of any one Micro-sensor or Micro-actuator.
4. Describe the Oxidation process in MEMS fabrication. Differentiate between dry oxidation and wet oxidation.
5. Explain the basic step-by-step process of Photolithography used in MEMS fabrication.
6. What is Surface Micromachining? Explain the basic process steps involved in creating a freestanding micro-cantilever.
7. Explain the concept of Linear Thermal Expansion. Why is it an important consideration when designing MEMS devices with multiple materials?

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

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

1. a) Discuss the modeling of Coupled Electromechanical Systems in detail. **(8)**
   b) Explain Hooke's law for a 3-dimensional isotropic material, detailing the relationship between stress, strain, Young's modulus, and Poisson's ratio. **(7)**
2. a) Give a comprehensive overview of the LIGA process. What are its advantages over standard photolithography? **(8)**
   b) Discuss various Deposition Techniques (such as CVD and PVD) used in MEMS fabrication in detail. **(7)**
3. a) Compare and contrast Bulk Micromachining and Surface Micromachining. **(7)**
   b) Detail the steps involved in Bulk Micromachining. **(8)**
4. a) Explain the problem of "Stiction" during the release phase of surface micromachining. Discuss various physical and chemical methods used to prevent stiction. **(8)**
   b) Describe the need for Wafer Bonding in MEMS packaging. Explain Anodic bonding and Silicon Fusion bonding in detail. **(7)**
5. Write short note on any two (i) Lithography (ii) Micro/Nano Sensors (iii) Applications of MEMS (iv) Etching

6E8171

Roll No. _____ [Total No. of Pages : 2

6E8171

B.Tech. VI-Sem. (Main/Back) Examination, April/May - 2026
Bio Medical Engineering
6BM4-02 Therapeutic and Assistive Devices

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. Define electrical stimulation of cardiac muscle.
2. What is the function of a pulse generator in a pacemaker?
3. Distinguish between invasive and non-invasive ventilators.
4. What is diathermy?
5. Define electrotherapy.
6. What is the purpose of a defibrillator?
7. Name any two types of LASER used in surgery.
8. What is the role of a humidifier in ventilation systems?
9. Define infusion pump.
10. What is neonatal phototherapy used for?

PART - B
(Analytical / Problem Solving Questions)

Attempt any Five questions. **(5×4=20)**

1. Explain the need for cardiac pacemakers and their basic working principle.
2. Classify ventilators and explain any one type with suitable diagram.
3. Compare IR diathermy and microwave diathermy.
4. Explain the working of a DC defibrillator with block diagram.
5. Describe the electrode system used in electrotherapy.
6. Explain the principle of electro-surgery and its applications.
7. Describe the working of syringe pump and its applications.

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

Attempt any Three questions. **(3×10=30)**

1. a) Explain different types of pacemakers.
   b) Describe rate-responsive pacemakers.

2. a) Explain anesthesia delivery systems.
   b) Discuss safety aspects in ventilators.

3. a) Explain ultrasonic therapy and its applications.
   b) Discuss nerve-muscle stimulators.

4. a) Explain different types of LASER used in surgery.
   b) Discuss safety procedures in LASER applications.

5. a) Explain neonatal care devices such as incubator and radiant warmer.
   b) Describe automated drug delivery systems.

6E8172

Roll No. _____ [Total No. of Pages : 2

6E8172

B.Tech. VI-Sem. (Main/Back) Examination, April/May - 2026
Bio Medical Engineering
6BM4-03 Medical Imaging Technology

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. Define X-ray production.
2. What is the function of an anode in an X-ray tube?
3. What is radiographic film sensitometry?
4. Define fluoroscopy.
5. What is thermography?
6. Define acoustic impedance.
7. What is Doppler effect in ultrasound?
8. What is the role of collimator in X-ray imaging?
9. Define image intensifier.
10. What is radiation protection?

PART - B
(Analytical / Problem Solving Questions)

Attempt any Five questions. **(5×4=20)**

1. Explain the construction and working of an X-ray tube with diagram.
2. Describe the principle of X-ray image formation and factors affecting image quality.
3. Explain the working of fluoroscopic imaging system (E-arm).
4. Compare conventional radiography and digital radiography.
5. Explain infrared imaging system and its medical applications.
6. Describe different types of ultrasound probes and their applications.
7. Explain Doppler ultrasound and its clinical significance.

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

Attempt any Three questions. **(3×10=30)**

1. a) Explain physics and production of X-rays.
   b) Discuss causes of X-ray tube failure.

2. a) Explain X-ray image intensifier and its working.
   b) Discuss radiation dose measurement and protection techniques.

3. a) Explain angiography and digital subtraction angiography (DSA).
   b) Discuss applications of cine angiography.

4. a) Explain thermography and infrared detectors.
   b) Discuss clinical applications of infrared imaging.

5. a) Explain ultrasonic imaging modes (A-mode, B-mode, M-mode).
   b) Discuss ultrasound imaging artifacts and safety considerations.

6E8173

Roll No. _____ [Total No. of Pages : 2

6E8173

B.Tech. VI-Sem. (Main/Back) Examination, April/May - 2026
Bio Medical Engineering
6BM4-04 Biomedical Digital Signal Processing

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. Define discrete-time signal.
2. State the sampling theorem.
3. What is spectral analysis?
4. Define adaptive filtering.
5. What is IIR filter?
6. Define FIR filter.
7. What is QRS complex in ECG?
8. What is EEG signal?
9. Define data compression.
10. What is wavelet transform?

PART - B
(Analytical / Problem Solving Questions)

Attempt any Five questions. **(5×4=20)**

1. Explain sampling and reconstruction of signals with suitable diagram.
2. Describe LMS adaptive filter algorithm and its applications.
3. Compare FIR and IIR filters.
4. Explain bilinear transformation method for digital filter design.
5. Describe ECG signal processing and QRS detection.
6. Explain EEG signal analysis in time and frequency domain.
7. Describe wavelet transform and its applications in biomedical signals.

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

Attempt any Three questions. **(3×10=30)**

1. Explain discrete-time signal representation, frequency domain analysis, and cepstral analysis with applications in biomedical signals.
2. Describe the design of IIR filters using impulse invariance method and compare Butterworth and Chebyshev filters.
3. Explain ECG signal processing techniques including QRS detection, heart rate variability analysis, and pattern recognition.
4. Discuss EEG signal processing using autoregressive models, detection of brain wave components, and analysis of evoked potentials.
5. Explain biomedical data compression techniques. (TP, AZTEC, CORTES) and discuss discrete wavelet transform with pyramid algorithm.

6E8174

Roll No. _____ [Total No. of Pages : 2

6E8174

B.Tech. VI-Sem. (Main/Back) Examination, May/June - 2026
Bio Medical Engineering
6BM4-05 Biomaterials

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. Define biomaterial.
2. What are mechanical properties of biomaterials?
3. Define biocompatibility.
4. What is corrosion in metallic biomaterials?
5. Define ceramic biomaterials.
6. What are polymeric biomaterials?
7. What is hydrogel?
8. Define sterilization.
9. What is cytotoxicity?
10. Define tissue engineering.

PART - B
(Analytical / Problem Solving Questions)

Attempt any Five questions. **(5×4=20)**

1. Explain classification of biomaterials with suitable examples.
2. Describe stress-strain behavior of biomaterials.
3. Explain properties and applications of metallic biomaterials.
4. Compare bioactive and bioinert ceramic materials.
5. Describe different types of polymeric biomaterials and their applications.
6. Explain sterilization techniques used for biomaterials.
7. Discuss surface properties of biomaterials and their importance.

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

Attempt any Three questions. **(3×10=30)**

1. Explain selection criteria, biological responses, and mechanical properties of biomaterials used in medical applications.
2. Describe metallic and ceramic biomaterials including their properties, applications, and limitations.
3. Explain polymeric and composite biomaterials, including their structure, properties, and biomedical applications.
4. Discuss biocompatibility, toxicity testing, and sterilization methods along with their effects on biomaterials.
5. Explain the principles of tissue engineering, including cell types, extracellular matrix (ECM), and wound healing process.

6E8175

Roll No. _____ [Total No. of Pages : 2

6E8175

B.Tech. VI-Sem. (Main/Back) Examination, April/May - 2026
Bio Medical Engineering
6BM5-11 DBMS

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. Define data abstraction in DBMS.
2. What is data independence? Name its types.
3. Differentiate between DDL and DML.
4. What is an Entity-Relationship (ER) model?
5. Define relational algebra.
6. What is normalization?
7. Define ACID properties.
8. What is indexing in DBMS?
9. Define concurrency control.
10. What is SQL injection?

PART - B
(Analytical / Problem Solving Questions)

Attempt any Five questions. **(5×4=20)**

1. Explain database system architecture with a neat diagram.
2. Describe different data models with suitable examples.
3. Write relational algebra queries for the following:
   a) Select all students with marks > 75
   b) Find names of students enrolled in a specific course
4. Explain functional dependency and Armstrong's axioms with examples.
5. Describe different types of normalization (1NF, 2NF, 3NF).
6. Explain query processing and optimization techniques.
7. Discuss different indexing techniques and B-tree structure.

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

Attempt any Three questions. **(3×10=30)**

1. a) Design and ER diagram for a hospital database system.
   b) Convert it into relational schema.

2. Explain SQL in detail:
   a) DDL and DML commands
   b) Write queries using SELECT, JOIN, GROUP BY

3. Explain transaction processing in detail including:
   a) Serializability
   b) Timestamp ordering

4. Discuss concurrency control mechanisms and database recovery techniques.

5. Explain database security mechanisms including:
   a) Authentication and Authorization
   b) DAC, MAC, RBAC models
   c) SQL Injection and prevention