

Total No. of Questions: 22

Total No. of Pages: 02

Roll No. _____

B.Tech IV sem (Main/Back) Exam April-May 2026

Biomedical Engg.

4BM2-01 Advanced Engineering Mathematics-II

Paper Code : 4E1325

EC, EI, BM

Time: 3 Hours

Maximum Marks: 70

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 (Answer should be given up to 25 words only)

All questions are compulsory

Q.1 Determine whether $f(z) = z^2 + \bar{z}$ is analytic.

Q.2 What is a harmonic function?

Q.3 Under what condition is a mapping conformal?

Q.4 What does the Maximum Modulus theorem state?

Q.5 Evaluate : $\int_C \frac{dz}{z}$ where C is the unit circle $|z| = 1$.

Q.6 Find the residue of $\frac{1}{z(z-1)}$ at $z = 0$.

Q.7 Find $P_2(x)$ using the generating function of Legendre polynomial.

Q.8 Write the Bessel differential equation.

Q.9 What is a basis of a vector space?

Q.10 What is a canonical form of a matrix?

10 x 2 = 20

Part B (Analytical/Problem solving questions)

Attempt any Five questions

Q.1 Prove that the function $u = x^3 - 3xy^2$ satisfies Laplace's equation and find the corresponding analytic function $f(z) = u + iv$.

Q.2 Find the value of

$$\int_{|z|=3} \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)} dz$$

Q.3 Expand $f(z) = \frac{1}{z^2 - 3z + 2}$ in a Laurent series for $1 < |z| < 2$.

Q.4 Find out zeroes and discuss the nature of singularities of

$$f(z) = \frac{z-2}{z^2(z^2+1)} \sin\left(\frac{1}{z-1}\right)$$

Q.5 Show that $x \int_0^1 y^{n+1} J_n(xy) dy = J_{n+1}(x)$.

Q.6 Check the linear dependence/linear independence of the following set of vectors

$$S = \{(1, 0, 2, 1), (1, 3, 2, 1), (4, 1, 2, 2)\} \text{ in } \mathbb{R}^4.$$

Q.7 In $\mathbb{R}^3$, let $v_1 = \{2, 1, 1\}$ and $v_2 = \{1, -1, 3\}$. Determine whether the vector $v = \{1, 5, -7\}$ belongs to $\text{Span}\{v_1, v_2\}$.

5x 4 = 20

Part C(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

Q.1 Prove that the function defined by

$$f(z) = \begin{cases} \frac{x^3 y(y-ix)}{x^6 + y^2}, & \text{if } z \neq 0 \\ 0, & \text{if } z = 0 \end{cases}$$

is not analytic at the origin although Cauchy-Riemann equations are satisfied at the origin.

Q.2 Find the residue of : $f(z) = \frac{z^2 - 2z}{(z+1)^2(z^2+4)}$ at all its poles in the finite plane.

Q.3 Use method of contour integration to evaluate

$$\int_0^{2\pi} \frac{\cos^2 3\theta}{5 - 4 \cos 2\theta} d\theta$$

Q.4 State and prove orthogonal property of Legendre polynomial.

Q.5 Apply the Gram-Schmidt process to the vectors

$$\beta_1 = (1, 0, 1), \beta_2 = (1, 0, -1), \beta_3 = (0, 3, 4),$$

to obtain an orthonormal basis for $V_3(\mathbb{R})$ with the standard inner product.

3 x 10 = 30

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B.Tech IV sem (Main/Back) Exam April-May 2026

Aeronautical Engg.

4AN1-02 Technical Communication

Paper Code : 4E1303

All Branches

Time: 3 Hours

Maximum Marks: 70

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 (Answer should be given up to 25 words only)

All questions are compulsory

T-435

- Q. 1 What is Ideation in the process of Technical communication ?
- Q.2 What do you mean by Linguistic Competence ?
- Q.3 What is SQ3R Reading Technique ? Who developed this technique ?
- Q.4 Name any four graphic aids generally used in technical document ?
- Q.5 How will you ensure maximum engagement and share while preparing the online content ?
- Q.6 Define technical discourse.
- Q.7 What do you mean by the term Minutes of Meeting ?
- Q.8 What is Topicalising in the process of note making?
- Q.9 What does the term 'BCC' mean in the heading of an email ?
- Q.10 What is the main purpose of report writing?

10 x 2 = 20

Part B (Analytical/Problem solving questions)

Attempt any Five questions

- Q.1 What are the aspects of effective technical communication ?
- Q.2 How does active reading differ from passive reading ?
- Q.3 Reading is a complex communication process of receiving and interpreting the written word Elaborate.
- Q.4. What are the factors which affect the information and document design?
- Q.5 Correct the following sentences :
 - (i) Neither of the boys are selected for the final
 - (ii) The people of South India loves their tradition and follows them whole-heartedly.
 - (iii) Sartia is more better than Hari in playing chess.
 - (iv) What a terrible night it is ?

- Q.6 What are the main steps that are involved in summarizing technical texts ?
Q.7 What do you mean by the term Methodology in technical articles ?

5 x 4 = 20

Part C(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

T-435

- Q.1 Write short notes on following :
- Literature survey and data collection.
 - Difference between report and a Proposal.
 - Strategies for reading technical text.
 - Internal and External Proposals.
- Q.2 Assume yourself as Shashwat Sharma, a B. Tech. student from MNIT Jaipur. Write an email message to Mr. Ayush Bhatia personnel manager of NTPC Power Management Institute at Noida, U.P. requesting him to allow you to do summer training there as a part of your academic assignments.
- Q.3 Suppose you want to avail a study loan from State Bank of India. Write a letter to the Chief Manager, SBI branch of your locality requesting him/her to send you all the information related to the loan.
- Q.4 What are the types of Technical Report ? Mention the structure of a format Report ?
- Q.5 What is the importance of Technical communication in engineering? How can clear, concise and accurate documentation contribute to the success of engineering projects?

3 x 10= 30

Total No. of Questions : 22

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B.Tech IV sem (Main/Back) Exam April-May 2026

Aeronautical Engg.

4AN1-03 Managerial Economics & Financial Accounting

Paper Code : 4E1302

All Branches

Time: 3 Hours

Maximum Marks: 70

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 (Answer should be given up to 25 words only)

All questions are compulsory

T-435

- Q. 1 Define Managerial Economics.
- Q.2 What is the meaning of demand ?
- Q.3 Define monopoly?
- Q.4 What is the meaning of Cash Flow analysis?
- Q.5 What is the meaning of Oligopoly?
- Q.6 Define Financial statement analysis ?
- Q.7 Define opportunity cost ?
- Q.8 What is the meaning of survey method ?
- Q.9 What is payback Period ?
- Q.10 Define Managerial Economics.

10 x 2 = 20 .

Part B (Analytical/Problem solving questions)

Attempt any Five questions

- Q.1 Discuss the importance of Managerial Economics in decision making.
- Q.2 Define 'Demand' and explain the factors that influence the demand of product.

- Q.3 Calculate the BEP in units and rupees using the following details :
- Selling price per unit Rs. 100 .
 - Variable cost per unit Rs. 60.
 - Fixed cost Rs. 20,000
 - Actual sales Rs. 2,00,000
- Q.4 Discuss the various concept of National income- Gross National products, Net National Product, Personal income and dispensable Income.
- Q.5 Define Balance Sheet ? Give two characteristics of Balance Sheet ?
- Q.6 Distinguish between Monopolistic competition and Perfect Competition ?
- Q.7 You are required to calculate.
- i) Margin of Safety
 - ii) Total sales
 - iii) Variable cost from the following figures
 - Fixed costs Rs. 12, 000
 - Profit Rs. 1,000
 - Break-Even Sales Rs. 60,000

5 x 4 = 20

Part C(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

- Q.1 Define **Ratio Analysis**. Explain the importance of Liquidity and Profitability ratio for a firm.
- Q.2 How the price and output is determined under the perfect competition during the short period ?
- Q.3 Explain the concept of Market Equilibrium the context of Demand and Supply. Discuss how changes in demand and supply affect equilibrium price and quantity. Use diagrams to illustrate your answer.
- Q.4 Calculate the Net present value (NPV) of the two projects X and Y. Suggest which of the two projects should be accepted assuming a discount rate of 10%.

Item	Project -A	Project-B
Initial Investment	Rs. 80,000	Rs. 1,20,000
Life Period	5 years	5 years
Scrap Value	Rs. 4,000	Rs.8000
(Annual Cash Inflows)	(CFAT)	(CFAT)
Year : 1	Rs. 24,000	Rs. 70,000
, 2	Rs. 36,000	Rs. 50,000
, 3	Rs. 14,000	Rs. 24,000
, 4	Rs. 10,000	Rs.8,000
, 5	Rs. 8,000	Rs.8,000

- Q.5 Define **Managerial Economics** and discuss its nature, scope, and relationship with other disciplines like statistics and Mathematics.

3 x 10= 30

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B.Tech IV sem (Main/Back) Exam April-May 2026

Biomedical Engg.

4BM4-04 Analog Circuits

Paper Code : 4E1326

EC, EI, BM

Time: 3 Hours

Maximum Marks: 70

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 (Answer should be given up to 25 words only)

All questions are compulsory

- Q.1 Describe the role of a transconductance amplifier in signal processing.
- Q.2 What is the purpose of biasing in BJT and FET amplifiers?
- Q.3 List the four primary feedback topologies in amplifier circuits?
- Q.4 Define Common-Mode Rejection Ratio (CMRR).
- Q.5 What is the effect of negative feedback on the gain and bandwidth of an amplifier?
- Q.6 Differentiate between integrator and differentiator.
- Q.7 State the Barkhausen criterion for sustained oscillations.
- Q.8 What is a band-pass filter, and how is it used in communication systems?
- Q.9 Write a short note on the role of the reference voltage in a DAC circuit?
- Q.10 What is the basic operation of an inverting amplifier using an OP-AMP?

10x2=20

Part B (Analytical/Problem solving questions)

Attempt any Five questions

- Q.1 An amplifier has an input signal of 5V at 0.1 milliampere the output of the amplifier provides 10 milliampere to a 450 ohm load. Determine:
- I. The current voltage and power gain
- II. The input resistance to the amplifier
- Q.2 Define the terms gain margin and phase margin in the context of amplifier stability. How do these factors influence the design and performance of feedback amplifiers?

- Q.3 Explain the working principle and efficiency of a Class A amplifier.
- Q.4 Draw the basic structure of a differential amplifier and explain its operation.
- Q.5 Explain the basic concept of a switched capacitor circuit. What are the advantages of using switched capacitor circuits in the design of amplifiers?
- Q.6 Design and draw an inverting amplifier with gain of 120 and input impedance of 5k.
- Q.7 Write a short note on Weighted Resistor DAC also give its advantages and limitations.

5x4=20

Part C. (Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

- Q.1 Discuss the working principle of a Schmitt trigger using an operational amplifier. Derive the expressions for the upper threshold voltage. Discuss the advantages of using a Schmitt trigger in practical applications.
- Q.2 Describe the working principle of a low-pass active filter using an operational amplifier. Derive the transfer function and cutoff frequency. Design a low-pass filter using an op-amp with given the following components:
Cut off frequency = 1 kHz
The resistor $R=10\text{ k}\Omega$
- Q.3 Explain the working of the Hartley Oscillator. Derive the expression for its frequency of oscillation. Compare the Hartley Oscillator with the Colpitts Oscillator.
- Q.4 Derive the small-signal model of a BJT transistor and use it to calculate the voltage gain, input resistance, and output resistance of a common-emitter amplifier.
- Q.5 Describe the operation of a single-slope ADC. Derive the expression for its resolution and conversion time. Discuss its advantages and limitations in comparison to other types of ADCs.

3x10=30

Total No. of Questions : 22

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B.Tech IV sem (Main/Back) Exam April-May 2026

Biomedical Engg.

4BM4-05 Microcontrollers

Paper Code : 4E1327

EC, EI, BM

Time: 3 Hours

Maximum Marks: 70

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 (Answer should be given up to 25 words only)

All questions are compulsory

- Q.1 Write the status and control signals with values in 8085
- Q.2 Write the function of TRAP and ALE signals in 8085
- Q.3 Draw flag register of 8085 microprocessor, with set reset condition
- Q.4 If the content of stack pointer is 3000H, what will be the value after two successive POP instructions
- Q.5 Determine the physical address in 8086 when, [DS]=3000H, [BX]=2000H and [SI]=1000H
- Q.6 Define ACI and CMA instructions in 8085
- Q.7 Define RISC and CISC processor architectures
- Q.8 Define the modes of operation of 8255 programmable parallel I/O device
- Q.9 Define cache memory and virtual memory?
- Q.10 Define memory mapped I/O and I/O mapped I/O

10 x 2 = 20

Part B (Analytical/Problem solving questions)

Attempt any Five questions

- Q.1 State and explain the addressing modes of 8085 microprocessor
- Q.2 Compare the instructions in 8085: RIM & SIM (ii) XTHL & XCHG (iii) CALL & RET
- Q.3 Draw and explain the timing diagram of opcode fetch, using 1Byte instruction MOV C, A (Code 4FH) stored in location 2250H

- Q.4. Write a 8085 program to transmit an ASCII character stored in register B, using the SOD line as a 1-bit output port
- Q.5. Draw flag register of 8086 microprocessor, explain each flag with set-reset conditions
- Q.6. List all the interrupts available in 8085. Explain interrupt structure in 8085
- Q.7. Interface 1K(1024x8) RAM with 8085 generating chip select logic using NAND gate. Write its address range.

5x 4 = 20

Part C (Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

- Q.1. Draw the architecture of 8051 microcontroller, describe the working of each functional block. Write the distinct features of the ports.
- Q.2. Explain interfacing of 8-Bit D/A converter with the 8085
- Q.3. Write an assembly language program to add two 8 bit numbers 7C H and 4A H stored at 2040H and 2041H respectively. Store the result at memory location starting from 2000H
- Q.4. Draw internal architecture of 8086 microprocessor, explain the working with function of each block
- Q.5. Discuss any two: i. 80286 Microprocessor ii. RISC Processor iii. ARM-Processor/controller

3 x 10 = 30

Total No. of Questions : 22

Total No. of Pages : 02

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B.Tech IV sem (Main/Back) Exam April-May 2026
Biomedical Engg.
4BM3-06 Electronics Measurement & Instrumentation
Paper Code : 4E1328
EC, EI, BM

Time: 3 Hours

Maximum Marks: 70

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 (Answer should be given up to 25 words only)

T-495

All questions are compulsory

1. Define the terms of accuracy and precision.
2. What do you mean by limits of errors?
3. What are the applications of Q meters?
4. What are the merits and demerits of digital voltmeters?
5. Define the term time delay of CRO?
6. What do you mean by term multibeam and multitrace of CRO?
7. What are the merits and demerits of sine wave generators?
8. What are the applications of spectrum analysers?
9. Differentiate the active and passive transducers.
10. What do you mean by LVDT? Draw its Characteristics.

10x2=20

Part B (Analytical/Problem solving questions)

T-495

Attempt any Five questions

1. Explain the Gaussian error analysis with suitable examples.
2. Draw and explain the circuit diagram of electronic voltmeters.

3. Explain the circuit diagram of shielding and grounding of electronic instruments.
4. Explain the various types of CRO Probes with neat diagram?
5. Explain the working of frequency selective wave analyzers.
6. Explain the characteristics & applications of RTD.
7. Explain the working of Bourdon tubes with suitable diagrams.

5x4=20

Part C (Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

1. Explain the following errors with suitable examples:-
 - (a) Random errors
 - (b) Systematic errors
2. Draw and explain the basic diagram of vector impedance meters with merits and demerits & applications also.
3. An electrically deflected CRT has a final anode voltage of 1700 V and parallel deflecting plates 1.5 cm long and 4.8 mm apart. If the screen is 50 cm from centre of deflecting plates, find the deflection factor of the tube.
4. Explain the block diagram of frequency selective wave analyzers with applications.
5. Explain the following with suitable diagram:-
 - (a) Load Cell
 - (b) Tacho-generators

3x10=30

Total No. of Questions: 22

Total No. of Pages: 02

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B.Tech IV sem (Main/Back) Exam April-May 2026

Biomedical Engg.

4BM4-07 Analog and Digital Communication

Paper Code : 4E1329

EC, EI, BM

Time: 3 Hours

Maximum Marks: 70

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 (Answer should be given up to 25 words only)

All questions are compulsory

T-435

- Q1. Draw the circuit diagram of VSB Modulation.
- Q2. Write any three applications of FM and PM each.
- Q3. What do you mean by Modulation Index?
- Q4. What is Nyquist criterion?
- Q5. Write basic four differences between AM, FM and PM.
- Q6. What is the need for time division multiplexing?
- Q7. A 500 kHz carrier is amplitude modulated with a sinusoidal signal of 10 kHz, and the modulation index is 0.7. Find the sideband frequencies and bandwidth of the AM wave.
- Q8. What is minimum Shift Keying?
- Q9. What is Pulse Modulation?
- Q10. What is sampling Process?

10x2=20

Part B (Analytical/Problem solving questions)

Attempt any Five questions

T-435

- Q1. Define amplitude modulation and describe it in detail with suitable diagrams.
- Q2. Explain Quadrature Amplitude Modulation (QAM) and its applications in modern digital communication systems.
- Q3. An AM system operates with a carrier power of 100 W and a modulation index of 0.8. The channel introduces noise with a power of 10 W. Calculate:
 - (a) The signal-to-noise ratio (SNR)
 - (b) The improvement in SNR if the modulation index is increased to 1.0

- Q4. What is Delta Modulation (DM)? Explain its working principle with the help of a block diagram and mention its advantages and drawbacks. T-435
- Q5. Discuss different types of digital modulation techniques such as Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), and Minimum Shift Keying (MSK).
- Q6. Draw the sample and hold circuit used in PCM sampling.
- Q7. Describe Pulse Code Modulation (PCM) in detail. Explain its advantages and disadvantages over analog communication. **5x4=20**

Part C (Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

- Q1. Compare AM techniques DSBSC, SSB and VSB.
- Q2. State the principle of Angle Modulation. Derive phase deviation, modulation index, and frequency deviation and percent modulation. T-435
- Q3. A receiver has an input signal power of 5 mW and noise power of 0.5 mW. Calculate:
- (a) The Signal-to-Noise Ratio (SNR) in linear scale and dB..
 - (b) If the noise power increases to 1 mW, how does the SNR change?
- Q4. Discuss the impact of Gaussian noise in digital communication and how it affects error probability.
- Q5. A Delta Modulation system operates with a sampling rate of 40 kHz. If the maximum frequency of the input signal is 3 kHz, find:
- (a) The maximum step size to avoid slope overload.
 - (b) The quantization noise power for a step size of 0.2V.

3x10=30