

Roll No.

3018

B. Tech. 4th Semester (EE)

Examination – May, 2026

BIOLOGY

Paper : BSC-BIO-201-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. Write the short notes on the following : $2.5 \times 6 = 15$

- (a) What is cell theory ?
- (b) What is allele ?
- (c) Explain gene cloning.
- (d) What are types of Microbes ?
- (e) What is adapter and linker.
- (f) Explain concept of central dogma.

3018-1200(P-3)(Q-9)(26)

P. T. O.

UNIT – I

2. (a) What are differences between animal and plant cell? 7.5
(b) What is economic importance of Microbes? 7.5
3. (a) Describe Meiosis in detail. 7.5
(b) What is evidence of nucleic acid as a genetic material? 7.5

UNIT – II

4. Discuss the important functions of lipids and proteins. 15
5. Write the short notes on any *two* : $7.5 \times 2 = 15$
(a) Amino acids
(b) Structure of DNA
(c) Different structures of protein

UNIT – III

6. What is genetic engineering and what are different tools used in genetic engineering? 15

3018- (P-3)(Q-9)(26) (2)

7. Write short notes on any *two* : $7.5 \times 2 = 15$

- (a) Restriction enzymes
(b) Plasmid vector
(c) Transgenic animals

UNIT – IV

8. Write down the applications of biotechnology in enzyme technology. 15
9. Write short notes on : $7.5 \times 2 = 15$
(a) Role of Biotechnology in Agriculture
(b) Role of Biotechnology in Environment *Cleanness*.

3018- (P-3)(Q-9)(26) (3)

Roll No.

3095

**B. Tech. 4th Semester (EE)
Examination – May, 2026**

DIGITAL ELECTRONICS

Paper : PCC-EE-202-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. Compulsory question :

3 × 5 = 15

(a) Convert :

(i) Decimal 109.25 into binary.

(ii) Hex 2AD6 into Octal.

(b) Discuss parity checker in details.

(c) Difference between latch and flip flop.

(d) Write briefly about PAL.

(e) Discuss CCD.

3095-1460(P-3)(Q-9)(26)

P. T. O.

UNIT - I

2. (a) Discuss addition and subtraction of two numbers (78 and 55) using complements of them. 7
- (b) Solve the following : $2 \times 4 = 8$
- (i) $A + BC + (CA - ABC) (A - B - C)$
- (ii) $(A + C + B - 1) + (AB + 1) (B + C + 1)$
3. (a) At the receiver the Hamming code data received is 10111010111. Find out the error and also give the correct code. The even parity has been used at transmitter. 10
- (b) How De-multiplexer differ from decoders ? Can they be used for each other ? 5

UNIT - II

4. (a) Simplify the function using Quine Mc-Clusky method : 10
- $X(A, B, C, D) = m\sum (0, 1, 2, 5, 9, 11, 12, 14)$.
- (b) Give out sequences of steps to solve a problem using K-map method. 5
5. (a) Design a binary synchronous counter which counts upto 9 and then starts reverse counting upto zero i.e. initial stage and repeats the process. 8

- (b) Design decimal to hexadecimal encoder. Also give out TT. 7

UNIT - III

6. Write short notes on the following : $2 \times 7.5 = 15$
- (a) Design of D and T type flip flop using SR flip flop
- (b) Up Down counters
7. (a) Discuss working of ripple counters. 8
- (b) Design a mode 10 counter. 7

UNIT - IV

8. (a) Discuss briefly designing of sample and hold circuit. 8
- (b) Discuss in details the design A to D convertor. 7
9. Write briefly about the following : $3 \times 5 = 15$
- (a) RAM
- (b) PLD
- (c) ROM

Roll No.

3096

**B. Tech. 4th Semester (EE)
Examination – May, 2026**

ELECTRICAL MACHINES - II

Paper : PCC-EE-206G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is **compulsory**. All questions carry equal marks.

1. (a) What do you mean by the term cogging and crawling ?
- (b) Why an induction motor never run at synchronous speed ?
- (c) Why rotor bar are skewed in an induction motor ?
- (d) What is the coil span factor and distribution factor ?
- (e) Enlist the methods to determine the voltage regulation of an alternator ? $5 \times 3 = 15$

3096-1300-(P-3)(Q-9)(26)

P. T. O.

UNIT - I

2. Derive an expression for development of rotating magnetic field in 3-phase induction motor. 15
3. Discuss various methods of speed control of 3-phase induction motor. 15

UNIT - II

4. Describe the working principle of 1-phase induction motor. Explain why a 1-phase induction motor is not self starting. 15
5. A 2-pole, 240V, 50Hz, single-phase induction motor has the following constants referred to stator : $R_1 = 2.2\Omega$, $X_1 = 3.0\Omega$, $R_2' = 3.8\Omega$, $X_2' = 2.1\Omega$; $X_m = 86\Omega$. Find the stator current and input power when the motor is operating at a full load speed of 2820 r.p.m. 15

UNIT - III

6. Draw and explain phasor diagram of an alternator for (i) Lagging Load (ii) Leading load and (iii) Unity Power Factor. 15

7. What is voltage regulation ? Explain the Potier triangle method to determine the voltage regulation. 15

UNIT - IV

8. (a) Give the construction and principle of operation of a synchronous motor. 8
(b) Discuss the role of damper winding in synchronous motor. 7
9. Write a short note on : 15
(a) V-curve of synchronous motor
(b) Power angle curve

Roll No.

3097

**B. Tech. 4th Semester (EE)
Examination – May, 2026**

TRANSMISSION & DISTRIBUTION

Paper : PCC-EE-210-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Section. Question No. **1** is *compulsory*. All questions carry equal marks.

1. Compulsory questions :

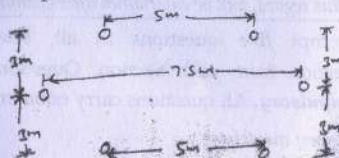
- (i) What is the present-day scenario of power system in India ? $3 \times 5 = 15$
- (ii) Explain proximity effect.
- (iii) Write down the concept of GMR.
- (iv) Write brief about the insulating material used in insulator.
- (v) How corona cause the radio interference ?

SECTION - A

2. Draw the layout of outdoor substation and explain the various component used in it. 15
3. Write short note on : 15
 - (a) Radial distribution system
 - (b) Interconnected distribution system

SECTION - B

4. Determine the inductance per phase of a double circuit three phase line as shown in figure below the transmission line is transposed within each circuit and each circuit remains on its own side the diameter of each conductor is 15 mm. Explain why we given arrangement is better as compared to when the conductor of the same phase are placed in this same horizontal plane. 15



5. Determine the efficiency and regulation of a three phase 100 KM, 50 Hz transmission line delivery 20 MW at a power factor of 0.8 lagging and 66 kV to a balanced load. The conductors are of copper each having resistance 0.1 ohm per km 1.5 CM outside dia. spaced equilateral 2 m between centers neglect leakage and use nominal π -method. 15

SECTION - C

6. Define string efficiency and derive the expression of string efficiency for 5 insulating discs in a string. 15
7. An overhead line has following data : 15

Span length 160 m connected, dia 0.95 cm, weight per unit length of the conductor 0.65 kg/meter, ultimate stress 425.0 kg per centimeter square, wind pressure 40 kg per meter square of projected area, factor of safety 5. Calculate the sag.

SECTION - D

8. How we can do the capacitance grading of cables in underground line ? 15
9. Determine the corona characteristics of a three-phase line 160 km long conductor, dia. 1.036 CM, 2.44 m delta spacing a temperature 26.67°, altitude 2440 m corresponding to an approximate barometer pressure of 73.15 cm operating voltage 110 KV at 50 Hz. 15

Roll No.

3098

**B. Tech. 4th Semester (EE)
Examination – May, 2026**

SIGNALS & SYSTEMS

Paper : PCC-EE-214-G

Time : Three hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any *five* questions, selecting *one* question from each Section. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) Define continuous-time and discrete-time signals, providing one example for each. $1.5 \times 10 = 15$
- (b) State the characteristics of even and odd signals.
- (c) Describe shifting and scaling operations on signals.
- (d) Explain the inter-relationships between unit impulse, unit step and unit ramp signals.
- (e) Define Fourier Transform (FT) and its conditions of existence.

3098-125(P-4)(Q-9)(26)

P. T. O.

- (f) Compare Discrete Time Fourier Transform (DTFT) with continuous-time FT.
- (g) State Parseval's theorem.
- (h) Name one analysis domain for first and second-order systems.
- (i) Define poles and zeros in system analysis.
- (j) Explain one property of Laplace Transform (LT) and one property of Z-transform (ZT).

SECTION - A

2. (a) Find the power and the rms value of the signal $x(t) = 5 \cos(\omega_0 t + \theta)$. 7
 (b) Differentiate between energy and power signals using suitable examples. 8
3. Give the mathematical expression and graphical representation of the following continuous-time and discrete-time signal : 15
 - (a) Unit step
 - (b) Unit impulse
 - (c) Ramp signal
 - (d) Exponential signals
 - (e) Signum function

3098- (P-4)(Q-9)(26) (2)

SECTION - B

4. What is convolution ? Explain time convolution and frequency convolution theorems. 15
5. Find the output $y(n)$ of a causal discrete-time LTI system which is characterised by the difference equation $y(n) - \frac{3}{4}y(n-1) + \frac{1}{8}y(n-2) = 2x(n)$ for input $x(n) = \left(\frac{1}{4}\right)^n u(n)$. 15

SECTION - C

6. Explain the analysis of first-order continuous-time systems in both time and frequency domains, focusing on the significance of poles and zeros. Provide an example. 15
7. Define system bandwidth and illustrate its determination using a first-order continuous-time low-pass filter. 15

SECTION - D

8. Explain the properties and theorems of Laplace Transform (LT) and its application in solving differential equations, emphasizing the concept of Region of Convergence (ROC). 15

3098- (P-4)(Q-9)(26) (3)

P. T. O.

9. Using partial fraction method, determine inverse Z-transform of following system given by : 15

$$X(z) = \frac{z(z^2 - 4z + 5)}{(z-1)(z-2)(z-3)}$$

For ROC being $|z| > 3$, $2 < |z| < 3$, $|z| < 2$.

SECTION - C

SECTION - D

Roll No.

3099

**B. Tech. 4th Semester (EE)
Examination – May, 2026**

ELECTROMAGNETIC FIELDS

Paper : PCC-EE-216-G

Time : Three hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Section. Question No 1 is *compulsory*. All questions carry equal marks.

1. (a) Define unit vectors in cylindrical and spherical coordinate systems. $10 \times 1.5 = 15$
(b) State Gauss's theorem and its significance.
(c) Define electric field intensity and its SI unit.
(d) What is the difference between electric potential and potential difference ?
(e) Explain conductors and dielectrics with examples.

3099-1200-(P-4)(Q-9)(26)

P. T.O.

- (f) What is the magnetic scalar potential ?
- (g) Define self-inductance and mutual inductance.
- (h) What is displacement current, and why is it necessary ?
- (i) Write the wave equation for plane electromagnetic waves in free space.
- (j) Define skin effect.

SECTION - A

- 2. (a) Explain vector addition, subtraction, and scalar & vector multiplications with examples. 7.5
- (b) Describe the concept of gradient, divergence, and curl with their physical significance. 7.5
- 3. (a) Prove that curl of a gradient of any scalar field is always zero. 7.5
- (b) Given a scalar field $\phi(x, y, z) = x^2 + y^2 + z^2$, find the gradient $\nabla\phi$ at $(1, -2, 3)$. 7.5

SECTION - B

- 4. (a) Derive an expression for electric field intensity due to a line charge distribution. 7.5
- (b) Explain the application of Gauss's law in finding the electric field due to a uniformly charged spherical shell. 7.5

3099- -(P-4)(Q-9)(26) (2)

- 5. (a) Derive Poisson's and Laplace's equations and discuss their applications. 7.5
- (b) Derive an expression for the capacitance of a two-wire transmission line. 7.5

SECTION - C

- 6. (a) Derive the expression for magnetic field intensity due to a long, straight current-carrying conductor using Biot-Savart law. 7.5
- (b) Derive an expression for magnetic field due to an infinite current-carrying solenoid. 7.5
- 7. (a) Define magnetization and permeability. How do they affect magnetic materials ? 7.5
- (b) Explain the concept of magnetic boundary conditions and derive the boundary conditions at an interface between two different magnetic materials. 7.5

SECTION - D

- 8. (a) Derive Maxwell's equations in integral and differential form. 7.5
- (b) Explain the concept of Motional Electromotive Force (EMF) with examples. 7.5

3099- -(P-4)(Q-9)(26) (3) P. T. O.

9. (a) Derive Explain Poynting Theorem and derive the expression for Poynting Vector. 7.5
- (b) Derive the wave equation for a conducting medium and explain the significance of lossy dielectrics. 7.5

Roll No.

3100

B. Tech. 4th Semester (EE)

Examination – May, 2026

**MATHEMATICS - III (NUMERICAL METHODS,
PROBABILITY AND STATISTICS)**

Paper : BSC-MATH-204-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Section. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) What is a divided difference table ? How is it useful ?
- (b) What is Crank Nicolson Method ? Why is it known as implicit method ?
- (c) Using Euler's method, find approximate value of y when $x = 1$ of $\frac{dy}{dx} = x + y$, $y(0) = 1$ (take $h = 0.2$)
- (d) Define forward differences and backward differences.

3100-2100-(P-4)(Q-9)(26)

P. T. O.

- (e) Find the probability distribution of the number of heads in three tosses of a coin
- (f) Write the finite difference approximations to partial derivatives in x and y directions.

SECTION - A

2. (a) Given $f(0) = -18$, $f(1) = 0$, $f(3) = 0$, $f(5) = -248$, $f(6) = 0$ and $f(9) = 13104$, find $f(x)$.

- (b) Evaluate $\int_0^6 \frac{1}{1+x^2} dx$ using :

- (i) Trapezoidal rule
(ii) Simpson's rule

3. (a) Given $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.7660$, $\sin 55^\circ = 0.8192$, $\sin 60^\circ = 0.8660$, find $\sin 62^\circ$.
- (b) Solve the non-linear equation $x \log_{10} x = 1.2$ by Newton Raphson Method.

SECTION - B

4. (a) Using Runge-Kutta method, compute $y(0.2)$ and $y(0.4)$ from $\frac{dy}{dx} = 3x + \frac{1}{2}y$, $y(0) = 1$
- (b) Using modified Euler's method, obtain a solution of the equation $\frac{dy}{dx} = 2 + \sqrt{xy}$, with initial conditions $y = 1$ when $x = 1$ at $x = 2$ in steps of 0.2.

3100-2100-(P-4)(Q-9)(26) (2)

5. Solve the elliptic equation $u_{xx} + u_{yy} = 0$ for the following square mesh with boundary values as shown :

	1		1	
0				0
0				0
	0		0	

SECTION - C

6. (a) In a bolt factory, there are four machines A, B, C, D manufacturing 20%, 15%, 25% and 40% of the total output respectively. Of their outputs 5%, 4%, 3% and 2% in the same order, are defective bolts. A bolt is chosen at random from the factory's production and is found defective. What is the probability that the bolt was manufactured by machine A or machine D?
- (b) Is the function defined as follows a density function?

$$f(x) = \begin{cases} e^{-x} & , x \geq 0 \\ 0 & , \text{otherwise} \end{cases}$$

If so, find $P(1 \leq X \leq 2)$

7. (a) Fit a normal curve to the following distribution :

x :	2	4	6	8	10
f :	1	4	6	4	1

3100-2100-(P-4)(Q-9)(26) (3)

P. T. O.

- (b) A manufacturer knows that the condensers he makes contain on an average 2% defective. He packs them in boxes of 100. What is the probability that a box selected at random will contain 3 or more defective condensers ?

SECTION - D

8. (a) In a hospital 475 female and 525 male babies were born in a week. Do these figures confirm the hypothesis that males and females are born in equal number.

- (b) Calculate the first moments of the following distribution about the mean :

x:	0	1	2	3	4	5	6	7	8
f:	1	8	28	56	70	56	28	8	1

9. A survey of 320 families with 5 children each revealed the following distribution :

No. of boys :	5	4	3	2	1	0
No. of girls :	0	1	2	3	4	5
No. of families :	14	56	110	88	40	12

Is this result consistent with the hypothesis that male and female births are equally probable ?