**B. Tech (EE), 4ᵗʰ Semester, (G-Scheme)
Examination, May–2024
BIOLOGY
Paper–BSC-BIO-201-G**

me allowed : 3 hours]   [Maximum marks : 75

ote : **Question number 1 is compulsory** and attempt **four**
more questions by selecting **one** question from each
unit. All questions carry equal marks.   (15 each)

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

(a)   Gene and genome

(b)   Mitosis & Meiosis

(c)   Functions Carbohydrate

(d)   Golden rice

(e)   Plasmid

(f)   Monoclonal antibodies

Unit-I

.   What is a cell? What are the differences between
prokaryotic and eukaryotic cells?   15

.   Write the short note on any **two** : $2 \times 7.5 = 15$

(a)   Importance of biology for engineers

(b)   Genetic code

(c)   Types of RNA & their functions

ACE Scanner

Unit-II

4. Write the short note on any **two** : $2 \times 7.5 =$

    (a) Cholesterol

    (b) Functions of DNA

    (c) Types of RNA & their functions

5. What are proteins? Describe their structure and function in detail.

Unit-III

6. Write the short note on any **two** : $2 \times 7.5 =$

    (a) Mechanism of gene cloning

    (b) Restriction enzymes

    (c) Transgenic animal

7. What is the importance of gene cloning in the modern era of sciences?

Unit-IV

8. Write the short note on : $2 \times 7.5 =$

    (a) Biotech in medicine

    (b) Biotech in sewage treatment

9. What is biotechnology? What are pre-requirements for biotechnology ?

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B. Tech. (EE) 4th Semester G-Scheme

Examination, May–2024

DIGITAL ELECTRONICS

Paper-PCC-EE-202G

Time allowed : 3 hours]   _[Maximum marks :75_

Note : **Question No. 1 is compulsory.** _Attempt any one question from each section._

(a) Write the simplification of the Boolean expression
$$\overline{\overline{(AB\overline{C})}} + \overline{(A\overline{B}C)} .$$

(b) Represent $(32)_{10}$ in excess 3 code.

(c) Build a half adder circuit with the help of 1 EX-OR and 1 AND gate.

(d) Define decoder.

(e) How many flip flops are required to construct a decade counter?

(f) What is programmable logic array? How it differs from ROM?

(g) How many address bits are required to represent a 32 K memory.

(h) What will be the output of SR flip flop when S=1, R=0?

   (i)   How many two-input AND and OR gates 3

       required to realize Y=CD+EF+G?

   (j)   Convert, $(131.F2)_{16} = ( )_{10}$

$1\frac{1}{2} \times 10$

Section-A

2.   (a) Compare :

       (i)   MOS and CMOS IC logic families

       (ii) TTL and ECL IC logic families.

   (b) (i)   Perform 2's complement subtraction of
          $(7)_{10} - (11)_{10}$

       (ii) Find the hex sum of $(93)_{16} + (DE)_{16}$

3.   (a) What are Universal gates? Implement all ba
       gates using universal gates.

   (b) (i)   Determine b if $(193)_b = (623)_8$

       (ii) Convert $(234.02)_5$ to decimal

Section - B

4.   (a) Design a 8 to 1 multiplexer by using the fou
       variable function given by.   1

   (b) $F(A,B,C,D) = \Sigma m(0,1,3,4,8,9,15)$

5.   Discuss in detail, the working of full adder logic circui
    and extend your discussions to explain a binary adder
    which can be used to add two binary numbers.   1:

Section-C

6. Using D-flip flop and waveforms explain the working of a 4-bit SISO shift register.   15

7. (a) With relevant diagram, explain the working of master-slave JK flip flop.   10

   (b) Write short note on Johnson counter.   5

Section-D

8. (a) With the help of neat diagram, explain the working of a successive approximation A/D converter.   10

   (b) Compare memory devices RAM and ROM.   5

9. (a) Explain binary weighted resistor method of D/A converter.   10

   (b) What is programmable logic array?   5

B. Tech. 4th Semester (EE) G-Scheme
Examination, May–2024
ELECTRICAL MACHINES-II
Paper-PCC-EE-206G

Time allowed : 3 hours]   *[Maximum marks : 75*

Note : *Question 1 is compulsory. Attempt five questions in total selecting **one** question from each unit.*

1.   (a)   Why an indcution motor will never run at its synchronous speed?

       (b)   Why rotor bar are skewing in an induction motor?

       (c)   Discuss principle of reluctance motor.

       (d)   Differentiate single layer and double layer winding.

       (e)   List various methods to determine the voltage regulation of an alternator.

       (f)   Why is the field system of an alternator made as a rotor?

       (g)   Demonstrate the conditions to be satisfied for parallel operation of an alternator.

       (h)   Define pullout torque.

       (i)   Classify to types of an induction motor.

       (j)   Distinguish between transient and sub-transient reactances.

                             $10 \times 1.5 = 15$

Unit–I

2.   Derive an expression for development of rotating magnetic field in three phase induction motor.   15

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3. (a) Explain the torque-slip characteristic of 3-phase induction motor.

(b) Discuss double cage and deep bar motor. 7

Unit–II 8

4. Explain various methods of speed control of 3-phase induction motor.

15

5. A 2-pole, 240V, 50Hz, single-phase indcution 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 for resistive, inductive and capacitive load of an alternator.

15

7. (a) Discuss output power equation of a synchronous generator.

8

(b) Explain about power-angle curve of synchronous generator.

7

Unit–IV

8. What is the need for parallel operation of an alternator? Also discuss briefly methods of synchronization. 15

9. Write a short note on :

15

(a) V-curve of synchronous motor

(b) Role of damper winding in synchronous motor

B. Tech. (EE) 4th Semester G-Scheme
Examination, May–2024
TRANSMISSION AND DISTRIBUTION
Paper-PCC-EE-210-G

Time allowed : 3 hours]   · [Maximum marks : 75

Note : **Question No.1 is compulsory.** Attempt any one question from each section.

1. (a) What are the advantages of Interconnected system?

   (b) Define feeder and Distributor.

   (c) State the applications of HVDC transmission.

   (d) What is Ferranti effects?

   (e) Enlist the methods that are used for improving string efficiency.

   (f) Define Proximity effect.

   $6 \times 2.5 = 15$

Section-A

2. (a) Write short note on the equipment's used in substations.   8

   (b) Differentiate between indoor and outdoor substation.   7

3. Explain the following of DC distributor: 15

   (i) Distributor fed at one end.

   (ii) Distributor fed at both end.

   (iii) Distributor fed at centre.

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Section-B

4. Derive the expression for calculating internal and external flux linkage for a current carrying conductor. Use these expressions to derive the equation for inductance of single phase transmission line.

    15

5. A three phase, 50Hz, 132 kV overhead transmission line consisting of three conductors placed in a horizontal plane 4m apart. Conductor diameter is 2 cm. If the line length is 100 km, calculate the charging current per phase assumping complete transposition.

    15

Section-C

6. (a) Explain the various types of insulators used in Overhead transmission lines.

    10

   (b) Explain how electrical breakdown can occur in an insulator.

    5

7. (a) Explain Sag template? How it is used for location of towers and stringing of power conductors. 10

   (b) A 132 kV transmission line has the following parameters: weight of conductor is 680kg/km, length of span is 260m, overall strength is 3100 kg, and safety factor is 2. Find the height above earth at which the conductor needs to be supported. Required earth clearance is 10 m.

    5

Section-D

8. Explain the methods of grading of cables with neat diagram and equations.

    15

9. Define corona loss and explain following with respect to it :(i) Effects (ii) disruptive critical voltage (iii) Visual disruptive voltage (iv) Corona power loss. Also explain the interference with the neighboring communication circuits.

    15

B. Tech. (EE) 4th Semester G-Scheme
Examination, May–2024
SIGNALAND SYSTEMS
Paper-PCC-EE-214G

Time allowed : 3 hours]   [Maximum marks : 75

Note : **Q. No. 1 is compulsory. Attempt five questions in all taking one question from each section.**

1. (a) Explain the properties of Delta function.   2.5

    (b) Explain the relationship between unit ramp and delta function.   2.5

    (c) What is the condition for the existence of Fourier transform.   2.5

    (d) What is the region of convergence?   2.5

    (e) Explain the s to z plane mapping.   2.5

    (f) Explain the relationship between z transform and Fourier transform.   2.5

Section-A

2. (a) Explain the classification of signals with examples.   10

    (b) Check $x(t) = e^{-at}$ is periodic or nonperiodic.   5

3. (a) Explain the following system :   8

        (i) Causal and non causal system.

        (ii) Linear time variant and Invariant system

    (b) Sketch the signal $x(t) = A\sin t$ for $-\infty < t < \infty$. Also check it is a power signal or an energy signal.   7

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(2)

Section - B

4. Explain and prove the properties of DTFT.

5. (a) Discuss the relationship between LT and FT.
    (b) Explain the application of fourier transform.

Section-C

6. Derive an expression for first order and second order continuous time system.

7. (a) Find the pole and zero plot for the signal x(n)= u(n).
    (b) Explain in brief the concept of system bandwidth with the help of an example.

Section-D

8. (a) Evaluate the Laplace transform of $x(t)=e^{at} u(t)$
    (b), Explain and prove the properties of LT (any four)

9. Using the Z Transform method, solve the different equation $y(n+2)-\dfrac{3}{2}y(n+1)+\dfrac{1}{2}y(n)=\left(\dfrac{1}{4}\right)^{n}$ with initial conditions $y(0)=10$ and $y(1)=4$.

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B. Tech. (EE) 4ᵗʰ Semester G-Scheme Examination, May–2024

ELECTROMAGNETIC FIELDS

Paper-PCC-EE-216G

Time allowed : 3 hours]　　　　　*[Maximum marks : 75*

Note : ***Question No.1 is compulsory.*** *Attempt any* **one** *question from each section.*

1. (a) Define characteristics impedance.

   (b) Define :
      (i) Dipole moment
      (ii) Relative dietlectric constant

   (c) Define Divergence theorem.

   (d) What is magnetic vector potential?

   (e) What are Poisson's and Laplace's equation?

   (f) Define Biot-Savart's Law.

   　　　　　　　　　　　　　　$6\times2.5=15$

Section-A

2. Given vector $A = y\hat{a}_x + (x+z)\hat{a}_y$ in cartesian coordinate system at point $(-2,6,3)$. Convert the vector A with cylindrical and spherical coordinates. 　15

3. (a) With neat diagrams, explain cylindrical system with coordinates $(\rho,\Box,z)$. Also find line, surface and volume integral for it. 　10

   (b) State and prove Stoke's theorem. 　5

Section-B

4. Describe boundary conditions of electrostatic field for two different perfect dielectric media. 　15

5. (a) Derive relationship between polarization and electric field intensity.

(b) Derive equation for electrostatic energy density. The point charges-1nC, 4nC, and 3nC care located at (0,0,0), (0,0,1) and (1,0,0), respectively. Find the energy in the system. 10

Section-C

6. Derive and explain Force equations due to magnetic fields. 15

7. (a) State and explain Ampere's circuital law. Describe two applications of this law. 10

(b) Define inductance and derive an expression for inductance for a solenoid. 5

Section-D

8. Derive Maxwell's equation from electrostatic and magneto static field. 15

9. (a) Describe plane wave reflection. 15

(b) Derive poynting vector and state its significance. 15

B.Tech. 4th Semester (EE)(G-Scheme)
Examination, May-2024

MATHEMATICS-III

Paper : BSC-MATH-204 G

Numerical Methods Probability and Stats

Time allowed : 3hours]   [Maximum marks : 75

Note: Question 1st is compulsory. Attempt total **five** questions with selecting **one** question from each section. All questions carry equal marks.

1. (a) Define Interpolation and Lagrange's polynomial.   6×2.5

   (b) Evaluate
   $$\Delta^4(1-x)(1-2x)(1-3x)(1-4x)$$

   (c) Discuss the rate of convergence of Newton Raphson Method.

   (d) State Simpson's $\frac{3}{8}th$ Rule.

   (e) Find by Taylor's series method, the value of y at $x = 0.1$ and $x = 0.2$ from
   $$\frac{dy}{dx} = x^2y - 1, y(0) = 1$$

   (f) What is difference between initial value problem and final value problem ?

   Section–A

2. (a) Find a real root of the equation $3x = \cos x + 1$ by false-position Method correct to four decimal places.

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(b) Given the values

x :	300	304	305	3
$\log_{10} x$:	2.4771	2.4829	2.4843	2.4

Evaluate $\log_{10} 310$ by using

(i) Lagrange's formula

(ii) Newton's divided difference form

3. (a) Evaluate $\int_0^1 \frac{dx}{1+x}$ using

(i) Trapezoidal rule taking $h = \frac{1}{4}$

(ii) Simpson's rule taking $h = \frac{1}{6}$

(b) From the following table, estimate number of students who obtained m between 40 and 45 :

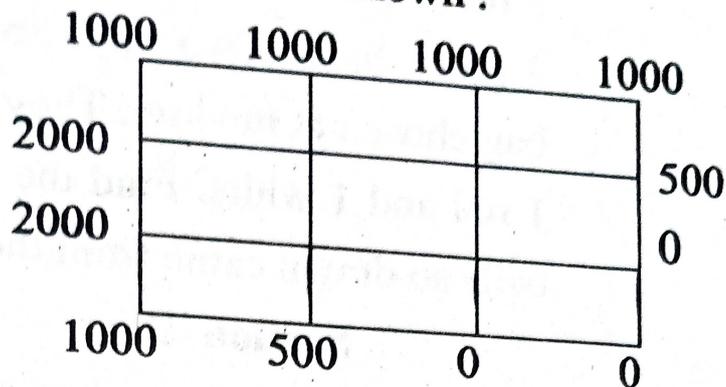| Marks :	30-40	40-50	50-60	60-70	70-
No. of students :	31	73	124	35	3

Section–B

4. (a) Using modified Euler's method, obtain solution of the equation $\frac{dy}{dx} = \log(x +$ with initial conditions $y = 2$ at $x =$ at $x = 1.2$ and 1.4 in steps of 0.2.

(b) Using Runge-Kutta method, comp $y(0.2)$ and $y(0.4)$ from

$$10\frac{dy}{dx} = x^2 + y^2, y(0) = 1$$

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


```
        1000    1000    1000    1000
2000    ┌───────┬───────┬───────┐
        │       │       │       │  500
2000    ├───────┼───────┼───────┤
        │       │       │       │  0
1000    └───────┴───────┴───────┘
        1000    500     0       0
```

Section–C

6. (a) Two unbiased dice are thrown together at random. What is the expected value of sum of the numbers shown by the two dice ?

(b) The probability that a bomb dropped from a plane will strike the target is 1/5. If six bombs are dropped, find the probability that

(i) Exactly two will strike the target

(ii) At least two will strike the target

7. (a) Fit a binomial distribution for the following data and compare the theoretical frequencies with the actual ones :

x :	0	1	2	3	4	5
f :	2	14	20	34	22	8

(b) There are three bags : first containing 1 white, 2 red, 3 green balls : second 2 white, 3 red, 1 green balls and third 3 white, 1 red, 2 green balls. Two balls are drawn from a bag chosen at random. They are found to be 1 red and 1 white. Find the probability that balls so drawn came from the second bag.

Section–D

8. (a) A sample of 18 items has a mean 24 units and standard deviation 3 units. Test the hypothesis that it is a random sample from a normal population with mean 27 units.

   (b) How will you measure kurtosis of a distribution ? How does it differ from skewness ?

9. Two independent samples of 8 and 7 items respectively had the following values of the Variable (weight in ounces) :

   Sample I :   9 11 13 11 15 9 12 14

   Sample II : 10 12 10 14 9 8 10

   Is the difference between the means of the sample significant ?