B.Tech. (EE) 4th Semester (G Scheme)
Examination, July–2022
ELECTRICAL MACHINES-II
Paper– PCC-EE-206-G

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

Note : ***Question No. 1 is compulsory.*** *Attempts **five** questions in total selecting **one** question from each unit.*

1. (a) Discuss any two methods of starting of synchronous motor.

   (b) What is meant by plugging?

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

   (d) Discuss principle of stepper motor.

   (e) Why an induction motor will never run at its synchronous speed?

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

   (g) Briefly discuss the role of damper winding in synchronous motor.

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

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

   (j) Briefly discuss the principle of shaded pole motor. 1.5×10=15

Unit - I

2. (a) Define field speed, rotor current and power factor of a three phase induction motor. 8

   (b) Explain three modes of operation of 3-phase induction motor. 7

3. Explain briefly various speed control schemes of 3-phase induction motor. 15

Unit - II

4. Explain various methods of starting of a 1-phase induction motor. 15

5. A 2-pole, 240V, 50Hz, single-phase induction motor has the following constants referred to stator: R_1=2.2Ω, X_1= 3.0Ω, R'_2= 3.8Ω, X'_2=2.1Ω, X_m=86Ω. 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. (a) Derive an expression for coil span factor and distribution factor. 8

   (b) Draw and explain phasor diagram for inductive and capacitive load of an alternator. 7

7. (a) Explain the procedure for Potier triangle method to calculate the voltage regulation of alternator. 7

   (b) A three phase star connected alternator on open

circuit is required to generate a line voltage of 3600V at 50 Hz when driven at 500 r.p.m. The stator has 3 slots per pole per phase and 10 conductors per slot. Calculate (i) the no. of poles and (ii) useful flux per pole. Assume all the conductors per phase to be connected in series and coils to be full-pitch. 8

Unit - IV

8. What are the necessary conditions for parallel operation of an alternator? Also discuss dark-bright lamp method for synchronization 15

9. Write a short note on:

   (a) Power-angle curve

   (b) Synchronous condensor 15

B.Tech. (E.E.) 4th Semester (G-Scheme)
Examination, July–2022
ELECTROMAGNETIC FIELDS
Paper– PCC-EE-216-G

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

Note : *Attempt five questions in total, selecting at least one from each section.* ***First Question is compulsory.***

1. (a) Write about the magnetic vector potential. 6×2.5

(b) State Biot-Savart,s law.

(c) What is divergence of Curl of a vector?

(d) Explain the skin effect.

(e) Differentiate between scaler field and vector field. Give examples.

(f) What is Ampere's law?

Section - A

2. Transform Vector $A = y\,\hat{a}_x + (x+z)\,\hat{a}_y$ into spherical co-ordinate system. Also evaluate its value at P(–2, 6, 3) 15

3. (a) Describe the gradient of a scaler field. 7.5

(b) Differentiate between linear / elliptical and circular polarization. 7.5

Section - B

4. (a) Define dielectric - dielectric boundary conditions. 7.5

   (b) Derive the Maxwell's curl equation for time varying electric fields. 7.5

5. (a) Develop an expression for the potential difference at any point between spherical shells in terms of the applied potential employing Laplace's equation. 7.5

   (b) Define electrostatic energy and electric density. 7.5

Section - C

6. Write notes on:- 15

   (i) Magnetic boundary Conditions.

   (ii) Point form of Maxwell's equation.

7. Write notes on:- 15

   (i) Force on a differential current element.

   (ii) Magnetic circuits.

Section - D

8. (a) Write Maxwell's equation in time varying fields and give their interpretation. 7.5

   (b) State Poynting theorem. 7.5

9. Write notes on:- 15

   (i) Electromagnetic waves.

   (ii) Wave equation in phasor form.

B.Tech. (EE) 4th Semester (G-Scheme)
Examination, July–2022
DIGITAL ELECTRONICS
Paper– PCC-(EE-202-G)

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

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

1. (a) Find the decimal equivalent of the following binary numbers assuming sign magnitude representation of binary numbers 6×2.5

(i) 101100 (ii) 1111

(b) Represent the following numbers in one's compliment form

(i) 11010100 (ii) 10010100

(c) Find two's compliment of the numbers

(i) 01100100 (iii) 11011000

(d) Explain half subtractor.

(e) What do you mean by Don't care condition?

(f) Explain D-type flip-flop.

Unit - I

2. Explain operation of Schottky TTL. 15

3. Formulate 8-bit ASCII code for 'My dear Surender' and represent it in hexadecimal code with (i) Even parity (ii) Odd parity

Unit - II

4. Minimise the logic function in POS form as: 15

$f(A, B, C, D) = \Pi M (4, 6, 10, 12, 13, 15)$

5. Simplify the Logic function 15

$Y(A,B, C, D) = \Sigma M(0, 1, 3, 7, 8, 10, 11, 15)$

Using the Quine - McCluskey minimization technique.

Unit - III

6. (a) Explain parallel to serial converter. 7

(b) What are the applications of converters. 8

7. Explain clocked S-R Flip-Flop. 15

Unit - IV

8. (a) Explain successive approximation A/D converter. 10

(b) What do you man by CAM. 10

9. (a) Explain parallel comparator A/D converter. 10

(b) Discuss programmable array logic. 5

3100

B. Tech (EE) 4th Semester (G. Scheme)
Examination, July–2022
MATHEMATICS-III
(Numerical Methods Probability and Statistics)
Paper code : BSC-MATH-204-G

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

Note: *Attempt **five** questions in total by selecting **one** question from each unit. **Question no. 1 is compulsory.***

1. (a) Define interpolation.

(b) Write Newton's backward difference formula.

(c) State Simpson's $\frac{1}{3}$rd rule.

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

(e) Explain Euler's method for solution of ordinary differential equations.

(f) Write two dimensional Laplace equation.

(g) State Baye's theorem.

(h) Define discrete random variables.

(i) Define Kurtosis.

(j) Define Hypothesis testing.

Unit-I

2. Find a root of $x^3-3x+1=0$, by using :

   (i) Bisection Method

   (ii) Newton's Raphson Method

3. Given the values :

x :	5	7	11	13	17
$f(x)$	150	392	1452	2366	5202

Evaluate $f(9)$, using Lagrange formula.

Unit-II

4. Using Runge-Kutta Method, solve $\frac{dy}{dx} = \frac{y^2-x^2}{y^2+x^2}$ with $y(0)=1$ at $x = 0.2, 0.4$

5. Solve the partial differential equation :

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = -10\,(x^2+y^2+10)$$

over the square with sides $x = 0 = y$, $x = 3 = y$ with $u = 0$ on the boundary and mesh length = 1.

Unit-III

6. Describe the following in short :

   (i) Binomial distribution

   (ii) Poisson distribution

7. Write detail note on continuous distribution functions and densities.

Unit-IV

8. Write detail note on hypothesis testing with the help of various test.

9. Explain Chi-Square Test for goodness of fit and independence of attributes in detail.

B.Tech. (EE) 4th Semester (G-Scheme)
Examination, July–2022
BIOLOGY
Paper– BSC-BIO-201-G

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

Note : ***Question No. 1 is compulsory*** *and attempts* ***four*** *more questions by selecting* ***one*** *question from each unit. All questions carry equal marks (15 each).*

1. Write the short notes on the following. 6×2.5=15

(a) Difference between plant & animal cells

(b) Phenotype and Genotype

(c) Adaptor and linker

(d) Cholesterol

(e) Monoclonal antibody

(f) Indicator plants

Unit - I

2. What are organisms? Detail description of the characteristic feature of a living organism? 15

3. Write the short note on any *two*: 2×7.5=15

(a) Gene interaction

(b) Mendel's laws of inheritance

(c) Cell cycle

Unit - II

4. Write the short note on any *two*: 2×7.5=15

   (a) Carbohydrates

   (b) Types of RNA

   (c) Functions of proteins

5. What are lipids? Describe the structure and functions of lipids in detail. 15

Unit - III

6. Write the short note on any *two*: 2×7.5=15

   (a) Restriction enzymes

   (b) Transgenic plants

   (c) Transgenic animal

7. What are the cloning vectors? Describe properties, functions of various types of cloning vectors? 15

Unit - IV

8. Write the short note on 2×7.5=15

   (a) Production and uses of therapeutic agents

   (b) Biotech in sewage treatment

9. What is Biotechnology? What is the importance of Biotechnology in the modern era of sciences? 15

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

Examination, July–2022

SIGNALS AND SYSTEMS

Paper– PCC-EE-214-G

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

Note: *Attempt **five** questions in all, selecting **one** question from each Unit (I, II, III, & IV). **Question no. 1 is compulsory.** All questions carry equal marks.*

1. (a) Define Unit Ramp function. 2.5

(b) What is meant by duality in DTFT? 2.5

(c) What are the conditions for the existence of Fourier Transform? 2.5

(d) Define Filter. What are the types of Filter? 2.5

(e) Define Region Of Convergence (ROC). 2.5

(f) What is meant by unilateral Laplace Transform? 2.5

Unit-I

2. Define signal. Explain in detail the classification of signals with examples. 15

3. (a) Explain the following operations for independent variable of a signal:

(i) Time shifting

(ii) Time scaling

(iii) Time reversal 8

(b) Determine whether the given signal is energy signal or power signal and calculate their energy or Power.

$x(t) = \cos^2\omega_o t$ 7

Unit-II

4. (a) What is Fourier transform? Find the Fourier transform of an impulse function. Also draw spectrum. 7

$x(t) = \delta(t)$

(b) What is Convolution? Explain time-convolution and frequency-convolution theorems of CTFT. 8

5. (a) State and prove time-shifting property of DTFT. 8

(b) Explain the difference between CTFT and DTFT. 7

Unit-III

6. (a) Explain the magnitude-phase representation of the frequency response of linear-time invariant System. 7

(b) Explain the time-domain properties of ideal frequency selective filters. 8

7. Explain in detail block diagram representation for Discrete-time LTI system. 15

Unit - IV

8. (a) A damped sine wave is given by

$f(t) = e^{-at} \text{ Sin } \omega t$

Find Laplace Transform of this signal. 7

(b) Write short notes on:

(i) Condition of existence: convergence of Laplace Transform.

(ii) Relationship between Laplace and Fourier Transform. 8

9. (a) Using partial fraction method, determine inverse Z-transform of following system given by

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

For ROC being $|z|>3$, $2<|z|<3$, $|z|<2$. 8

(b) Find the Z-transform of discrete-time unit impulse $\delta[n]$. 7

B.Tech. (EE) 4th Semester (G Scheme)
Examination, July–2022
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) Why glass insulators cannot be used above 50Kv?

(b) What is the value of GMR of a conductor having radius r?

(c) List the advantages of using bundled conductor.

(d) What is skin effect and on what factors does it depend?

(e) Explain String efficiency.

(f) Define Surge impedance loading. 6×2.5=15

Section-A

2. Draw and explain structure of modern power system with typical voltage levels. 15

3. Compare different distribution systems with respect to the volume of conductor material used. 15

Section-B

4. (a) Derive the expression for flux linkages and inductance inside and outside the conductor producing flux. 10

(b) Discuss Proximity effect. 5

5. Classify transmission line on the basis of their length. Explain their characteristics as well. 15

Section-C

6. In a 33 kV overhead line, there are three units in the string of insulators. If the capacitance between each insulator pin and earth is 11% of self capacitance of each insulator, find the distribution of voltage over 3 insulators and sting efficiency. 15

7. (a) Obtain an expression for the sag of a transmission line supported by towers of same height at the ends. 10

(b) Discuss the role of equalizer ring. 5

Section-D

8. What is Corona in power system and What are the factors affecting corona loss? Discuss them briefly. What are the methods of reducing corona loss? Discuss the advantages and disadvantages of corona. 15

9. (a) What is the principle of HVDC system operation? Discuss the technical and economical advantages of dc system over ac system. 10

(b) Describe Grading of cables. 5