

Roll No.

3096

B. Tech. 4th Semester (EE)

Examination – July, 2021

ELECTRICAL MACHINES-II

Paper : PCC-EE-206-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 : Question No. 1 is *compulsory*. Attempt *four* more questions by selecting *one* question from each Section.

1. (a) Mention the undesirable effects produced by certain combination of rotor and stator slots.
- (b) What is synchronizing power in alternators ?
- (c) What is the role of damper winding in synchronous motor ?
- (d) Why wound rotor construction is adopted ?
- (e) Define cogging.
- (f) Why synchronous motor is not self-starting ?

$2.5 \times 6 = 15$

SECTION - A

2. (a) Describe mathematically development of rotating magnetic field in 3-phase induction motor. 10
(b) State difference between squirrel cage and slip ring induction motor. 5
3. Draw and explain the equivalent circuit of 3-phase induction motor. 15

SECTION - B

4. Why single phase induction motor is not self-starting while three-phase IM is self-starting? Describe starting methods used for single-phase IM. 15
5. What are the various methods of speed control of IM? Explain Slip power recovery speed control method of IM. Mention advantages and disadvantages of rotor resistance method. 15

SECTION - C

6. Define voltage regulation of an alternator. Describe Potier method of determining regulation of an alternator. 15
7. (a) A 4-pole, 50 Hz, star connected alternator has 15 slots per pole and each slot has 10 conductors. All the conductors of each phase are connected in

3096- (P-3)(Q-9)(21) (2)

series and the winding factor being 0.95. When running on no-load for a certain flux-per-pole, the terminal e.m.f. was 1825 volt. If the winding are lap-connected as in d.c. machine, what would be the e.m.f. between the brushes for the same speed and the same flux/pole? Assume sinusoidal distribution of flux. 10

(b) Define pitch factor and distribution factor. 5

SECTION - D

8. What are the conditions that must be satisfied for parallel operation of Alternators? Derive voltage and current equations for parallel operation of 2 alternators. 15
9. Write short note on : 15
- (a) Damper winding.
 - (b) Synchronous condenser.
 - (c) Applications of synchronous motor.

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Roll No.

3018

**B. Tech. 4th Semester (EE)
Examination – July, 2021**

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 Number 1 is *compulsory*. All questions carry equal marks.

1. Write the short notes on the following : $1.5 \times 10 = 15$

- (a) Father of biology
- (b) Central Dogma
- (c) Gene
- (d) Allele

- (e) Enzyme
- (f) Starch
- (g) Glycoprotein
- (h) Cholesterol
- (i) Clone
- (j) Golden rice

UNIT - I

2. What is biology ? Why should an engineer study biology ? 15

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

- (a) Cell theory
- (b) Mendel's laws of inheritance
- (c) Economic importance of microorganism

UNIT - II

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

- (a) Amino acids
- (b) Structure and function of lipids
- (c) Types and function of RNA

3018-1500-(P-3)(Q-9)(21) (2)

5. What is nucleic acid ? Describe the Watson and Crick model of DNA in detail. 15

UNIT - III

6. Write the short notes on : 7.5 × 2 = 15

- (a) Restriction enzymes
- (b) Steps of gene cloning

7. What are the transgenic animals ? What is the importance of transgenic animals in modern era ? 15

UNIT - IV

8. Write the short notes on : 7.5 × 2 = 15

- (a) Enzyme technology
- (b) Role of biotech in medicine

9. What is Biotechnology ? What are pre-requirements for the biotechnology ? 15

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Roll No.

3098

B. Tech. 4th Semester (EE)

Examination – July, 2021

SIGNALS AND 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 five questions in all, selecting one question from each unit (I, II, III & IV). Question Number 1 is compulsory. All question carry equal marks.

- ✓ (a) Define Delta function. 2.5
- (b) What is meant by convolution property in DTFT ? 2.5
- (c) State the properties of Fourier Transform of a discrete-time aperiodic sequence. 2.5
- (d) Write the limitations of Fourier Transform. 2.5
- (e) State the methods to find inverse Z-transform. 2.5
- (f) What is meant by bilateral Laplace Transform ? 2.5

UNIT - I

2. Give the mathematical expression and graphical representation of the following continuous-time and discrete-time signal: 15

- (i) Unit Step
- (ii) Unit impulse
- (iii) Exponential signal
- (iv) Signum function
- (v) D.C. signal

3. (a) Explain Energy and Power signal with the help of example. 8

(b) Determine whether the given signal is energy signal or power signal and calculate their energy or Power. 7

$$x(t) = \text{rect}(t/T_0) \cos \omega_0 t$$

UNIT - II

4. (a) What is inverse Fourier transform? Find the inverse Fourier transform of $\delta(\omega)$. Also draw spectrum. 7

(b) State and prove Parseval's theorem for Energy signal of CTFT. 8

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

(b) State and explain Sampling theorem. 7

UNIT - III

6. (a) Explain the frequency response of linear-time invariant system. 7

(b) Explain the time-domain and frequency-domain aspects of non-ideal filters. 8

7. Explain and evaluate second order continuous-time LTI system. 15

UNIT - IV

8. (a) A damped sine wave is given by: 7

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

Find Laplace Transform of this signal.

(b) Drive Initial value and Final value theorem. 8

9. (a) Determine the Z-transform of the discrete-time signal. Also find the ROC. 7

$$x(n) = 2^n u(n) + 3(1/2)^n u(n)$$

(b) Define Region of convergence of Z-transform and explain its properties. 8

Roll No.

3095

**B. Tech. 4th Semester (EE)
Examination – July, 2021**

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 : Question No. 1 is *compulsory*. Attempt *four* more questions, selecting *one* question from each Section.

1. (a) De-Morganize the following function $[(A + B') + (C + D)']$. 1.5 × 10 = 15
- (b) Represent $(32)_{10}$ in excess 3 code.
- (c) Realize AND gate using NAND.
- (d) Define encoder.
- (e) What is the Gray equivalent of $(25)_{10}$.
- (f) What is programmable logic array ? How it is differs from ROM ?

(g) How many address bits are required to represent a 4 K memory ?

(b) For JK flip-flop if, J = 0, K = 1, what will be the output after clock pulse ?

(f) How many two input AND gates and two input OR gates are required to realize $Y = BD + CE + AB$?

(j) Write the decimal equivalent of hex number 1A53

SECTION - A

2. (a) Give comparison between various logic families. 10

(b) Draw and give truth table of following gates : 5

(a) EX-OR

(b) AND

(c) OR

(d) NOR

(e) NAND

3. (a) Write in detail about various error detecting and correction codes. 10

(b) Using Boolean algebra, reduce the following functions : 5

(i) $y = A\bar{B}C + B\bar{D} + AB\bar{D} + \bar{A}C$

(ii) $y = [(A + B)(\bar{A} + B)] + [(A + B)(A + \bar{B})]$

SECTION - B

4. (a) What is half adder ? Explain a half adder with the help of truth table and logic diagram. 10

(b) Use K-map to simplify each expression : 5
 $Y = (AC + A\bar{C}D)(AD + AC + BC)$

5. (a) What is De-multiplexer ? Explain, with the help of suitable block diagram and logic circuit of 1 to 16 de-multiplexer. 10

(b) Implement the function $F(x, y, z) = \Sigma(1, 2, 6, 7)$ using 4×1 multiplexer. 5

SECTION - C

6. (a) What is synchronous counter ? Design a MOD-5 synchronous counter using J-K flip flop. 10

(b) Explain working of serial in serial out shift register. 5

7. (a) Draw the circuit diagram of Master Slave J-K flip flop using NAND gates. What is the race around condition ? How is it eliminated in a Master slave J-K flip flop ? 10

(b) What is shift register ? What are its various types ? List out some applications of shift register. 5

Roll No.

3099

B. Tech. 4th Semester (EE)

Examination – July, 2021

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 (A, B, C & D). Question Number 1 is *compulsory*. All question carry equal marks.

1. (a) What are the uniform plane waves ? $2.5 \times 6 = 15$
(b) Define skin depth.
(c) What is Brewster angle ?
(d) What is the difference between irrotational field and the solenoidal field ?
(e) What is the net effect (on D) of applying electric field to a dielectric ?
(f) Prove :

$$\nabla \cdot (\nabla \times H) = 0$$

SECTION - A

2. Transform the vector $4\hat{a}_x - 2\hat{a}_y - 4\hat{a}_z$ into spherical and cylindrical coordinates at point $(-2, -3, 4)$. 15
3. (a) With neat diagrams, explain Spherical system with coordinates (r, θ, ϕ) . Also find line, surface and volume integral for it. 10
- (b) State and prove Divergence theorem. 5

SECTION - B

4. Given the potential $V = \frac{10}{r^2} \sin\theta \cos\phi$: 15
- (a) Find electric flux density D at $(2, \pi/2, 0)$.
- (b) Calculate work done in moving a $10 \mu\text{C}$ charge from point A $(1, 30^\circ, 120^\circ)$ to B $(4, 90^\circ, 60^\circ)$.
5. (a) Explain Gauss law of Electrostatic and describe few applications of Gauss's Law. 10
- (b) Derive relationship between polarization and electric field intensity. 5

SECTION - C

6. Describe boundary conditions of magneto static field for two different magnetic media. 15

3099-1500-(P-3)(Q-9)(21) (2)

7. (a) Derive the expression for energy stored in magnetic field. 5

(b) Define magnetic vector potential and derive an expression for vector potential due to long wire of small circular cross section carrying the current of 1 ampere. 10

SECTION - D

8. Derive Maxwell's equation from electrostatic and magneto static field. 15
9. What do you understand by electromagnetic waves ? Explain wave propagation in lossy dielectrics and derive wave equations for the same. 15

3099-1500-(P-3)(Q-9)(21) (3)

Roll No.

3100

**B. Tech. 4th Semester (EE)
Examination – July, 2021**

**MATHEMATICS-III (Numerical Methods, Probability &
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 Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) State Regula-Falsi method.
- (b) Write Newton's forward difference formula.
- (c) Write Trapezoidal rule of numerical integration.
- (d) Define transcendental equation.

(e) Explain Taylor's series method for ordinary differential equations.

(f) Write one dimensional heat equation.

(g) Define conditional probability.

(h) Define discrete random variables.

(i) Define skewness.

(j) Define hypothesis.

UNIT - I

2. Find the positive root of $x^3 - 2x - 5 = 0$ by:

(i) Bisection method

(ii) Newton's method

3. Given the values:

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

Evaluate $f(9)$, using Newton's divided difference formula.

3100-1500-(P-4)(Q-9)(21) (2)

UNIT - II

4. Apply Runge-Kutta method to find an approximate

value of y for $x = 0.2$ in steps of 0.1, if $\frac{dy}{dx} = x + y^2$,

given that $y = 1$, where $x = 0$.

5. Solve the Poisson equation:

$$U_{xx} + U_{yy} = -81xy, \quad 0 < x < 1, \quad 0 < y < 1$$
 given that:

$$u(0, y) = 0, \quad u(x, 0) = 0, \quad u(1, y) = 100, \quad u(x, 1) = 100$$
 and

$$h = \frac{1}{3}$$

UNIT - III

6. Explain various discrete probability distributions in short.

7. Write short note on:

(i) Expectation of discrete random variables.

(ii) Variance of a sum of discrete random variables.

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P. T. O.

UNIT - IV

8. Write detail note on different measures of central tendency.

9. Write note on :

(i) Large sample test for single proportion.

(ii) Tests for single mean.

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Roll No.

3097

B. Tech. 4th Semester (EE)

Examination – July, 2021

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 : Question No. 1 is compulsory. Attempt five questions in all selecting one question from each Section carrying equal marks.

1. (a) Explain the present day scenario in power system.
- (b) What do you mean by ferranti effect in transmission line?
- (c) What are the various types of insulating material used in insulator?
- (d) Explain the concept of radio interference due to corona in transmission line.

SECTION – A

2. Explain the comparison in various distribution systems.

3. Draw the neat and clean layout of indoor and outdoor substation.

SECTION – B

4. Drive the expression for inductance of single phase two wire line.
5. Find sending end voltage and voltage regulation of a 250Km, three phase 50Hz transmission line delivering 25MVA at p.f of 0.85 lagging to a balanced load at 132Kv. The line conductors are spaced equilaterally 3m apart. The conductor resistance is 0.11 ohm/Km and its effective diameter is 1.6cm. Neglect leakage.

SECTION – C

6. Explain various types of insulator in transmission line.
7. Drive the expression for sag in mechanical design of transmission line.

SECTION – D

8. Explain the method of capacitance grading of cable in line.
 9. Explain various types of links in HVDC transmission.
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