4E1319

Total No. of Questions : 22 Total No. of Pages : 04

Roll No. : .....

4E1319

B. Tech. IV-Sem. (Main/Back) Exam, 2024

ELECTRICAL AND ELECTRONICS ENGG.

4EE2-01 Biology

4E1319

EE, EX

Time : 3 Hours Maximum Marks : 70

Attempt all ten questions from Part A, five questions out of seven questions from Part B and two 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 [10x2=20]

(Answer should be given up to 25 words only)

All question are **compulsory**.

Q.1. Define Brownian.

Q.2. What do you understand by the concept of allele ?

Q.3. Define cellularity.

Q.4. What are monomeric units ?

Q.5. What is an Enzyme ?

Q.6. Mention the importance of gene.

Q.7. What is spontaneity ?

Q.8. Give two examples of Single celled organisms.

Q.9. Write the function of protein.

Q.10. What is objective of the course ?

PART-B

(Analytical/Problem Solving questions)

Note : Attempt **any five** questions. [5x4=20]

Q.1. Write the fundamental differences between Science and Engineering by drawing a comparison between Eye and Camera.

Q.2. Define Epistasis. Explain recessive epistasis with the help of suitable example giving the Ratio of Phenotype and Genotype.

Q.3. Explain ultrastructure of Prokaryotic and Eukaryotic cell.

Q.4. Write short notes on the following :

(a) Amino acids

(b) Nucleotide

Q.5. Explain molecular basis of information transfer.

Q.6. Write short notes on the following :

(a) Growth Kinetics

(b) Sterilization

Q.7. Write short notes on the following :

(a) Protein as Enzymes

(b) Protein as Receptors

PART-C

(Descriptive/Analytical/Problem Solving/Design Questions/)

Note : Attempt **any three** questions. [3x10=30]

Q.1. Describe Mendel's Law of Independent Assortment and concept of Segregation in detail.

Q.2. Write an essay on Terrestrial habitat.

Q.3. Describe genetic code in detail.

Q.4. Write an essay on Mechanism of Enzyme Action.

Q.5. Describe Primary, Secondary, Tertiary and Quaternary Structure of Protein.

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4E1320

Total No. of Questions : 22 Total No. of Pages : 04

Roll No. : .....

4E1320

B. Tech. IV-Sem. (Main/Back) Exam, 2024

ELECTRICAL AND ELECTRONICS ENGINEERING

4EE3-04 Electronic Measurement and Instrumentation

EE,EX

Time : 3 Hours Maximum Marks : 70

Instruction to Candidates :

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 **[10x2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. What is absolute and secondary instruments ?

Q.2. What is recording and integrating instruments ?

Q.3. State Blodel's Theorem for N-phase P-wire system.

Q.4. What is difference between CT and PT ?

Q.5. Give the classification of Resistance.

Q.6. Write down the three methods for measuring the medium resistance.

Q.7. What are interrupters and alternators.

Q.8. Write down the three characteristics of detectors used in AC-bridge.

Q.9. What is the difference between the AC and DC potentiometers.

Q.10. What is the difference between polar-type potentiometers and co-ordinate type potentiometers.

PART-B

[5x4=20]

(Analytical/Problem Solving questions)

Attempt any five questions

Q.1. The inductance of a moving iron ammeter in micro-henry is given by the expression.

$$L = 20 + 10\theta - 3\theta^2$$

Where o is the deflection in radians from 3 zero position. Determine the deflection of ammeter for a current of 10A if the spring constant is 8×10^{-6} Nm / radian.

Q.2. Explain the working principle of a moving iron indicating instrument. Show that this type of instrument can be used both for dc and ac measurements.

Q.3. Explain 3-voltmeter method for power measurement with the circuit and phasor diagram.

Q.4. Explain the Hey's bridge for measurement of inductance with suitable phasor diagram.

Q.5. Show that the Wein frequency bridge will be balanced at only one frequency given by :

$$f = \frac{1}{2\pi\sqrt{R_1 R_2 C_1 C_2}}$$

Where C_1, C_2, R_1, and R_2 have their usual meanings.

Q.6. Draw the construction and working of a dc potentiometer.

Q.7. Explain the principle of a rectangular type co-ordinate a.c. potentiometer.

PART-C **[3x10=30]**

(Descriptive/Analytical/Problem Solving Design/Questions)

Attempt any three questions

Q.1. Calculate the inductance of a coil from the following measurements on an ac potentiometer. Voltage drop across a 0.3 Ω standard resistance connected in series with the coil = $0.612\angle 12^{0}6V$ Voltage across the test coil through 100/1 volt ratio box = $0.781\ \angle 50^{0}48V$ Frequency of supply is 50 Hz.

Q.2. Explain the construction of a PMMC meter with the help of a neat sketch. Derive the expression for deflection for a PMMC ammeter if it is (i) spring control and (ii) gravity control.

Q.3. Draw the connection diagram of a 3- ϕ energy meter and explain its working. How do you correct it if it is found to be moving fast.

Q.4. Describe Kelvin's double bridge for the comparison of two low resistances. Give the theory of the bridge and arrangement necessary in order that the greatest precision possible may be obtained.

Q.5. State the various methods for measurement of low resistance. Why is the voltmeter-ammeter method unsuitable for the precise measurement of low resistance ?

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17

4E1321

Total No. of Questions : 22 Total No. of Pages : 04

Roll No. : .....

4E1321

B.Tech. IV-Sem. (Main/Back) Exam. - 2024

ELECTRICAL ENGINEERING

4EE4-05 Electrical Machine-II

EE, EX

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates :

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 may suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(As mentioned in Form No. 205)

1. ..... 2. .....

PART-A **[10×2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q. 1 Give the importance of airgap in rotating machines.

98

Q.2 Give application of winding distribution factor.

Q.3 What is pulsating magnetic field?

Q.4 Give application of Doubly-Fed Induction Machines.

Q.5 Give application of Single Phase Induction Motor.

Q.6 What information can be obtained from a V curve?

Q.7 What type of winding is an important factor in rotating machines?

Q.8 Give basic difference between torque and speed of a rotating machine.

Q.9 What information can be obtained from a phasor diagram?

Q.10 Give challenges related to cylindrical rotor synchronous machine.

PART-B **[5×4=20]**

(Analytical/Problem-solving questions)

Word limit : 100 words

Attempt any five questions

Q.1 Give scope and outcome of this course?

Q.2 Explain the following :

(a) Distributed winding

(b) Winding axis

Q.3 By help of suitable diagram, explain the concept of Magnetic field produced by a single winding.

Q.4. Explain the effect of parameter variation on torque-speed characteristics for an Induction motor.

Q.5 Explain the Split-phase starting methods.

Q.6 A 3-phase, 16-pole synchronous generator has a star-connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.04 Wb and the speed is 375 rpm. Find the frequency and phase emf and line emf. The total turns/phase may be assumed to be series connected.

Q.7 Explain the concept of power-angle characteristics.

PART-C **[3×10=30]**

(Descriptive/Analytical/Problem-Solving/Design question)

Attempt any three questions

Q. 1 Explain the construction and working of a squirrel cage induction motor with its torque slip characteristics.

Q.2 Find the synchronous impedance, synchronous reactance and the terminal voltage when full load is thrown off, Of a 250 Amp, 6600 Volts, 0.8 p.f. alternator, in which a given field current produces an armature current of 250 Amp on short circuit and a generated e.m.f. of 1500 Volts on open circuit. The armature resistance is 2 W.

Q.3 Explain working method of parallel operation of alternator.

Q.4 Explain the concept of Three windings spatially shifted by 120 degrees by help of suitable application.

Q.5 Write short notes on **any two** from the following :

(a) Sinusoidally distributed winding

(b) Braking and speed control for induction motors

(c) Starting of a Synchronous motor

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4E1322

Total No. of Questions : 22 Total No. of Pages : 04

Roll No. : .....

4E1322

B.Tech. IV-Sem. (Main/Back) Exam. - 2024

ELECTRICAL ENGINEERING

4EE4-06 Power Electronics

EE, EX

Time : 3 Hours **Maximum Marks : 70**

nstructions to Candidates :

ttempt all ten questions from Part-A, five questions out of seven questions rom Part-B and three questions out of five questinns from Part-C.

chematic diagrams must be shown wherever necessary. Any data you el missing suitably be assumed and stated clearly. Units of quantities sed / calculated must be stated clearly.

lse of the following supp.rting material is permitted during examination. Mentioned in Form No. 205)

. ..... 2. .....

PART-A [10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

.1. Plot I-V characteristics of SCR.

.2. Name the methods to turn on the thyristor.

Q.3. Define the latching current in SCR.

Q.4. What is a Snubber circuit?

Q.5. Define delay angle and extinction angle

Q.6. Define Transformer Utilization Factor (TUF), Form Factor and Ripple Factor for rectifiers.

Q.7. Write the expression of the output voltage of a single-phase full-wave fully controlled converter.

Q. 8 Define the duty cycle in a chopper.

Q. 9 Define the modulation index.

Q. 10. List a few applications of inverters in domestic and industrial appliances.

PART-B [5x4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1. Discuss the construction, characteristics, working, and applications of TRIAC.

Q.2 Discuss the R and RC triggering method for a thyristor.

Q.3. Discuss the symmetrical and asymmetrical AC-DC converters.

Q.4. (a) Discuss the working principle of a single-phase full-wave fully controlled converter with RL load under continuous mode of conduction and discontinuous mode of conduction.

(b) Sketch neat waveforms for source voltage, output voltage, load current, and source current in each case.

Q 5. A single-phase full bridge converter is connected to 'R' load. The source voltage is of 230 V, 50 Hz. The average load current is of 10 A. For R=20Ω, Find the firing angle.

Q.6. Derive the mathematical relationship between the duty ratio (D) and the average output voltage (Vo) of a boost converter. Assume ideal components in your analysis.

Q.7. What is pulse modulation? List the various PWM techniques. How do these differ from each other?

PART-C [3x10=30]

(Descriptive/Analytical/Problem Solving/Design questions)

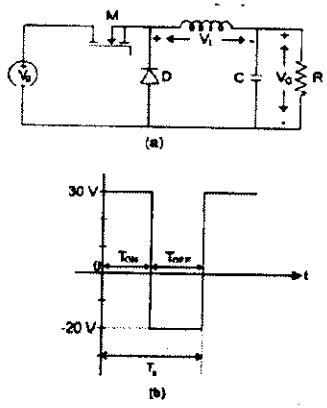
Attempt any three questions

Q1. A single-phase full wave fully controlled converter with RLE load of R=0.4 ohms, L=2mH is being fed from a source voltage of 230V and frequency 50 Hz. Compute the firing angle delay for E=120 V and for E = -120 V. Find the input power factor in both cases.

Q.2 Discuss the three-phase 6-pulse AC-DC converter with RL load. Sketch the input voltage, current and output voltage, current waveforms for delay angles of 45 degrees and 90 degrees.

Q.3 Explain the construction, operation, and output waveforms of both boost and buck converters.

Q.4 A buck converter as shown in Figure (a) is working in steady state . The output voltage and the inductor current can be assumed ripple-free. Figure (b) shows the inductor voltage VL during a complete switching interval. Assuming all devices are ideal, calculate the duty cycle of the buck converter.



Q. 5. Discuss the principle of working of a three-phase bridge inverter with an appropriate circuit diagram. Draw phase and line voltage waveform on the assumption that each thyristor conducts for 180 degrees and the resistive load is star-connected. The sequence of firing of various SCRs should also be indicated in the diagram.

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102

4E1323

Total No. of Questions : 22 Total No. of Pages : 04

Roll No. : .....

4E1323

B.Tech. IV-Sem. (Main/Back) Exam. - 2024

ELECTRICAL ENGINERING

4EE4-07 Signals and Systems

EE, EX

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates :

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) **[10×2=20]**

(All questions are compulsory)

Q.1. Define signal. Differentiate between discrete time signal and continuous time signal.

Q.2. Discuss the terms :

(i) Linearity

(ii) Causality

Q.3. Discuss the relationship between z-transform and DTFT.

Q.4. How can aliasing be eliminated? Explain.

Q.5. What do you understand by reconstruction?

Q.6. What are the advantages of DFT in comparison of DTFT?

Q.7. Define circular convolution.

Q.8. Differentiate between impulse response and step response.

Q.9. Discuss state transition matrix and its role.

Q.10. Define magnitude and phase response.

PART-B

(Analytical / Problem Solving Questions)

(Attempt any five questions) **[5×4=20]**

Q.1. For the following input-outut relationship, determine whether the corresponding system is linear, time invariant or both.

(a) $y(t) = t^2x(t-1)$

(b) $y[n] = x^2[n-2]$

Q.2. State and prove the initial value and final value theorem for Laplace transform.

Q.3. Find the z-transform of the expression $x(n) = a^n u(n) + b^n u(-n-1)$, also draw the ROC.

Q.4. Explain sampling of continuous time signal by impulse function with diagram and appropriate mathematical expressions.

Q.5. Find the Nyquest rate and discrete signal x(n) for the following continuous time signals :

(a) $x(t) = \sin(4\times10^3\pi t)/\pi t$

(b) $x(t) = 1 + \cos(2000\pi t) + \sin(400\pi t)$

(c) $x(t) = \sin c(50\pi t) + \sin c(100\pi t)$

Q.6. Find the 4-point DFT of sequence $x(n) = \cos\frac{n\pi}{4}$

Q.7. Determine the convolution of the given signals :

$x(t) = u(t-3) - u(t-5)$ and

$h(t) = e^{-3t} u(t)$

Where u(t) is unit step function.

PART-C

(Descriptive/Analytical/Problem Solving/ Design Question)

(Attempt any three questions) **[3×10=30]**

Q.1. Describe all the properties of DFT in detail. Also, define the feedback control systems.

Q.2. (a) Find the Laplace transform of following signal $x(t) = e^{-2t} u(-t) + e^{-3t} u(-t)$ Mark the poles and zero of x(s) and also the ROC in the s-plane.

(b) Explain filtering.

Q.3. Find the inverse z-transform of $x(z) = \dfrac{z^3 - 10z^2 - 4z + 4}{2z^2 + 2z - 4}$ with ROC|z|<1

Q.4. A signal x[n] with Fourier transform $x(e^{jw})$ has the property that :

$$\left(x[n] \sum_{k=-\infty}^{\infty} \delta[n - 3k] \right) * \left(\frac{\sin \frac{\pi}{3} n}{\frac{\pi}{3} n} \right) = x[n]$$

For what values of w is it guaranteed that $x(e^{jw}) = 0$.

Q.5. For a continuous time periodic signal :

$$x(t) = 2 + \cos\left[\frac{2\pi}{3}\right] t + 4\sin\left[\frac{5\pi t}{3}\right]$$

Determine the fundamental frequency w_0 and the Fourier series coefficient a_k such that

$$x[t] = \sum_{k=-\infty}^{\infty} a_k . e^{jkw_0 t}$$

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4E1324

Total No. of Questions : 22 Total No. of Pages : 4

Roll No. : .....

4E1324

B. Tech. IV-Sem. (Main/Back) Exam, 2024

ELECTRICAL ENGG.

4EE4-08 Digital Electronics

EE,EX

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 **[10x2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Explain digital signals.

Q.2. Write the truth table of NAND, operations.

Q.3. Describe TTL.

Q.4. Write short note on ALU.

Q.5. Explain in brief Flip Flops.

Q.6. What do you mean by A/D converters ?

Q.7. Write short note on quantization.

Q.8. Explain RAM.

Q.9. Describe CAM.

Q.10. Write short note on FPGA.

PART-B [5x4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1. Describe Schottky TTL and CMOS logic.

Q.2. Obtain decimal equivalent of hexadecimal. number $(3A.2F)_{16}$.

Q.3. Implement the expression using a multiplexer F(A, B, C, D) = Σ_m (0, 2 3, 6, 8, 9, 12, 14).

Q.4. Describe shift registers. Write the application of shift registers.

Q.5. Explain sample and hold circuit.

Q.6. Write short notes on the following :

(i) Sequential Memory

(ii) ROM as a PLD

Q.7. Explain CPLDs.

PART-C [3x10=30]

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any three questions

Q.1. Design a Gray-to-Binary Code Converter.

Q.2. Describe BCD Arithmetic and Carry look ahead adder.

Q.3. Explain clocked SR flip flop, J-K and D-type flipflops.

Q.4. Explain Synchronous counters and sequence generator.

Q.5. Describe A/D converter using voltage to frequency and voltage to time conversion.

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