4E1319

Roll No. _____ [Total No. of Pages : 2

4E1319

B.Tech. IV Sem. (Main/Back) Examination - July 2023
Electrical Engineering
4EE2-01 Biology
EE, EX

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

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**, Attempt any **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).

PART - A

(Answer should be given up to **25** words only)

All questions are **compulsory.** **(10×2=20)**

1. Why do we need to study biology?
2. What is biophysics used for in life processes?
3. Define the term 'molecular taxonomy'.
4. What is an allele?
5. What is a prosthetic group in the enzyme?
6. Who proposed the first experimental shreds of evidence for the genetic material in an organism?
7. Which types of chemical bonds are associated with a protein molecule?
8. What is Keq?
9. What do you mean by biological sterilization?
10. Anabolism and catabolism are types of bioprocesses of _____ and _____ reactions.

PART - B

(Analytical/Problem solving questions)

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

1. Explain briefly the significance of brownian movements in biology.
2. Write a concise note on taxonomic hierarchy.
3. "Law of segregation is the universally accepted law of inheritance". Justify the statement.
4. How does an enzyme catalyze a reaction? Support with illustrations.
5. Check out the salient features of a genetic code.
6. Clarify the role of protein receptors in the functionality of cellular actions.
7. Score an energy balance sheet of the EMP pathway.

PART - C

(Descriptive/Analytical/Problem solving/Design questions)

Attempt any **Three** questions. **(3×10=30)**

1. How will you identify and classify microorganisms?
2. DNA is the sole material for the molecular basis of information transfer. Support it with proper documentation.
3. Compare DNA to RNA at a molecular level.
4. "Fruit fly and Arabidopsis are worthy material for study in genetics and development". Enlighten with confirmations.
5. Light on objective and scope of biology.

4E1320

Roll No. _____ [Total No. of Pages : 2

4E1320

B.Tech. IV - Sem. (Main/Back) Examination, July - 2023
Electrical and Electronics Engineering
4EX3-04 Electronic Measurement and Instrumentation
EE, EX

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

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**, Attempt any **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).

PART - A

(Answer should be given up to 25 words only)

All questions are **compulsory** **(10×2=20)**

1. What are the applications of electrodynamic instruments?
2. What do you mean by phantom loading in energy meter.
3. Write the applications of potential transformers.
4. Define the term burden in instrument transformers.
5. What do you mean by standardization and calibration of potentiometers?
6. What are the merits and demerits of AC potentiometers?
7. Classify the ranges of low, medium and high resistances.
8. Draw the circuit diagram of Price's Guard wire method for measurement of resistances.
9. Draw the phasor/vector diagram of De Sauty bridge.
10. Draw the circuit diagram of Hay's Bridges.

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PART - B

(Analytical/Problem solving questions)

Attempt any **Five** questions. **(5×4=20)**

1. Explain the construction and working of moving coil type instruments.
2. Derive the expression of Blondel's theorem for n - phase.
3. Explain the effect of variation of power factor of instrument transformers.
4. Draw and explain the diagram of crompton potentiometers.
5. Draw and explain the circuit diagram of Kelvin's double bridge method for measurement of resistances.
6. What are the various difficulties are encountered in measurement of high resistances. Explain their overcome techniques.
7. Explain the circuit diagram and phasor/vector diagram of Heaviside's bridges.

PART - C

(Descriptive/Analytical/Problem solving/Design questions)

Attempt any **Three** questions. **(3×10=30)**

1. Explain the construction and working of induction type instruments with merits and demerits.
2. Discuss the ratio and phase angle errors and their minimization techniques of instrument transformers.
3. Explain the working and applications of Slide wire potentiometers with neat diagram with merits and demerits.
4. Draw and explain the circuit diagram of measurement of earth resistances with applications.
5. Explain the circuit diagram and phasor/vector diagram of Maxwell's Bridges with merits, demerits and applications.

4E1321

Roll No. _____ [Total No. of Pages : 2

4E1321

B.Tech. IV Sem. (Main/Back) Examination, July - 2023
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**, Attempt any **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 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)

PART - A

(Word limit 25)

All questions are **compulsory.** **(10×2=20)**

1. Explain the importance of physical arrangement of winding in stator.
2. Explain winding distribution factor.
3. Describe the effect of a constant magnetic field in AC machines.
4. Explain the effect of poor revolving magnetic field in AC machines.
5. Give the losses that effect the performance of Induction machine.
6. What do you understand by torque slip characteristics.
7. Give application of a single phase induction machine.
8. Give power range of working of single phase induction machine.
9. Give importance of V curve.
10. Give example of operation of parallel operation of alternators.

PART - B
(Word limit 100)

Attempt any **Five** questions. **(5×4=20)**

1. Give scope and outcome of the electrical machine - II.
2. By help of neat diagram explain the Air - gap MMF distribution of AC machine winding.
3. Explain the concept of three windings spatially shifted by 120 degrees.
4. Explain the working model of doubly fed induction machine.
5. Describe the double revolving field theory.
6. Explain the concept of load division in synchronous machine.
7. In a 6 pole, 3 phase, 50 Hz Induction motor with star connected Rotor, the rotor resistance per phase is 0.3 Ω, the reactance at standstill is 1.5 Ω per phase and the e.m.f between the slip rings on open circuit is 175 V.
   Calcualte :
   i. Slip at a speed of 960 RPM.
   ii. Rotor e.m.f per phase.
   iii. Rotor frequency and reactance at speed of 950 RPM.

PART - C

Attempt any **Three** questions. **(3×10=30)**

1. a. A 3 φ, 50 Hz slipring induction motor gives a stand still open circuit voltage of 500 V between slip rings. Calculate the rotor current and power factor at (i) standstill and (ii) with a slip of 4%. The per phase rotor resistance and inductance are 0.2 Ω and 0.04H.
   b. By help of neat diagram explain the construction and working module of squirrel cage induction motor.
2. Design a single phase induction motor and explain its constriction feature and equivalent circuit diagram.
3. a. In a 2000 V. single - phase synchronous generator, a full - load current of 100A is produced on short - circuit by a field excitation of 2.5 and an emf of 500V is produced on open - circuit by the same excitation. The armature resistance is 0.8 W. Determine the voltage regulation when the generator is delivering a current of 100 A at (i) unity power factor, (ii) 0.71 power factor lagging ; and (iii) 0.8 power factor leading.
   b. Explain the concept of armature reaction in synchronous machine.
4. Describe and design (a) Sinusoidally distributed winding, (b) Winding distribution factor.
5. Write short notes on :
   a. Revolving magnetic field.
   b. Three Phase rotating magnetic field.

4E1322

Roll No. _____ [Total No. of Pages : 3

4E1322

B.Tech. IV- Sem. (Main/Back) Examination, July - 2023
Electrical Engineering
4EE4-06 Power Electronics
EE, EX

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

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**, Attempt any **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 may 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. (As Mentioned in form No. 205).

PART - A

(Word limit 25)

All questions are compulsory **(10×2=20)**

1. Draw two-transistor behavioral model of a thyristor.
2. Why Snubber Circuits are used in Power Electronics?
3. Draw and explain the turn-off snubber Circuit for thyristor.
4. Draw the V - I characteristics of Power IGBT.
5. What are the various implications of heat dissipation in power MOSFET?
6. What are the desirable features for a semi conductor device to operate as an ideal switch?
7. Mention the differences between MOSFET and IGBT.
8. What do you understand by a duty ratio for any given converter?
9. What do you understand by commutation of SCR?
10. Explain the latching and holding current in thyristor.

PART - B

(Word limit 100)

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

1. A three-phase controlled rectifier has an input voltage which is 480 V rms at 60 Hz. The load is modelled as a series resistance and inductance with R = 10 Ω and L=50 mH. Determine the delay angle required to produce an average current of 50 A in the load.

2. Show that the power factor for the controlled Full wave rectifier with resistive load is $pf = \sqrt{1-\frac{\alpha}{\pi}+\frac{\sin(2\alpha)}{2\pi}}$

3. A half-controlled single-phase bridge rectifier is supplying an R-L load. It is operated at a firing angle α and the load current is continuous . Calculate the fraction of cycle that the free wheeling diode conducts.

4. A three phase fully controlled bridge converter is feeding a load drawing a constant and ripple free load current of 10A at a firing angle of 30°. Find out the Total Harmonic Distortion (%THD) and the rms value of fundamental component of input current.

5. Explain the working of boost converter with suitable diagram and Waveforms.

6. Mention in detail, the various applications of DC - DC converters.

7. A Single-phase inverter is operated in PWM mode generating a single-pulse of width 2d in the centre of each half cycle as shown in figure Q7. It is found that the output voltage is free from 5th harmonic for pulse width 144°. What will be percentage of 3rd harmonic present in the output voltage ($V_{o3}/V_{01\,max}$)?

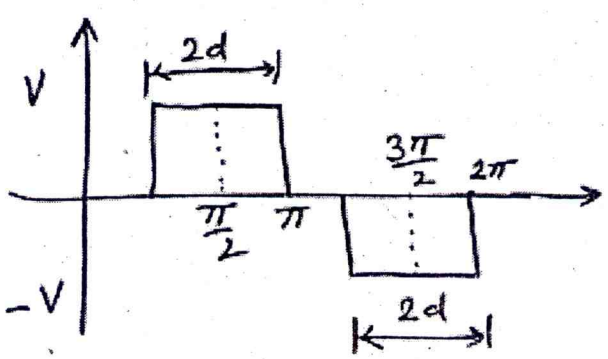

Figure. Q7

PART - C

Attempt any Three questions . **(3×10=30)**

1. Design a circuit that will produce an average current that is to vary from 8 to 12A in an 8Ω resistor. Single phase ac sources of 120 and 240 V rms at 60 Hz are available. The current must have a peak-to peak variation of no more than 2.5A. Determine the average and rms currents and maximum voltage for each circuit element.

2. Design a buck converter to produce an output voltage of 18V across a 10Ω load resistor. The output voltage ripple must not exceed 0.5%.The dc supply is 48V. Design for continuous inductor current. Specify the duty ratio, the switching frequency, the values of the inductor and capacitor, the peak voltage rating of each device, and the rms current in inductor and capacitor. Assume ideal component.

3. In a full bridge inverter of figure Q3 has a switching sequence that produces a square wave Voltage across a series RL load. The switching frequency is 60 Hz, V_{dc}=100 V, R = 10Ω, and L = 25 mH. Determine (a) an expression for load current.

   b) The average current in the dc source.

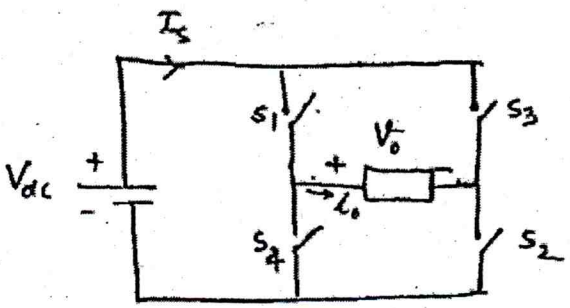

Figure. Q3

4. The full bridge inverter is used to produce a 60 Hz voltage across a series RL load using bipolar PWM. The dc output to the bridge is 100 V, the amplitude modulation ratio m_a is 0.8, and the frequency modulation ratio m_f is 21. The load has a resistance of R = 10Ω and series inductance L = 20mH. Determine the THD of the load current.

5. Design a bipolar PWM inverter that will produce a 75-V rms 60 Hz output from a 150V dc source . The load is a series RL combination with R = 12Ω and L = 60 mH. Select the switching frequency such that the current THD is less than 10 percent.

4E1323

Roll No. _____ [Total No. of Pages : 2

4E1323

B.Tech. IV-Sem. (Main/Back) Examination, July - 2023
Electrical Engineering.
4EE4-07 Signals and Systems
EE, EX

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

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**, Attempt any **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 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).

PART - A
(word limit 25)

All questions are **compulsory**. **(10×2=20)**

1. Differentiate between Even and odd signals.
2. Define the unit impulse sequence.
3. What do you mean by the Causal and Non-causal systems.
4. Write the condition for stability of system.
5. Differentiate continuous - time and discrete - time systems.
6. What are linear constant - coefficient differential equations.
7. Define Region of convergence (ROC) for Laplace transform.
8. Find the Laplace transform of unit impulse function.
9. Define interpolation.
10. State the formula for Fourier transform.

PART - B
(word limit 100)

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

1. State and explain the Parseval's theorem.
2. Find the orthogonality of the signals $Sin(\omega t)$ and $Sin(2\omega t)$ over the time interval (0,T).

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3. Compute the output y(t) for a continuous - time LTI system whose impulse response h(t) and the input x(t) are given by $h(t) = e^{-\alpha t} u(t)$ and $x(t) = e^{\alpha t} u(-t)$.

4. Find the minimum sampling frequency for non - zero frequency spectra $X(j\omega)$ defined between $10kHz < |\omega| < 20kHz$.

5. What are energy and power signals?

6. Explain the properties of Laplace transform.

7. What is zero - order hold, derive the expression for transfer function of zero - order hold?

PART - C

Attempt any **Three** questions. **(3×10=30)**

1. The discrete - time system shown in Fig. 1 is known as unit delay element. Determine

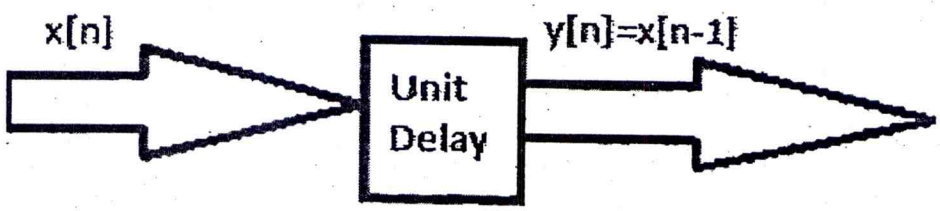

Fig. 1 Unit Delay Element

whether system is (a) memoryless (b) causal (c) linear (d) time - invariant (e) stable.

2. Find the Z-transform X(z) and sketch the pole zero plot with the ROC for

$x[n] = ((1/3)^n)u[n] + ((1/2)^n)u[-n-1]$.

3. Consider a continuous - time LTI system described by

$$\frac{dy(t)}{dt} + 2y(t) = x(t)$$

using fourier transform, find the output y(t) to the input x(t) = u(t).

4. Describe the various methods of reconstruction of signals from its samples.

5. Compute y[n]=x[n]*h[n], where $x[n] = \alpha^n u[n], h[n] = \alpha^{-n} u[-n]$, $0 < \alpha < 1$.

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Roll No. _____ [Total No. of Pages : 2

4E1324

B.Tech. IV-Sem. (Main/Back) Examination, July - 2023
Electrical Engineering
4EE4-08 Digital Electronics
EE, EX

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

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**, Attempt any **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 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).

PART - A

(Word Limit 25)

All questions are **compulsory.** **(10×2=20)**

1. State the associative property of boolean algebra. **(2)**
2. List different digital logic families. **(2)**
3. Differentiate between a conventional encoder and a priority encoder. **(2)**
4. Draw the truth table for a half adder circuit and write the boolean expressions for sum and carry. **(2)**
5. Write excitation table of D flip - flop. **(2)**
6. Write about race around condition. **(2)**
7. What are the advantages and disadvantages of R-2R ladder D/A converter. **(2)**
8. State the advantages and applications of sample and hold circuits. **(2)**
9. Differentiate between static RAM and dynamic RAM. **(2)**
10. What is a programmable logic array? How it differs from ROM. **(2)**

PART - B

Attempt any **Five** questions. **(5×4=20)**

1. Perform each of the following conversions :
   a. $(444.456)_{10}$ in to octal number.
   b. $(A3B)_{16}$ in to decimal number.
   c. $(2D5)_{16}$ in to binary number.
   d. $(115)_{10}$ in to hexadecimal number. **(4)**
2. Compare the characteristics of TTL and CMOS logic families. **(4)**
3. Using K-map, minimize the expression

   $F(A,B,C,D) = \sum m(1,5,7,9,11,13,15)$. **(4)**
4. Explain 4 - bit serial in parallel out register. **(4)**
5. Draw the logic diagram and timing sequence of a 4 - bit ring counter. **(4)**
6. Explain the terms accuracy and resolution for D/A converter. **(4)**
7. Differentiate EPROM and PROM. **(4)**

PART - C

Attempt any **Three** questions. **(3×10=30)**

1. Define the following with one example :
   a. Error correcting codes.
   b. Gray code.
   c. Hamming distance.
   d. Even and odd parity code. **(10)**
2. Using the Quine - McCluskey method, obtain the minimal sum of product expression of the following function. **(10)**

   $F(A,B,C,D) = \sum m(0,1,3,7,8,9,11,15)$.
3. a. Convert J-K flip - flop to S-R flip - flop. **(5)**
   b. Design a 4 - bit synchronous counter. **(5)**
4. With a neat block diagram, describe the working of a successive approximation A/D converter and illustrate it with a suitable example. **(10)**
5. Write a notes on FPGA (field programmable gate array) with a neat diagram. **(10)**
