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4E1319

Roll No. _____

Total No. of Pages: 3**4E1319****B. Tech. IV - Sem. (Main) Exam., - 2022****Electrical Engineering****4EE2 – 01 Biology****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 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.
(Mentioned in form No. 205)*

1. NIL2. NIL**PART – A****(Answer should be given up to 25 words only)****[10×2=20]****All questions are compulsory**

Q.1 Define lithotrophs.

Q.2 What do you mean by sterilization?

Q.3 Define crossing over. Write the stage in which it occurs.

Q.4 What is peptide bond?

Q.5 Define turn over number.

- Q.6 If the parents are XY and XX, what are the possibility of next generation to be girl child?
- Q.7 Define phospholipids.
- Q.8 Define Apoenzyme. Give an example.
- Q.9 How many ATP are released during glycolysis and also mention the enzyme involved.
- Q.10 Define culture media.

PART – B

(Analytical/Problem solving questions)

[5×4=20]

Attempt any five questions (Word limit 100)

- Q.1 Differentiate between autotrophs and heterotrophs.
- Q.2 What is two kingdom classification? Give its drawbacks.
- Q.3 State Mendel's law of segregation.
- Q.4 Normally females do not suffer from Hemophilia, explain.
- Q.5 Explain growth curve.
- Q.6 Distinguish between DNA & RNA.
- Q.7 What are biomolecules? Explain its function with examples.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

[3×10=30]

Attempt any three questions

- Q.1 Discuss the mechanism of enzyme action.

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Q.2 Describe Krebs's cycle with a diagram.

Q.3 How did Hershey and Chase prove that DNA is the genetic material?

Q.4 Describe functions of polysaccharides in living organism.

Q.5 Why E. coli is considered as a model organism?

4E1302

Roll No. _____

Total No. of Pages: **4**

4E1302

B. Tech. IV - Sem. (Main) Exam., - 2022

Computer Science & Engineering (AI)

**4CAI1 – 03 Managerial Economics and Financial Accounting
All Branches**

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 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.
(Mentioned in form No. 205)*

1. NIL

2. NIL

PART – A

(Answer should be given up to 25 words only)

[10×2=20]

All questions are compulsory

- Q.1 “Managerial economic supports manager to take decision for successful implementation of economic strategies.” Comment upon this statement.
- Q.2 Define GDP and NNP concepts of national income.
- Q.3 What is meant by price elasticity?
- Q.4 Elaborate the term circular flow of economy. Who are the main players involve in the circular flow of economy?

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- Q.5 What are the basic elements of demand and supply?
- Q.6 Write the concept of opportunity cost with one example.
- Q.7 Define Kinked demand curve and write one reason of price rigidity.
- Q.8 Differentiate between deductive and inductive methods of economics.
- Q.9 Discuss any two significant uses of cash flow statement.
- Q.10 What is meant by debt, liabilities and current assets in accounting?

PART – B

(Analytical/Problem solving questions)

[5×4=20]

Attempt any five questions (Word limit 100)

- Q.1 Define the concept of managerial economics. What are the micro and macro scopes of economics? Explain all in brief.
- Q.2 What is Law of demand? Draw the suitable diagram of demand curve and write its determinants.
- Q.3 Elaborate the cost and output relations in short run and long run. What is the role of Marginal cost in decisions?
- Q.4 How demand forecasting is useful for future decision making? Explain any two methods of demand forecasting.

Q.5 Write the stages of production function. How manager can control the inputs in production?

Define your answer with suitable table of inputs and diagram.

Q.6 How price, output and profit can be determined in perfect competition? Draw suitable diagram.

Q.7 Sttelio Ltd. presents the following information and you are required to calculate funds from operations –

Profit and Loss Account

	₹		₹
To Operation Expenses	1,00,000	By Gross Profit	2,00,000
To Depreciation	40,000	By Gain on Sale of Plant	20,000
To Loss on sale of Building	10,000		
To Advertising Suspense Account	5,000		
To Discount Allowed	500		
To Discount on issue of Shares written off	500		
To Goodwill written off	12,000		
To Net Profit	52,000		
	2,20,000		2,20,000

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PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

[3×10=30]

Attempt any three questions

- Q.1 Define circular flow of economy with suitable diagram. Which are the current economic problems are facing by nation after pandemic situation (Year 2020 - 2021)?
- Q.2 Define the term demand elasticity. What are the various degrees of elasticity? Define each with diagram and example.
- Q.3 What is meant by least cost combinations in production function? Elaborate the properties of least cost combinations.
- Q.4 Why price is rigid in market? Give reasons. Draw Kinked demand curve and how price and output can be determined under Kinked demand curve.
- Q.5 Differentiate between –
- (a) Demand curve and Supply curve
 - (b) Explicit cost and implicit cost
 - (c) Static economy and Dynamic economy
 - (d) Monopoly market and Monopolistic market
 - (e) Cash flow statement and Fund flow statement.
-

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4E1303

Roll No. _____

Total No. of Pages: 3

4E1303

B. Tech. IV - Sem. (Main) Exam., - 2022
Computer Science & Engineering (AI)
4CAI1 – 02 Technical Communication
All Branches

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 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.
 (Mentioned in form No. 205)*

1. NIL2. NIL

PART – A

(Answer should be given up to 25 words only)

[10×2=20]

All questions are compulsory

- Q.1 What is technical communication?
 Q.2 Write the forms and aspects of 'Technical communication'?
 Q.3 What is the process of technical writing?
 Q.4 Define note-making.
 Q.5 What are the different discourse markers that can be used?
 Q.6 What are the different types of resumes?

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- 7 Combine the following sentence using an appropriate form of the verb given in the brackets.
- (a) Man and woman.....complementary to each other. (is/are)
 - (b) The leader as well as his brothers.....to the same tribe. (belong/belongs)
- 8 Mention the characteristics of the Report.
- 9 Find the errors in the following –
- (a) She can to drive.
 - (b) The house isn't enough big
- 10 Write short on the following –
- (a) Conference paper
 - (b) Journal

PART – B

(Analytical/Problem solving questions)

[5×4=20]

Attempt any five questions (Word limit 100)

- Q.1 “The more you read, the more you become efficient in speaking a language.” Throw light on the connection of reading and speaking and tell how you can develop effective speaking skills.
- Q.2 Write in detail about the aspects of technical communication and throw light on the 7C's of effective technical communication.
- Q.3 Write about the challenges in the process of technical communication in detail.
- Q.4 Elaborate editing strategies to achieve appropriate technical style.
- Q.5 Define technical communication and its importance in the life of an engineering professional.
- Q.6 Elucidate the structure and format of technical articles.
- Q.7 Write notes on the following –
- (a) Features of a report
 - (b) Sales Letter

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PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) [3×10=30]

Attempt any three questions

- Q.1 Create an email informing a group of people in the workplace about a co-worker of theirs whose management position has been downgraded to a staff position. Be clear, direct and concise in your delivery of the information and your explanation for it. Take into account workplace morale and the ethics of this decision. Your email should be at least 150 words long.
- Q.2 Your workplace is deciding how to upgrade the desktop computer systems. Prepare a report comparing three types of brands. Identify what categories you would use to compare all three. Include what graphics might be necessary for this report. Include your final recommendation at the end of the analysis.
- Q.3 Write a job application in response to the advertisement for various faculty positions in June 2019 issue of the Hindustan Times to apply for the post of Assistant Professor in Computer Science. Write a detailed resume to be enclosed with it.
- Q.4 (a) Discuss the various elements of a formal report.
(b) Write brief notes on the following –
(i) Significance of reports.
(ii) Formal and non-formal reports.
- Q.5 With the advancement of technology, technical communication has also evolved and many unethical practices have been adopted by the professionals with a huge loss of reputation and assets. Throw light on the role of ethics and moral values in generating, analyzing and communication of technical information.
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4E1320

Roll No. _____

Total No. of Pages: **2****4E1320****B. Tech. IV - Sem. (Main) Exam., - 2022****Electrical Engineering****4EE3 – 04 Electronic Measurement & Instrumentation****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 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.
(Mentioned in form No. 205)*1. NIL2. NIL**PART – A****(Answer should be given up to 25 words only)****[10×2=20]****All questions are compulsory**

- Q.1 What are the applications of moving coil and moving iron instruments?
- Q.2 What are the limitations of wattmeter and energy meter?
- Q.3 Write the applications of current transformers.
- Q.4 Define the term burden in instrument transformers.
- Q.5 What do you mean by calibration and standardization of potentiometers?
- Q.6 Differentiate the AC and DC potentiometers.
- Q.7 What are the ranges of low, medium and high resistance?

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Q.8 What are the factors are considered in measurement of earth resistances?

Q.9 Draw the Phasor/vector diagram of Hay's Bridges.

Q.10 Draw the circuit diagram of De Sauty Bridge.

PART – B

(Analytical/Problem solving questions)

[5×4=20]

Attempt any five questions (Word limit 100)

Q.1 Explain the construction and working of Electrodynamics type instruments.

Q.2 Derive the expression of Blondel's Theorem for N-phase.

Q.3 Explain the effect of variation of power factor of instrument transformers.

Q.4 Draw and explain the diagram of slide wire potentiometers.

Q.5 Draw and explain the circuit diagram of Kelvin's double bridge method for measurement of resistance?

Q.6 What are the importance of Price's Guard wire method for measurement of resistance?

Q.7 Explain the circuit diagram and Phasor/vector diagram of Wien's Bridges.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

[3×10=30]

Attempt any three questions

Q.1 Explain the testing and calibration techniques of single phase energy meter by phantom loading.

Q.2 Discuss the ratio and phase angle errors and their minimization techniques of instrument transformers.

Q.3 Explain the working and application of AC potentiometers with neat diagram.

Q.4 What are the various difficulties are encountered in measurement of high resistances. Explain their overcome techniques.

Q.5 Explain the circuit diagram and Phasor/vector diagram of Anderson's Bridges with merits, demerits and applications.

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4E1321

Roll No. _____

Total No. of Pages: **3****4E1321****B. Tech. IV - Sem. (Main) Exam., - 2022****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 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. (Mentioned in form No. 205)*1. NIL2. NIL**PART – A****(Answer should be given up to 25 words only)****[10×2=20]****All questions are compulsory**

- Q.1 Write the equations of pitch factor and distribution factor for ac machine windings.
- Q.2 What is the essential condition for maximum torque development in 3 phase induction motor?
- Q.3 What is the relation between electrical angle and mechanical angle?
- Q.4 How the starting torque can be increased in an induction motor?
- Q.5 What is cogging?
- Q.6 Write applications of slip ring induction motors.

- Q.7 Write the relation of speed and frequency of a synchronous generator.
- Q.8 Write the methods used for removing hunting in synchronous motors.
- Q.9 Write backward and forward slips of a single phase induction motors.
- Q.10 Draw V Curves of a synchronous motors.

PART – B

(Analytical/Problem solving questions)

[5×4=20]

Attempt any five questions (Word limit 100)

- Q.1 Derive the fundamental and harmonic pitch factor of a short pitched AC winding.
- Q.2 Explain star delta starting method for induction motors.
- Q.3 Draw the equivalent circuit of a three phase induction motor under running conditions.
- Q.4 What are necessary conditions for parallel operation of alternators?
- Q.5 Explain how to determine the values of X_d and X_q for salient pole synchronous machine by slip test.
- Q.6 Explain working of synchronous condenser using phasor diagrams.
- Q.7 Draw the torque speed characteristic of a single phase induction motors.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

[3×10=30]

Attempt any three questions

- Q.1 How the rotating field is established in the air gap of three phase AC machines? Find out resultant field using phasor diagrams. [10]
- Q.2 (a) Draw and explain the complete torque speed characteristic of a 3 phase induction machine for all the operating modes. [6]
- (b) How the power is transferred from stator to the rotor of an induction motor? [4]

Q.3 Plot O.C.C. and S.C.C. for an alternator. Explain how the synchronous reactance and short circuit ratio are calculated from the characteristics plotted? [4+3+3=10]

Q.4 A 40 kVA, 600 V, 3-Phase, Y-connected synchronous motor has $R_a = 0.8 \Omega/\text{phase}$ and $X_s = 8 \Omega/\text{phase}$. It has stray loss of 2 kW. The motor is operating at 600 V, while supplying a shaft load of 30 kW it is drawing rated current at leading power factor. Calculate -

- (a) Motor efficiency [2]
- (b) Excitation emf and power angle [5]
- (c) For same excitation maximum power output (gross) and corresponding net output and the power angle. [3]

Q.5 (a) What is crawling and how it can be removed? Explain. [4]

- (b) A 230 V, 380 W, 50 Hz, 4 Pole, single phase induction motor gave the following test results-

No load test:	230 V	84 W	2.8 A
Block rotor test:	110 V	460 W	6.2A

The stator winding resistance is 4.6 ohm and during the block rotor test, the auxiliary winding is open. Determine the equivalent circuit parameters. [6]

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4E1322

Roll No. _____

Total No. of Pages: 2**4E1322****B. Tech. IV - Sem. (Main) Exam., - 2022****Electrical Engineering****4EE4 - 06 Power Electronics****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 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.
(Mentioned in form No. 205)*1. NIL2. NIL**PART - A****(Answer should be given up to 25 words only)****[10×2=20]****All questions are compulsory**

- Q.1 What is meant by duty-cycle?
- Q.2 Write down three terminals of MOSFET and IGBT.
- Q.3 What are the different methods to turn on the Thyristor?
- Q.4 What is the function of freewheeling diodes in controlled rectifier?
- Q.5 Write the average output voltage formula in single phase full bridge rectifier.
- Q.6 Define holding and latching current in Thyristor.
- Q.7 In a single phase full converter output voltage during overlap is equal to.
- Q.8 Define effect of source inductance on performance of single phase and three phase full converter.
- Q.9 IGBT is a voltage controlled device. Why?
- Q.10 Which type of wave shape the output voltage of the ideal inverter consists of?

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PART – B

(Analytical/Problem solving questions)

[5×4=20]

Attempt any five questions (Word limit 100)

- Q.1 Differentiate between IGBT and MOSFET.
- Q.2 Describe different mode of operation of a Thyristor with the help of static V-I characteristic.
- Q.3 Draw and explain the V-I characteristic of MOSFET.
- Q.4 A 230V, 50Hz, one pulse SCR controlled converter is triggered at a firing angle of 40° and the load current extinguishes at an angle of 210° . Find the circuit turn off time, average output voltage and the average load current for $R=5\Omega$ and $L=2\text{mH}$.
- Q.5 Describe the different types of the inverter.
- Q.6 Describe the working of a single phase half bridge inverter. What is its main drawback? Explain how this drawback is overcome.
- Q.7 What is boost converter? Explain its operation. Sketch the input voltage input current output voltage output current waveforms.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

[3×10=30]

Attempt any three questions

- Q.1 Describe Reverse Recovery characteristic of power diode. Show that reverse recovery time and peak inverse current depend upon storage charge and rate of change of current.
- Q.2 Discuss the principle of working of a three-phase bridge VSI with an appropriate circuit diagram. Draw phase and line voltage waveforms on the assumption that each thyristor conduct for 180° and load is star connected resistive. The sequence of firing of various SCRs should also mention in diagram.
- Q.3 Describe the working of 3Φ fully controlled bridge converter in the rectifying mode and inversion mode. Derive the expressions for average output voltage and rms output voltage.
- Q.4 A-3 phase full converter Thyristor bridge feeds a resistive load R. Sketch input voltage waveforms and output waveform for angle of 30° .
- Q.5 Write down short note on –
 - (a) Bipolar sinusoidal modulation
 - (b) Unipolar sinusoidal modulation

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4E1323

Roll No. _____

Total No. of Pages: 2**4E1323****B. Tech. IV - Sem. (Main) Exam., - 2022****Electrical Engineering****4EE4 - 07 Signals & 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 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.
(Mentioned in form No. 205)*1. NIL2. NIL**PART - A****(Answer should be given up to 25 words only)****[10×2=20]****All questions are compulsory**

Q.1 Define even and odd signals.

Q.2 Draw signals –

(i) $-2u[n-2]$ (ii) $u[-n+3]$

Q.3 State Parseval's theorem.

Q.4 State homogeneity property of discrete time systems.

Q.5 State convolution property of Fourier transform.

Q.6 Define and draw discrete time real and complex exponential signal.

Q.7 Write mathematical expression of sampling theorem and define sampling time

Q.8 What is aliasing?

Q.9 What is state transition matrix?

Q.10 Write time shift property of Fourier series.

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PART – B

(Analytical/Problem solving questions)

[5×4=20]

Attempt any five questions (Word limit 100)

- Q.1 Write critical difference between continuous and discrete time complex exponential signals.
- Q.2 Differentiate zero-order hold and first-order hold sampler.
- Q.3 Determine the value of power and energy for the signal $x[n]=e^{j(\pi/2n+\pi/8)}$
- Q.4 For the given impulse responses of LTI systems check causal and stable systems
 $h(t)=e^{-6t}u(3-t)$
- Q.5 Determine the Laplace transform and region of convergence and pole zero plot for $x(t)=te^{2jt}$
- Q.6 Determine the z-transforms and sketch the ROC of the following signal –
 $x_1(n)=(1/3)^n ; n \geq 0$
 $(1/2)^{-n}; n < 0$
- Q.7 Write the expression of following properties of DTFT -
 (i) Time scaling
 (ii) Differencing and accumulation

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

[3×10=30]

Attempt any three questions

- Q.1 What do you understand by LTI system? State the properties of LTI system.
- Q.2 Consider the following periodic signal: $X_a(t)=1+\cos(10\pi t)$, suppose $x_a(t)$ is sampled with a sampling frequency of $f_s=8\text{Hz}$. Sketch the magnitude spectrum of sampled signal, does aliasing occur when $X_a(t)$ is sampled at the rate $f_s=8\text{Hz}$?
- Q.3 Draw block diagram representation for LTI system described by following difference equation –
 (i) $y[n]=\frac{1}{3}y[n-1]+\frac{1}{2}x[n]$
 (ii) $y[n]=\frac{1}{3}y[n-1]+x[n-1]$
- Q.4 Explain unit step response of an LTI system and determine the expression for impulse response in terms of step response.
- Q.5 Write and elaborate properties of ROC in Z transform.

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4E1324

Roll No. _____

Total No. of Pages: **2****4E1324****B. Tech. IV - Sem. (Main) Exam., - 2022****Electrical Engineering****4EE4 - 08 Digital Electronics****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 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.
(Mentioned in form No. 205)*1. NIL2. NIL**PART – A****(Answer should be given up to 25 words only)****[10×2=20]****All questions are compulsory**

- Q.1 Prove that $A + A'B = A+B$.
- Q.2 Distinguish between combinational and sequential circuit.
- Q.3 Implement a full adder using half adder.
- Q.4 Define flip flop.
- Q.5 State De-Morgan's theorem and mention its use.
- Q.6 Define 1's and 2's Complement of Binary Number with example.
- Q.7 Define 'Minterm' and 'Maxterm'.
- Q.8 State Distributive law and Duality principle.
- Q.9 State the necessity of multiplexer.
- Q.10 Define modulus of a counter? Write down the number of flip flops required for mod-5 counter?

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PART – B

(Analytical/Problem solving questions)

[5×4=20]

Attempt any five questions (Word limit 100)

- Q.1 Describe function of full sub-tractor circuit with its truth table, K-map simplification and logic diagram.
- Q.2 Design 1: 16 demultiplexer using 1: 4 demultiplexers.
- Q.3 Describe the working of Master-Slave JK Flip-Flop with Truth Table and Logic diagram.
- Q.4 Design 3-bit synchronous counter and draw output waveform.
- Q.5 Convert the following -
- (i) $(5C7)_{16} = (?)_{10}$
 - (ii) $(2598)_{10} = (?)_{16}$
 - (iii) $(10110)_2 = (?)_{10} = (?)_{16}$
- Q.6 Describe the procedure to design MOD-6 counter using IC 7490 in brief.
- Q.7 Design a four bit BCD adder using NAND gates only.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

[3×10=30]

Attempt any three questions

- Q.1 Realize the AND, OR, NOT, Ex-OR, Ex-OR GATE using NAND and NOR gate.
- Q.2 Realize the following function :
- (A) $F1 = \sum m (1, 2, 5, 6, 7, 11, 14)$
 - (B) $F2 = \pi M (0, 1, 2, 5, 6, 7, 8, 11, 12, 15)$
- Q.3 Describe the working principle of successive approximation type and dual slope ADC with the help of block diagram.
- Q.4 Design and explain decimal to BCD encoder.
- Q.5 Implement and explain the working of asynchronous 3 bit up-down counter with Truth Table and Logic diagram.
-

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4E1224

Roll No. _____

Total No. of Pages: 3

4E1224

B. Tech. IV- Sem. (Back) Exam., - 2022

HSMC Electrical & Electronics Engineering

4EX2-01 Biology

EE, EX

Time: 2 Hours

Maximum Marks: 80

Min. Passing Marks: 28

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three 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. (Mentioned in form No. 205)

1. NIL2. NIL**PART – A****(Answer should be given up to 25 words only)****[5×2=10]****All questions are compulsory**

- Q.1 Write down the similarity between Bird flying and aircraft.
- Q.2 Difference between prokaryotes and eukaryotes.
- Q.3 What does messenger RNA do during protein synthesis?
- Q.4 Define Glycolysis, and what is an energy currency?
- Q.5 What is the relationship between producers and consumers?

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PART – B

(Analytical/Problem solving questions)

[4×10=40]

Attempt any four questions

- Q.1 (a) Describe Mechanism of enzyme action with suitable examples.
(b) What are Genetic Codes?
- Q.2 What is the breakdown of glucose? Explain it with suitable cycle, and examples.
- Q.3 Write notes on –
(a) Sugars starch and Glucose
(b) Amino acids and Proteins
(c) Nucleotides and DNA/RNA
(d) Difference between DNA/RNA
- Q.4 What are Enzymes? How to monitor enzyme catalyzed reactions?
- Q.5 (a) Some bacteria dies quickly after drying, why?
(b) Agra is used for solidifying culture media, Why?
(c) Growth Kinetics
- Q.6 (a) How to meiosis and mitosis are as a part of Genetics, explain with suitable examples?
(b) How Genetic material passes from parent to offspring?

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

[2×15=30]

Attempt any two questions

- Q.1 (a) Explain Krebs cycle in detail, add a note on its significance.
(b) Explain concept of energy charge.

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- Q.2 (a) What is the Molecular basis of DNA? Explain Double Helix DNA structure. What is Nucleosome?
- (b) Difference between –
- (i) Exothermic & Endothermic
 - (ii) Endergonic & Exergonic reactions
- Q.3 (a) Classified organisms based on three kingdom classification.
- (b) What are Autotrophs, Heterotrophs and Lithotrophs? Explain with example.
- (c) Discuss the concept of complementation using Human Genetics?
-

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Roll No. _____

Total No. of Pages: 2

3E1103

3E1103

B. Tech. IV - Sem. (Back) Exam., - 2022

HSMC Aeronautical Engineering

4AN1-03/ Managerial Economics and Financial Accounting

Common for all branches

Time: 2 Hours

Maximum Marks: 80

Min. Passing Marks: 28

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three 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.
(Mentioned in form No. 205)*

1. NIL

2. NIL

PART – A

(Answer should be given up to 25 words only)

[5×2=10]

All questions are compulsory

Q.1 Circular flow of economic activity

Q.2 Demand forecasting

Q.3 Define marginal cost

Q.4 Oligopoly marker

Q.5 Capital budgeting

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PART – B

(Analytical/Problem solving questions)

[4×10=40]

Attempt any four questions

- Q.1 What is Managerial Economic? What are the principles of Managerial Economic?
- Q.2 What is National Income and methods of measuring National Income?
- Q.3 What is Price Elasticity? Explain types of Price Elasticity of Demand.
- Q.4 Discuss the different cost concepts relevant to managerial decision for Planning and Control.
- Q.5 Describe the characteristics of Pure/Perfect Competition and Pure Monopoly.
- Q.6 What are Financial Ratios? Explain two Financial Ratios in detail.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

[2×15=30]

Attempt any two questions

- Q.1 What is Law Supply? What are the determinants of Supply? Explain four determinates in detail.
- Q.2 State and explain the law of variable proportions.
- Q.3 What is Financial Statement Analysis? What are the three basic tools for Financial Statement Analysis?
-

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4E1225

Roll No. _____

Total No. of Pages: 2**4E1225****B. Tech. IV- Sem. (Back) Exam., - 2022****HSMC Electrical & Electronics Engineering****4EX3 – 04 Electronic Measurement & Instrumentation****EE, EX****Time: 2 Hours****Maximum Marks: 80****Min. Passing Marks: 28***Instructions to Candidates:**Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three 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.
(Mentioned in form No. 205)*1. NIL2. NIL**PART – A****(Answer should be given up to 25 words only)****[5×2=10]****All questions are compulsory**

- Q.1 For moving iron type instruments, give the expression for the deflecting torque.
- Q.2 Mention error in dynamometer wattmeters.
- Q.3 What is Wagner earthing device? Why it is used in measurable by AC bridges?
- Q.4 State an application of AC potentiometers.
- Q.5 What difficulties are encountered in measuring high resistance?

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PART – B

(Analytical/Problem solving questions)

[4×10=40]

Attempt any four questions

- Q.1 Derive the expression for the ratio and phase angle error.
- Q.2 What are the various types of error in induction type energy meter? Explain the methods incorporated for their compensation.
- Q.3 Define Instrument Transformer and explain the construction of both current and potential transformer.
- Q.4 Briefly explain Price Guard Wire Method.
- Q.5 Explain Testing and calibration of single phase energy meter by phantom loading.
- Q.6 Write a brief note on Wien's bridge for capacitance and frequency measurement.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

[2×15=30]

Attempt any two questions

- Q.1 Draw the diagram of DC potentiometer. What is meant by standardization of potentiometer & how can a potentiometer be used?
- (a) For calibration of voltmeter
 - (b) For calibration of wattmeter
- Q.2 Draw the circuit diagram of AC Bridge. Derive the conditions for balancing the bridge and draw the pharos diagram during balanced condition.
- Q.3 Write notes on –
- (a) Volt ratio box
 - (b) Measurement of earth resistance
 - (c) Applications of CT & PTs
-

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4E1226

Roll No. _____

Total No. of Pages: 4

4E1226

**B. Tech. IV- Sem. (Back) Exam., - 2022
PCC Electrical & Electronics Engineering
4EX4 – 05 Electrical Machine - II
EE, EX**

Time: 3 Hours

**Maximum Marks: 120
Min. Passing Marks: 42**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five 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.
(Mentioned in form No. 205)*

1. NIL

2. NIL

PART – A

(Answer should be given up to 25 words only)

[10×2=20]

All questions are compulsory

Q.1 Why starter is necessary for starting induction motor?

Q.2 Explain hunting of a synchronous machine.

Q.3 Differentiate between constant magnetic field and pulsating magnetic field.

Q.4 Explain cogging in 3 – phase induction motor.

Q.5 Define slip in terms of induction motor.

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- Q.6 Explain why a rotating field system is preferred in synchronous generators instead of stationary field system?
- Q.7 Define distribution factor.
- Q.8 Why single phase induction motor is not self-starting?
- Q.9 Define pitch factor.
- Q.10 What do you mean by synchronizing power?

PART – B

(Analytical/Problem solving questions)

[5×8=40]

Attempt any five questions

- Q.1 The test data on a 3 – phase star connected induction motor is given below -

No load test:

Line to line voltage = 400V

Input power = 1720W

Input current = 18A

Friction and windage loss = 580W

Block rotor test:

Line to line voltage = 50V

Input power = 2500W

Input current = 60A

Determine the equivalent circuit parameters if stator resistance is 0.15Ω per phase.

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- Q.2 Derive the emf equation of an AC machine having short pitched and distributed armature winding of three phases.
- Q.3 A 3-phase, 10KVA, 400V, 50Hz star connected alternator supplies the rated load at 0.8 power factor lagging. If the armature resistance is 0.5Ω and synchronous reactance is 10Ω . Find the torque angle and voltage regulation.
- Q.4 Explain the double field revolving theory of single – phase induction motor. Also derive the equation for net torque developed in the motor.
- Q.5 List out the methods of speed control of three phases Induction Motor. Explain any one in detail with neat diagram.
- Q.6 Explain how rotating magnetic field is produced by three phase current.
- Q.7 Draw the phasor diagram for lagging power factor and derive the output power equation of a salient pole synchronous generator. Also draw its power angle characteristics.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) [4×15=60]

Attempt any four questions

- Q.1 Explain briefly with neat diagrams the effect of varying excitation upon armature current and power – factor of a synchronous motor when input power to motor is maintained constant. Draw V – curves and state their significance.

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Q.2 A 10HP, 4-pole, 50Hz, 3-phase induction motor runs at 1450 rpm on full load. The stator copper loss is 231W and the rotational loss is 343W, determine –

- (i) Shaft torque
- (ii) Mechanical power developed
- (iii) Air gap power
- (iv) Rotor copper loss and
- (v) Motor efficiency

Q.3 Draw the torque – slip characteristic of a 3-phase induction motor and explain it. Find condition of maximum torque. Show the effect of rotor resistance on torque slip characteristic.

Q.4 (i) A 3-phase, 50Hz, 2 – pole, star connected turbo alternator as 54 slots with 4 conductors per slot. The coils are short pitched by 2 slots less than the pole pitch. If the machine gives 3300V between lines on open circuit with sinusoidal flux distribution, determine the useful flux per pole.

(ii) Explain working of synchronous condenser with its phasor diagram.

Q.5 Short notes on –

- (i) Potier – triangle method
- (ii) Two bright one dark lamp method

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4E1227

Roll No. _____

Total No. of Pages: **3****4E1227**

B. Tech. IV- Sem. (Back) Exam., - 2022
PCC Electrical & Electronics Engineering
4EX4 – 06 Power Electronics
EE, EX

Time: 3 Hours

Maximum Marks: 120
Min. Passing Marks: 42

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five 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.
 (Mentioned in form No. 205)*

1. NIL2. NIL**PART – A****(Answer should be given up to 25 words only)****[10×2=20]****All questions are compulsory**

- Q.1 What is commutation in SCR? Explain its classification.
- Q.2 Draw & explain two transistor model of a thyristor.
- Q.3 Why a bridge type full wave rectifier is preferred over a center tap full wave rectifier?
- Q.4 What are the merits and demerits of voltage commuted chopper?
- Q.5 Explain uses of square wave operation.
- Q.6 How are inverters classified?

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- Q.7 Explain modulation index.
- Q.8 What is the ripple factor in rectification?
- Q.9 Explain the term duty ratio.
- Q.10 Explain the safe operating areas of IGBT.

PART – B

(Analytical/Problem solving questions)

[5×8=40]

Attempt any five questions

- Q.1 The trigger circuit of a thyristor has a source voltage of 15V and the load line has a slope of -120V per Ampere. The minimum gate current to turn on the SCR is 25mA. Compute –
- (a) Source resistance required in the gate circuit.
- (b) The trigger voltage and trigger current for an average gate power dissipation of 0.4 waltz.
- Q.2 Describe the working of a single phase full converter in the inverter mode with RLE load.
- Q.3 Describe the principle of DC chopper operation. Derive an expression for its average DC output voltage.
- Q.4 For a DC-DC Boost converter, explain relation between duty ratio and average output voltage.
- Q.5 Explain unipolar sinusoidal modulation in single voltage source inverter.
- Q.6 What is the purpose of connecting diodes in antiparallel with thyristors in inverter circuits?
- Q.7 Describe the switching characteristics of power MOSFET.

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PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) [4×15=60]

Attempt any four questions

Q.1 Show that for a DC to DC converter the critical inductance of the filter circuits is given by –

$$L = \frac{V_o^2(V_s - V_o)}{2fV_sP_o}$$

Where, V_o , V_s , P_o and f are load voltage, source voltage, load power and chopping frequency respectively.

Q.2 (a) Explain the working of P-channel MOSFET with the help of output characteristics and switching waveforms.

(b) Discuss how SCRs suffer from unequal voltage distribution across them and during their turn on and turn off process.

Q.3 A three phase bridge inverter delivers power to a resistive load from a 450 volt DC source for a star connected load of 10Ω per phase, Determine for both (a) 180° mode (b) 120° mode (i) rms value of load current (ii) rms value of thyristor current (iii) load power.

Q.4 (a) With the help of circuit diagram, explain the working of step-up chopper.

(b) A step up chopper has input voltage of 660V. If the non-conducting time of thyristor chopper is $100\mu s$, compute the pulse width of output voltage.

Q.5 (a) Describe the working of a single phase series inverter with appropriate circuit and waveforms.

(b) For above inverter, derive an expression for the output frequency in terms of circuit parameters and T_{off} .

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4E1228

Roll No. _____

Total No. of Pages: 4**4E1228**

B. Tech. IV- Sem. (Back) Exam., - 2022
PCC Electrical & Electronics Engineering
4EX4 – 07 Signals & Systems
EE, EX

Time: 3 Hours

Maximum Marks: 120
Min. Passing Marks: 42

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five 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.
 (Mentioned in form No. 205)*

1. NIL2. NIL

PART – A

(Answer should be given up to 25 words only)

[10×2=20]

All questions are compulsory

- Q.1 Define transformation of the independent variable using with suitable example.
- Q.2 Give the relationship between unit impulse function and unit step function.
- Q.3 Discuss the Continuous – Time LTI System using with suitable example.
- Q.4 Define convergence of the Fourier Series and also explain the mathematical expression of this Fourier Series.
- Q.5 What are Dirichlet Conditions?
- Q.6 Explain Geometric evaluation of the Fourier transform from the pole zero condition.

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- Q.7 Discuss the linearity of the Laplace Transform.
- Q.8 Define properties of the z – transform in Signals Conditions.
- Q.9 What is Aliasing phenomenon? How can aliasing be eliminated?
- Q.10 Discuss the analysis and characterization of LTI system using z – transform.

PART – B

(Analytical/Problem solving questions)

[5×8=40]

Attempt any five questions

- Q.1 Determine whether or not each of the following continues-time signals is periodic. If the Signal is periodic, determine its fundamental period –

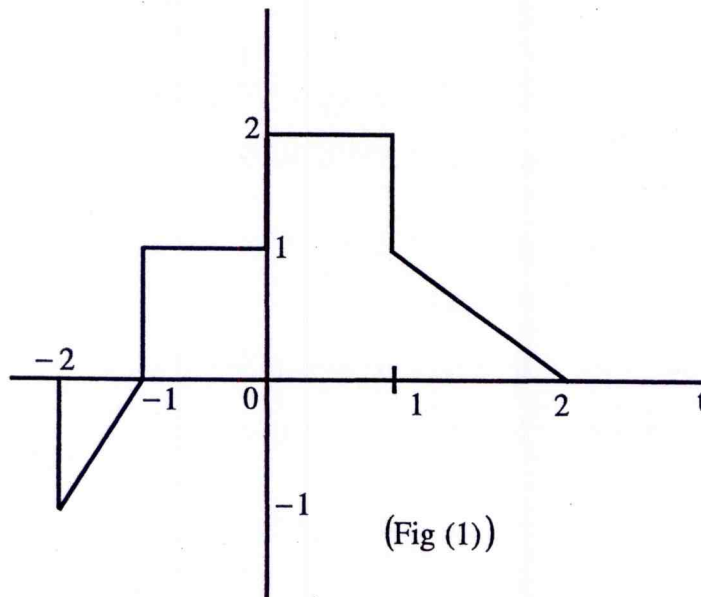
(a) $x(t) = 3\cos(4t + \pi/3)$

(b) $x(t) = \sum_{n=-\infty}^{\infty} e^{-(2t-n)} \mu(2t-n)$

- Q.2 A continues-time Signal $x(t)$ is shown in fig(1). Sketch and label carefully each of the following signals –

(a) $x(2t + 1)$

(b) $x(4 - t/2)$



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Q.3 State and prove the initial value and final value theorem of Laplace Transform.

Q.4 Determine and sketch the convolution of the following two Signals –

$$x(t) = \begin{cases} t + 1, & 0 \leq t \leq 1 \\ 2 - t, & 1 < t \leq 2 \\ 0, & \text{elsewhere} \end{cases}$$

$$h(t) = \delta(t + 2) + 2\delta(t + 1)$$

Q.5 Explain the Fourier Series Filtering System using their frequency response curves –

- (a) Frequency shaping filters
- (b) Frequency selective filters

Q.6 Define Sampling of Discrete time Signals and also explain impulse – Train Sampling using their mathematical and Signal waveform.

Q.7 Suppose that the algebraic expression for the z transform of $x[n]$ is –

$$x(z) = \frac{1 - \frac{1}{4}z^{-2}}{(1 + \frac{1}{4}z^{-2})(1 + \frac{5}{4}z^{-1} + \frac{3}{8}z^{-2})}$$

How many different regions of convergence could correspond to $X(z)$?

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) [4×15=60]

Attempt any four questions

Q.1 State and prove the Sampling Theorem. Also explain interpolation with zero – order hold circuit.

Q.2 We are given the following five factor about the real signals $x(t)$ with Laplace transform $X(s)$ –

- (a) $X(s)$ has exactly two poles
- (b) $X(s)$ has no zeros in the finite S – plane
- (c) $X(s)$ has a pole at $S = -1 + j$
- (d) $e^{2t}x(t)$ is not absolutely integrable
- (e) $X(0) = 8$

Determine $X(s)$ and specify its region of convergence.

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Q.3 Consider the continues-time LTI System for which the input $x(t)$ and output $y(t)$ are related by the differential equation.

Let $X(s)$ and $Y(s)$ denote Laplace transform of $x(t)$ and $y(t)$ respectively and let $H(s)$ denote the Laplace transform of $h(t)$, the system impulse response –

- (a) Determine $H(s)$ as a ratio of two polynomials in S . Sketch the pole zero pattern of $H(s)$.
- (b) Determine $h(t)$ for each of the following cases –
 - (i) The system is stable
 - (ii) The system is causal

Q.4 A discrete time periodic signal $x(n)$ is real valued and has a fundamental period $N = 5$.

The non-zero Fourier Series Coefficients for $x[n]$ are –

$$a_0 = 2, a_2 = \frac{2}{a-2} = 2e^{j\pi/6}, a_4 = \frac{2}{a-4} = e^{j\pi/3}$$

Express $x(n)$ in the form

$$x[n] = A_0 + \sum_{K=1}^{\infty} A_K \sin(\omega_K n + \phi_K)$$

Q.5 Show that the convolution of an odd and even function is an odd function and the convolution of two odd or two even functions is an even function.

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4E1229

Roll No. _____

Total No. of Pages: **3****4E1229**

B. Tech. IV- Sem. (Back) Exam.,- 2022
HSMC Electrical & Electronics Engineering
4EX4 – 08 Digital Electronics
EE, EX

Time: 2 Hours

Maximum Marks: 80
Min. Passing Marks: 28

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three 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.
 (Mentioned in form No. 205)*

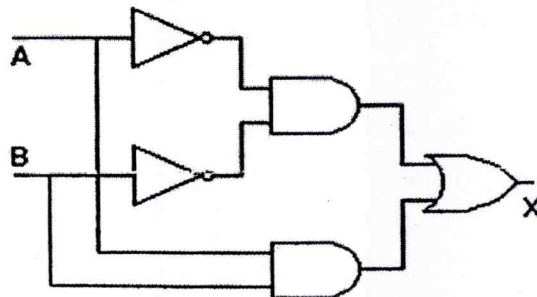
1. NIL2. NIL**PART – A****(Answer should be given up to 25 words only)****[5×2=10]****All questions are compulsory**

Q.1 Differentiate between the basic and universal logic gates. Give their symbols also.

Q.2 Simplify:

$$F = (XY' + X'Y)' (X+Y)$$

Q.3 Complete the truth table for the combinational circuit shown in the following figure –



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Q.4 Convert the following -

(i) $(110101)_2 = (?)_8$

(ii) (1010) gray code = $(?)$ excess-3 code

Q.5 Perform the subtraction using 2's complement arithmetic's -

(i) $(11011)_2 - (11001)_2$

(ii) $(10001)_2 - (11001)_2$

PART – B

(Analytical/Problem solving questions)

[4×10=40]

Attempt any four questions

Q.1 Implement a full subtracter using a 3 to 8 Decoder.

Q.2 Realize the following Boolean function using 4:1 multiplexer

$$F(W,X,Y,Z) = \sum m(0,3,5,7,9,11,13,15)$$

Q.3 Design a 3-bit synchronous Up/Down counters using T-Flip Flop.

Q.4 Briefly differentiate between Schottky TTL and Totem pole configuration in TTL logic family.

Q.5 Draw a logic diagram of clocked S-R flip flop and obtain its characteristics equation. Also show its excitation table.

Q.6 Explain a 4-bit R-2R ladder type D/A converter in detail.

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PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) [2×15=30]

Attempt any two questions

- Q.1 (a) Discuss a decade counter and its working principle.
- (b) Design a synchronous BCD counter with J-K flip flops.
- (c) Draw the clock and Q-output waveforms of each stage of a MOD-8 countdown ripple counter triggered by the clock trailing edge.
- Q.2 Reduce the following equation using Quine McCluskey (QM) method of minimization
- $$F = \sum m(0,2,3,6,7,8,10,11,12,15)$$
- Q.3 Write short notes on (any three) -
- (a) BCD to 7-Segment decoder
- (b) Field Programmable Gate Array (FPGA)
- (c) Dual slope A/D converter
- (d) Universal shift registers
- (e) Error detecting and correcting codes
-

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4E4120

Roll No. _____

Total No. of Pages: 2**4E4120****B. Tech. IV - Sem. (Back) Exam., - 2022****Electrical Engineering
4EE1A Analog Electronics
EE, EX, EC, EI****Time: 3 Hours****Maximum Marks: 80
Min. Passing Marks: 24****Instructions to Candidates:**

*Attempt any **five** questions, selecting **one** question from **each** unit.
All questions carry **equal** marks. 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. NIL2. NIL**UNIT- I**

- Q.1 (a) The overall gain of a multistage amplifier is 140. When negative voltage feedback is applied, the gain is reduced to 17.5. Find the fraction of the output that is feedback to the input. [8]
- (b) Write about general characteristics of negative feedback in details. [8]

OR

- Q.1 (a) An amplifier has a current gain of 240 and input impedance of 15 k Ω without feedback. If negative current feedback ($m_i = 0.015$) is applied, what will be the input impedance of the amplifier? [8]
- (b) Discuss about Miller compensation in amplifiers. [8]

UNIT- II

- Q.2 (a) Write the difference between Hartley and Colpitts oscillator and derive the expression for their oscillating frequencies. [8]
- (b) Explain the working and hence derive the expression for Wien Bridge oscillator. [8]

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OR

Q.2 Explain the following with required circuit diagrams –

- (a) Astable Multivibrator [8]
- (b) Bistable Multivibrator [8]

UNIT- III

Q.3 Draw the hybrid π model and explain each parameter and also find the inter relation between h parameter and hybrid π parameters. [16]

OR

- Q.3 (a) Draw the high frequency equivalent circuit of an emitter follower and derive the expression for upper cut – off frequency f_H . [8]
- (b) Drive the expression for CE amplifier current gain and voltage gain. [8]

UNIT- IV

- Q.4 (a) Draw and explain the circuit of single tuned amplifier with the help of frequency response. [8]
- (b) Draw and explain the circuit of Stagger tuned amplifier with the help of frequency response. [8]

OR

Q.4 Write the short note on followings –

- (a) Band Pass Amplifier [8]
- (b) Parallel Resonant Circuit [8]

UNIT- V

Q.5 Discuss the followings –

- (a) Cross over distortion [8]
- (b) Harmonic distortion [8]

OR

Q.5 Write the efficiency analysis for –

- (a) Class A amplifier [8]
- (b) Class B Amplifier [8]

4E4122

Roll No. _____

Total No. of Pages: **3**

4E4122

B. Tech. IV - Sem. (Back) Exam., - 2022
Electronic Instrumentation & Control Engineering
4EI3A Electrical Measurements
EE, EX, EI

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five** questions, selecting **one** question from **each** unit.
All questions carry **equal** marks. 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. NIL

2. NIL

UNIT- I

Q.1 (a) Explain the constructional details of an electro-dynamometer type wattmeter.

Derive the expression for torque when the instrument is used on a.c. Explain, why it is necessary to make the potential coil circuit purely resistive? [8]

(b) A moving-coil instrument whose resistance is 25Ω gives a full-scale deflection with a voltage of 25 mV. This instrument is to be used with a series multiplier to extend its range to 10 V. Calculate the error caused by 10°C rise in temperature. [8]

OR

- Q.1 (a) Describe errors in wattmeter and their compensation and adjustment. [8]
- (b) The inductance of a moving iron instrument is given by: $L = (10 + 5\theta - \theta^2) \mu\text{H}$ where θ is the deflection in radian from zero position. The spring constant is $12 \times 10^{-6} \text{ Nm/rad}$. Estimate the deflection for a current of 5A? [8]

UNIT- II

- Q.2 (a) Explain measurement of power and reactive KVA in 3-phase induction balanced and unbalanced system. [10]
- (b) Explain testing of CTs and PTs? [6]

OR

- Q.2 (a) Describe construction and operation of current and potential transformers and explain ratio and phase angle errors and their minimization? [8]
- (b) Explain three wattmeter method for measurement of power in three phase circuits. [8]

UNIT- III

- Q.3 (a) Explain the construction & working of Crompton potentiometers and its applications. [8]
- (b) Explain the use of the potentiometer for measurement of resistance and ammeter calibrations? [8]

OR

- Q.3 (a) Explain construction and operation of AC potentiometer and explain its applications. [8]
- (b) Write short notes on – [3+5=8]
- (i) Volt ratio box
- (ii) Slide wire potentiometer

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UNIT- IV

- Q.4 (a) Explain the working principle of fall of potential method for measurement of earth resistance. [8]
- (b) Explain ammeter and voltmeter method. [8]

OR

- Q.4 (a) Describe Kelvin's double bridge method. [8]
- (b) Explain substitution method for measurement of resistance. [8]

UNIT- V

Q.5 Describe the following –

- (a) Hay's bridge [8]
- (b) De Sauty bridge for capacitance measurement [8]

OR

Q.5 Explain the following –

- (a) Source of error in bridge measurement & precautions [5]
- (b) Wagner Earth device [5]
- (c) Wien's bridge for capacitance & frequency measurement [6]
-

4E4174

Roll No. _____

Total No. of Pages: 4

4E4174

B. Tech. IV - Sem. (Back) Exam., - 2022

Electrical Engineering

4EE4A Generation of Electrical Power

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

Instructions to Candidates:

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. 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. NIL

2. NIL

UNIT- I

- Q.1 (a) Explain the working of modern steam power plant with neat sketch. [8]
- (b) Explain the working of a hydroelectric power plant with neat sketch, also explain the importance and working of the penstock and surge tank in a hydroelectric power plant. [8]

OR

- Q.1 (a) Draw suitable diagrams for open cycle and close cycle gas turbine plants, and enumerate the advantages of the closed cycled gas turbine power plant over open cycle gas turbine power plant. [8]
- (b) Draw the schematic diagram of a Nuclear Power Plant along with its advantages and disadvantages. [8]

UNIT- II

- Q.2 (a) Explain the effect of nuclear and hydro power stations on the environment. [8]
- (b) What are the reasons for power crises in India? What will be the position of electrical supply in India in the years to come with the help of renewable energy sources? [8]

OR

- Q.2 (a) Explain the solar and tidal power plants for the generation of electrical energy. [8]
- (b) Explain the 'Green House Effect' in detail. [8]

UNIT- III

- Q.3 (a) The load on a power plant on a certain day is as under – [8]

Time	Load (in MW)
12 – 5 am	30
5 – 9 am	50
9 – 6 pm	80
6 – 10 pm	100
10 – 12 pm	20

Plot the chronological load curve and load duration curve, find the load factor of the plant and the energy supplied by the plant in 24 hours.

- (b) What are the causes and effects of low power factor? Explain in detail. Also explain the method of power factor improvement using synchronous condensers. [8]

OR

- Q.3 (a) A 1 - ϕ motor connected to 400 - V, 50 Hz supply takes 31.7 A at a power factor of 0.7 lagging. Calculate the capacitance required in parallel with the motor to raise the power factor 0.9 lagging. [8]
- (b) Explain the chronological load curve and the load duration curve and show how the load duration curve can be drawn from the chronological load curve with the help of an example. [8]

UNIT- IV

- Q.4 (a) What is depreciation reserve? Explain the sinking fund method to calculate the depreciation charges. [8]
- (b) A generating plant has a maximum capacity of 100 kW and costs ₹ 1,60,000. The annual fixed charges are 12% consisting of 5% interest, 5% depreciation and 2% taxes. Find the fixed charges per kWh if the load factor is - [8]
- (i) 100%
- (ii) 50%

OR

- Q.4 (a) Calculate the most economical power factor when kVA demand is constant. [8]
- (b) Explain Co - generation and energy conservation followed by their advantages and limitations. [8]

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UNIT- V

- Q.5 (a) Explain the major considerations for the selection of site for a nuclear power plant and a hydro power plant in detail. [8]
- (b) The monthly electricity consumption of a residence can be approximated as under – [8]

Light load : 5 Tube lights, 40W each, working for 3 hours daily

Fan load : 3 Fans, 100W each, working for 5 hours daily

Refrigerator load : 1 kWh daily

Miscellaneous load : 1 kW for one hour daily

Find the annual bill at the following tariff –

First 15 units ₹ 1.37 per kWh

Next 25 units ₹ 1.35 per kWh

Remaining units ₹ 1.16 per kWh

Constant charge of ₹ 3.52 per month.

OR

- Q.5 (a) What are the types of tariffs? Explain the general form of tariff. [8]
- (b) The monthly readings of a consumers meter are as under – [8]

Maximum demand = 60 kW

Energy consumed = 24,000 kWh

Reactive energy = 1,56,000 kVAR

If the tariff is ₹ 20 per kW of maximum demand plus 3 paise per unit 0.1 paise per unit plus 0.1 paise per unit for each 1% power factor below 85%, calculate the monthly bill of the consumer.

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Total No. of Pages: **3**

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B. Tech. IV - Sem. (Back) Exam., - 2022

Electrical & Electronics Engineering

4EX5A Electrical Machines-II

EE, EX

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five** questions, selecting **one** question from each unit. All questions carry **equal** marks. 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. NIL

2. NIL

UNIT- I

Q.1 (a) What is meant by distribution factor and pitch factor? Derive an expression for the distribution factor of winding in an alternator. [8]

(b) Explain, how the rotating magnetic field is developed in AC machines? [8]

OR

Q.1 (a) Explain the phenomenon of general equation of induced emf in an electrical machine. [8]

(b) Explain armature and field mmfs in ac machines. Also explain its rotating fields. [8]

2/2

UNIT- II

- Q.2 (a) Explain the construction of a three-phase induction motor with neat sketches of different parts. [5]
- (b) Discuss the principle of operation of 3-phase induction motor. How induction motor acts as transformer? [6]
- (c) A 3-phase, 50Hz induction motor has 6 poles and operates with a slip of 5% at a certain load. Determine: [5]
- (i) the speed of the rotor with respect to the stator.
 - (ii) the frequency of the rotor current.
 - (iii) the speed of the rotor magnetic field with respect to rotor.
 - (iv) the speed of the rotor magnetic field with respect to stator and
 - (v) the speed of the rotor magnetic field with respect to the stator magnetic field.

OR

- Q.2 (a) Derive the equation for torque of an induction motor under running condition. Find the condition for maximum torque under running condition. Draw torque-slip characteristics. [8]
- (b) Explain the power flow diagram of a 3-phase induction motor with neat sketches. [8]

UNIT- III

- Q.3 (a) Derive the equivalent circuit of a 1-phase induction motor based upon revolving field theory. [8]
- (b) Explain the torque – slip characteristics of an induction motor with neat sketches. [8]

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OR

- Q.3 (a) Explain the construction and working of 1-phase synchronous motor with the help of neat sketches. [8]
- (b) Explain the working of stepper motor with neat diagram. [8]

UNIT- IV

- Q.4 (a) Describe the various schemes for exciting the large synchronous generators with neat sketches. [6]
- (b) Describe the phenomenon of OC and SC tests in synchronous generator. [5]
- (c) Define voltage regulation of an alternator. Explain various factors which may affect the regulation of an alternator. [5]

OR

- Q.4 (a) Describe the various schemes for exciting the large synchronous generators with neat sketches. [8]
- (b) Explain zero power factor characteristics and concept of Potier triangle in synchronous generator. [8]

UNIT- V

- Q.5 (a) Show that a synchronous motor has no starting torque. Describe the methods of starting the synchronous motor. [8]
- (b) Explain synchronous induction motor. [8]

OR

- Q.5 (a) Draw the equivalent circuit and phasor diagram by deriving an expression of electromagnetic power developed by a cylindrical rotor in synchronous motor. [8]
- (b) Explain the effect of varying excitation on armature current and power factor in a synchronous motor. Draw V curves and state their significance. [8]

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Total No. of Pages: 4

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B. Tech. IV - Sem. (Back) Exam., - 2022

Electrical & Electronics Engineering

4EX6A Advanced Engineering Mathematics – II

EE, EX

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

Instructions to Candidates:

Attempt any **five** questions, selecting **one** question from **each** unit.
All questions carry **equal** marks. 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. NIL

2. NIL

UNIT- I

- Q.1 (a) Using Lagrange's interpolation formula, find the polynomial which passes through the points (0, 2), (1, 3), (2, 12) and (5, 147). [8]
- (b) By using Newton – Raphson method, find root of $x^4 - x - 10 = 0$, which is near to $x = 2$ correct upto three places of decimals. [8]

OR

- Q.1 Solve the following system of equations, by the Gauss – Seidel method of iteration – [16]

$$27x + 6y - z = 85$$

$$6x + 15y + 2z = 72$$

$$x + y + 54z = 110$$

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UNIT- II

Q.2 (a) Find the first derivative of $f(x)$ at $x = 0.1$ & 0.4 from the following table – [8]

x	0.1	0.2	0.3	0.4
y	1.10517	1.22140	1.34986	1.49182

(b) Given the differential equation – [8]

$$\frac{dy}{dx} = \frac{x^2}{y^2+1}$$

with the initial condition $y=0$ when $x=0$, use Picard's method to obtain y for $x=0.25, 0.5$ and 1.0 correct to three places of decimals.

OR

Q.2 (a) Compute $\int_0^1 \frac{x^2}{1+x^3} dx$, using Simpson's $\frac{1}{3}$ rule, by dividing into four equal parts. [8]

(b) Using Runge-Kutta method, solve the following initial value problem for $x=1.2$ & 1.4 [8]

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

UNIT- III

Q.3 (a) State and prove orthogonal property of Bessel function. [8]

(b) Prove that – [8]

(i) $(2n+1)xP_n = (n+1)P_{n+1} + nP_{n-1}$

(ii) $\int_0^1 x^2 P_{n+1} P_{n-1} dx = \frac{2n(n+1)}{(4n^2-1)(2n+3)}$

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OR

Q.3 (a) Show that -

[8]

(i) $xJ'_n(x) = nJ_n(x) - xJ_{n-1}(x)$

(ii) $J_{3/2}(x) = \sqrt{\frac{2}{\pi x}} \left(\frac{\sin x}{x} - \cos x \right)$

(b) Show that -

[8]

$$(1 - 2xz + z^2)^{-1/2} = \sum_{n=0}^{\infty} z^n P_n(x), \quad |x| \leq 1, |z| < 1$$

UNIT- IV

Q.4 (a) A manufacturing firm produces steel pipes in three plants with daily production volume of 500, 1000 and 2000 units respectively. According to past experience it is known that the fractions of defective output produced by the three plants are respectively 0.005, 0.008 and 0.010. If a pipe is selected from a day's total production and found to be defective. Find out what is the probability that it came from the first plant?

[8]

(b) Find the moment generating function of a binomial distribution and hence, find the mean and variance.

[8]

OR

Q.4 (a) A random variable x has the following probability distribution -

[8]

x	0	1	2	3	4	5	6	7
P(x)	0	k	2k	2k	3k	K ²	2k ²	7k ² +k

Find -

- (i) The value of k,
- (ii) $P(1.5 < x < 4.5)$ and
- (iii) The distribution function

- (b) Suppose on an average 1 house in 1000 in certain district has a fire during a year. If there are 2000 houses in that district, what is the probability that exactly 5 houses will have a fire during the year? [8]

UNIT- V

- Q.5 (a) Two random variables have the following regression lines – [8]
 $3x+2y-26=0$ and $6x+y-31=0$
 Find the mean values and coefficient of correlation between x and y.

- (b) Find inverse Z transform of [8]

$$F(z) = \frac{6z^2}{(z-1)^4(z+5)}$$

OR

- Q.5 (a) Obtain the rank correlation coefficient for the following data – [8]

X:	68	64	75	50	64	80	75	40	55	64
Y:	62	58	68	45	81	60	68	48	50	70

- (b) Using Z transform, solve the difference equation [8]

$$6u_{n+2} - u_{n+1} - u_n = 0$$

$$\text{given that } u(0)=0, u(1)=1$$
