II B.Tech. I Semester Supplementary Examinations Nov/Dec 2022

Life Sciences for Engineers
(Common to All Branches)

Max. Marks: 70   Time: 3 Hours
Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)
****

		Marks	CO	Blooms Level
UNIT–I				
1.	Describe the types of cells and write the differences between prokaryotes and eukaryotes cells?	14M	1	2
	OR			
2. a)	Explain the differences between Plant cell and Animal cell?	7M	1	2
b)	Describe is mitochondrion? Write their structure and important functions and draw the labelled diagram?	7M	1	2
UNIT–II				
3.	Define the proteins? Write the structure and functions of proteins?	14M	2	1
	OR			
4.	Define the antibodies and Write the types and functions of antibodies?	14M	2	1
UNIT–III				
5.	Explain the Glycolysis pathway and importance?	14M	3	2
	OR			
6.	Discuss the Clavin cycle/C_3 cycle?	14M	3	2
UNIT–IV				
7. a)	Explain the three laws of inheritance with examples?	7M	3	2
b)	Briefly describe the transcription and translation?	7M	3	2
	OR			
8.	Explain the Process of DNA Replication in prokaryotic and eukaryotic animals?	14M	4	2
UNIT–V				
9. a)	Write short notes on restriction enzymes?	7M	5	1
b)	Explain the Importance of DNA Cloning?	7M	5	2
	OR			
10. a)	Explain the applications of transgenic animals?	7M	5	2
b)	Discuss the tools of Recombinant DNA Technology?	7M	5	2

***

Code: 19AC31T

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2022

Partial Differential Equations and Complex Variables

(Common to CE, EEE, ME and ECE)

Max. Marks: 70   Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

****

		Marks	CO	BL

UNIT–I

1. a) Find the L.T of $f(t) = \begin{cases} \sin t, \ 0 < t < f \\ 0 \quad , \ t > f \end{cases}$ 7M   CO1   L1

   b) Find the L.T of $\sin(wt + r)$ 7M   CO1   L1

OR

2. Using L.T, Evaluate $\int\limits_{0}^{\infty} \dfrac{e^{-t} - e^{-2t}}{t} dt$ 14M   CO1   L3

UNIT–II

3. a) Find $L^{-1}\left\{ \dfrac{3(s^2 - 2)^2}{2s^5} \right\}$ 7M   CO2   L1

   b) Find the inverse L.T of $\dfrac{4}{(s+1)(s+2)}$ 7M   CO2   L1

OR

4. Using convolution theorem , find $L^{-1}\left\{ \dfrac{1}{s^2(s+1)^2} \right\}$ 14M   CO2   L3

UNIT–III

5. Obtain the Fourier series expansion of $f(x)$ given that

   $f(x) = k\, x(f - x)$ in $\ 0 < x < 2f$ where   k   is   a

   constant.   14M   CO3   L3

OR

6. Find the half range Cosine and Sine series for the function $f(x) = x$ in the range $0 < x < f$

14M CO3 L1

UNIT–IV

7. Using the method of separation of variables, solve

$$\frac{\partial^2 z}{\partial x^2} - 2\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = 0$$

14M CO4 L3

OR

8. A string is stretched and fastened to two points at a distance $"l"$ apart. Motion is started by displacing the string in the form $y = k(lx - x^2)$ from which it is released at time $t = 0$. Find the displacement at any point on the string at a distance x from one end at time t.

14M CO4 L3

UNIT–V

9. a) Prove that

$$\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) \left| \mathrm{Re}\,al\ f(z) \right|^2 = 2\left| f'(z) \right|^2$$

where $w = f(z)$ is analytic.

10M CO5 L5

b) Show that $f(z) = z + 2\overline{z}$ is not analytic anywhere in the complex plane.

4M CO5 L1

OR

10. Evaluate $\int_c (y^2 + 2xy)dx + (x^2 - 2xy)dy$ where c is the boundary of the region by $y = x^2$ and $x = y^2$.

14M CO5 L5

END

Code: 19A432T

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2022
Random Variables Theory
(Electronics and Communication Engineering)

Max. Marks: 70   Time: 3 Hours
Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)
****

			Marks	CO	Blooms Level
	UNIT–I				
1. a)	Define probability. Write and explain the axioms of probability.		7M	CO1	L2
b)	An experiment consists of observing the sum of the numbers showing up when two dice are thrown. If only three events are of interest represented by A= {sum=7}, B = {8<sum<=11} and C={10<sum}. Calculate the probabilities of the events by developing the mathematical model for the given experiment.		7M	CO1	L3
	OR				
2. a)	Explain the concept of Total probability.		7M	CO1	L2
b)	A Single card is drawn from the deck of 52 cards, what is the probability of the following				
	i. Card will be a 5 or smaller?				
	ii. Card is less than 5.				
	iii. Find conditional probability of i / ii		7M	CO1	L3
	UNIT–II				
3. a)	Define Random variable. List and define the types of random variable.		4M	CO2	L2
b)	Define probability density function. List & prove their properties.		10M	CO2	L2
	OR				
4.	Define Gaussian density functions and derive the Gaussian distribution function.		14M	CO2	L2
	UNIT–III				
5. a)	Define an expected value of a random function g(X).		6M	CO3	L3
b)	A random X is uniformly distributed on the interval (-5, 15). Another random variable Y= $e^{-x/5}$ is formed. Find E[Y].		8M	CO3	L3
	OR				
6.	Find the variance of a random variable X, skew and co-efficient of skewness for the uniform density function.		14M	CO3	L3
	UNIT–IV				
7.	Define Joint probability density function and Explain the properties of joint distribution function.		14M	CO3	L2
	OR				
8.	Define and obtain the equations for joint moments about the origin and joint central moments.		14M	CO3	L3
	UNIT–V				
9.	Define auto correlation function and prove their properties.		14M	CO5	L2
	OR				
10. a)	State some useful classifications of Random Processes.		7M	CO4	L2
b)	List all the properties of covariance function.		7M	CO5	L2

***

Code: 19A434T

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2022

Signals & Systems

(Electronics and Communication Engineering)

Max. Marks: 70   Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

****

Marks

UNIT–I

1.	State and prove the properties of Fourier series	14M

OR

2.	a)	Explain the various operations on signals	7M
	b)	Write the Classification of systems based on certain properties.	7M

UNIT–II

3.	a)	What is the Significance of Hilbert Transform? Explain	7M
	b)	Obtain the Fourier transform of Signum function and sketch its phase spectrum.	7M

OR

4.	a)	Find the Fourier transform of x(t) = u(2t), where u(t) is the unit step function	7M
	b)	State and prove Time Convolution property of Fourier Transform.	7M

UNIT–III

5.	a)	State and derive the relationship between bandwidth and rise time.	7M
	b)	What are the characteristics of ideal LPF and HPF	7M

OR

6.	a)	Differentiate LTI system with LTV system.	7M
	b)	Find the impulse response of series RC limit. Explain the difference between causal and non-causal systems.	7M

UNIT–IV

7.		Compute & plot the convolution y(t) of the given signals: (i) x(t) = u(t-3) – u(t-5), h(t) = u(t). (ii) x(t) = u(t), h(t) = u(t).	14M

OR

8.	a)	State and prove Time convolution property	7M
	b)	State and prove any four properties of Auto correlation function	7M

UNIT–V

9.		Find the inverse z-transform of $x(z) = (z^2 + z) / (z-1)(z-3)$, ROC: z > 3. Using (i) Partial fraction method, (ii) Residue method	14M

OR

10.	a)	Explain the constraints on ROC for various classes of signals	7M
	b)	State and prove the following properties of z-transform. i) Time shifting ii) Time reversal iii) Differentiation iv) Scaling in z-domain	7M

***

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2022
Digital Design
(Electronics and Communication Engineering)

Max. Marks: 70   Time: 3 Hours
Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)
****

Marks

UNIT–I

1. a) What is the difference between 1's and 2's compliments? Give one example.   7M
   b) Write a short note on logic gates and their truth tables   7M

OR

2.   Determine the prime implicants of the following function and verify using k-map. Y
     (P,Q,R,S)=   (3,4,5,7,9, 13, 14, 15)   14M

UNIT–II

3. a) Implement the following function using NAND gates F = wx + x y (z + w)   9M
   b) Convert the given expression in standard POS form
      F1(A,B,C,D) = (A+B)(B+C)(A+C)   &   F2(P,Q,R) = (P+ Q')(P+R)   5M

OR

4. a) Realize the following expressions using NAND and NOR logic separately
      Y = PQ' + QS + Q'RS'   7M
   b) Using K-map method, simplify the following 4-variable function
      F(A,B,C,D) =   (0, 2, 4, 5, 6, 7, 8, 10, 13, 15)   7M

UNIT–III

5. a) Implement a full adder with two half adders and one OR gate and explain the operation of
      full adder with the help of truth table   7M
   b) Explain 3 x 8 decoder with the help of truth table   7M

OR

6. a) Realize full adder using two level basic gates.   7M
   b) With a neat diagram explain operation of 2-bit magnitude comparator   7M

UNIT–IV

7. a) With a neat diagrams explain the operation of Ring counter   7M
   b) Draw the logic diagram of LATCH using NOR and NAND gates   7M

OR

8. a) Compare synchronous and asynchronous sequential circuits.   6M
   b) Draw and explain the working of 3-bit synchronous up/down counter.   8M

UNIT–V

9. a) Design a sequence detector to detect the binary sequence 1111 using T Flip-flop   7M
   b) Draw a ASM chart for a 2-bit binary counter having one enable line E such that: E=1
      (counting enabled) E = 0(counting disabled)   7M

OR

10. a) Discuss about the capabilities and limitations of FSM   7M
    b) Compare Mealy and Moore machines   7M

***

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2022
Electrical Circuits and Technology
(Electronics and Communication Engineering)

Max. Marks: 70   Time: 3 Hours
Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)
****

Marks

UNIT–I

1. Explain Transient Response of RL Series Circuits for DC Excitation using differential equation approach   14M

OR

2. Explain source transformation and how can it be used to convert (i) a practical voltage source into a practical current source; (ii) a practical current source into a practical voltage source.   14M

UNIT–II

3. Define Average & RMS Value, Form Factor, Peak Factor, Peak Value, Peak to Peak Value   14M

OR

4. A parallel resonance network consisting of a resistor of 60 , a capacitor of 120uF and an inductor of 200mH is connected across a sinusoidal supply voltage which has a constant output of 100 volts at all frequencies. Calculate, the resonant frequency, the quality factor and the bandwidth of the circuit, the circuit current at resonance and current magnification.

14M
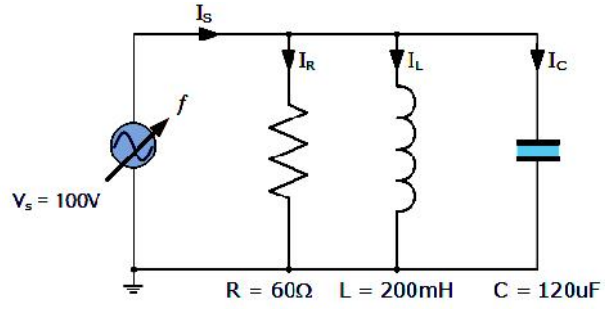
UNIT–III

5. Determine h parameters for the two port network shown below

14M
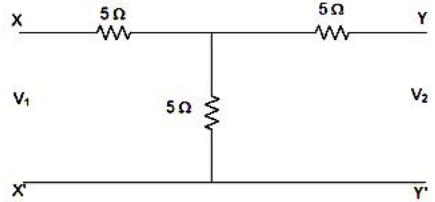
OR

6. When do we say that, an electric network is symmetrical? What are the conditions for an electrical network to be symmetrical in terms of (i) y-parameters; (ii) z-parameters; (iii) h-parameters   14M

UNIT–IV

7. How the efficiency of DC machine can be predetermined by using a swinburn's test with circuit diagram and give its advantages and disadvantages.   14M

OR

8. a) What is the function of commutator in a dc machines?   4M

   b) A 440 V dc shunt motor takes a current of 3 A at no load. The armature resistance including brushes is 0.3 and the field current is 1 A. Calculate the output and efficiency when the input current is 20 A.   10M

UNIT–V

9. a) Write the principle of Induction motor.   4M

   b) Explain with the help of suitable diagram how the rotating magnetic field is produced in a three phase motor?   10M

OR

10. Describe the method of calculating the regulation and efficiency of single phase transformer by open circuit and short circuit test.   14M

***

Code: 19A431T

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2022
Electronic Circuits
(Electronics and Communication Engineering)

Max. Marks: 70   Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

****

Marks

		UNIT–I	
1.	a)	Compare various coupling schemes used in amplifiers.	7M
	b)	Explain cascode amplifier operation with neat diagrams and mention its uses.	7M
		OR	
2.	a)	Draw the equivalent circuit of a CE amplifier using Millers theorem. What is the upper 3-dB frequency of such circuit?	7M
	b)	With a neat diagram, explain in detail about the operation of direct and transformer coupled amplifiers	7M
		UNIT–II	
3.	a)	Draw the hybrid –pi model of BJT. Explain the circuit elements in this model.	7M
	b)	Explain the frequency response of amplifier at Low, Mid and High frequencies	7M
		OR	
4.	a)	With hybrid equivalent circuit, derive the expressions for trans conductance.	7M
	b)	Derive the expression of Gain Bandwidth Product.	7M
		UNIT–III	
5.	a)	State and explain Barkhausen's criteria.	4M
	b)	Derive the expression for frequency of oscillations of RC phase shift oscillator.	10M
		OR	
6.	a)	Explain the working principle of crystal oscillator.	7M
	b)	In a transistorized Hartley oscillator the two inductances are 2 mH and 2 µH. if the frequency changed from 950 kHz to 1050 KHz, calculate the change in capacitor.	7M
		UNIT–IV	
7.	a)	Classify the different types of power amplifiers and explain them briefly.	4M
	b)	Analyze the operation of Series-Fed class A power amplifier and derive the expression for efficiency.	10M
		OR	
8.	a)	Derive the expression for the efficiency push pull class-B power amplifier.	10M
	b)	Define cross over distortion. And how to overcome it?	4M
		UNIT–V	
9.	a)	Explain Advantages, disadvantages and applications of tuned amplifiers	7M
	b)	Give the classification of large signal amplifiers	7M
		OR	
10.	a)	Derive the maximum efficiency of a transformer coupled class A Power amplifier.	7M
	b)	Explain class B push-pull amplifier operation with neat diagrams.	7M

***