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R-17

Code: 7G331

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 π 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 μ H. 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

Code: 7GC32

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

Engineering Mathematics-III

(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

UNIT-I

1. a) Using Taylor's series method, compute the value of y at $x=0.2$ from $\frac{dy}{dx} = x + y$; $y(0) = 1$. 7M
- b) Using the bisection method, find a real root of the equation $\cos x = xe^x$ correct to three decimal places. 7M

OR

2. Solve $y' = y^2 + x$, $y(0) = 1$. Using Taylor's series Method, Compute $y(0.1)$, $y(0.2)$ and $y(0.3)$. 14M

UNIT-II

3. a) The following table of values of x and y is given.

x	0	1	2	3	4	5	6
y	6.9897	7.4036	7.7815	8.1291	8.4510	8.7506	9.0309

Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x=6$ 7M

- b) Using Lagrange is interpolation formula find the value of $f(10)$ from the following table

x	5	6	9	11
y	12	13	14	16

7M

OR

4. Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x=1.1$ from the following table.

X	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

14M

UNIT-III

5. a) Fit a straight line $y = a + bx$ to the data by the method of least squares

x	0	1	3	6	8
y	1	3	2	5	4

7M

- b) Form the partial differential equation by eliminating a, b from $ax^2 + by^2 + z^2 = 1$ 7M

OR

6. a) Fit a curve $y = ae^{bx}$ to the following data by the method of least squares

x	0	1	2	3
y	1.05	2.10	3.85	8.30

7M

- b) Form a partial differential equation by eliminating the arbitrary functions from $z = f(x + at) + g(x - at)$. 7M

UNIT-IV

7. a) Express $f(x) = x$ as half range sine in $0 < x < 2$ 7M
 b) Find the Fourier series to represent $f(x) = f x$ in $0 \leq x \leq 2$ 7M

OR

8. a) Obtain the Fourier series for $f(x) = \left(\frac{f-x}{2}\right)^2$ in $0 < x < 2f$ 7M
 b) Find the half range cosine series for $f(x) = x(2-x)$ in $0 \leq x \leq 2$ and hence find prove that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \frac{1}{5^2} - \frac{1}{6^2} + \dots = \frac{f^2}{12}$ 7M

UNIT-V

9. a) Find the Fourier cosine transform of $f(x) = \begin{cases} x, & 0 < x < 1 \\ 2-x, & 1 < x < 2 \\ 0, & x > 2 \end{cases}$ 7M
 b) Find the finite Fourier sine and cosine transforms of $f(x)$ defined by

$$f(x) = \begin{cases} 1, & 0 < x < \frac{f}{2} \\ -1, & \frac{f}{2} < x < f \end{cases} \quad 7M$$

OR

10. a) Find the Fourier sin and cosine transform of $f(x) = 2e^{-5x} + 5e^{-2x}$ 7M
 b) Find the Fourier Transform of $f(x) = \begin{cases} a^2 - x^2, & \text{if } |x| < a \\ 0 & \text{if } |x| > a > 0 \end{cases}$, and hence show that

$$\int_0^a \frac{\sin x - x \cos x}{x^3} dx = \frac{f}{4}. \quad 7M$$

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Code: 7GC31

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

Environmental Science

(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)

UNIT-I

1. a) Define environment. Discuss briefly the importance of environment. 7M
- b) List out different branches of science having close relationship with environmental studies. 7M

OR

2. Explain the scope and importance of environmental studies. 14M

UNIT-II

3. a) Explain the various effects of land degradation. 7M
- b) Summarize the causes of deforestation. 7M

OR

4. Describe the advantages and problems associated with dams. 14M

UNIT-III

5. Identify and explain the major threats to the biodiversity. 14M

OR

6. a) Explain with the help of a diagram the nitrogen cycle. 7M
- b) Categorize the types of ecological pyramids. 7M

UNIT-IV

7. Discuss the effects of noise pollution and its control. 14M

OR

8. a) Discuss various control measures to minimize water pollution. 7M
- b) Explain the effects of marine pollution. 7M

UNIT-V

9. a) Explain the effects of depletion of ozone layer. 7M
- b) Describe briefly the environment and its relation to human health. 7M

OR

10. Describe the advantages and methods of rain water harvesting. 14M

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Code: 7G333

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. 7M
i) Time shifting ii) Time reversal iii) Differentiation iv) Scaling in z-domain

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Code: 7G132

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

Database Management Systems

(Computer Science and 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 are the advantages of DBMS? Explain. | 7M |
| b) Explain the advantages of using a query language instead of custom programs to process data. | 7M |

OR

- | | |
|---|-----|
| 2. a) Explain the differences between File Systems and DBMS | 4M |
| b) Explain the different roles of database administrators, application programmers, and end users of a database. Who needs to know the most about database systems? | 10M |

UNIT-II

- | | |
|---|----|
| 3. a) Distinguish strong entity set with weak entity set? Draw an ER diagram to illustrate weak entity set? | 8M |
| b) Explain the distinctions among the terms primary key, candidate key, and super key. | 6M |

OR

- | | |
|---|----|
| 4. a) Draw ER diagram for the airport database incorporating all the ER notations with explanation. | 8M |
| b) Write Merits and Demerits of ER Modeling. | 6M |

UNIT-III

- | | |
|---|----|
| 5. a) Briefly discuss about SQL join operators with examples. | 7M |
| b) Briefly discuss about data manipulation commands in SQL | 7M |

OR

- | | |
|---|----|
| 6. a) Compare the stored procedures with stored functions? | 7M |
| b) What are Correlated Queries how they are applied in SQL? | 7M |

UNIT-IV

- | | |
|--|----|
| 7. a) What is redundancy? Discuss the problems that may be caused by the redundancy with an example. | 7M |
| b) Define normalization. Explain second normal form with a suitable example. | 7M |

OR

- | | |
|---|----|
| 8. a) Define Boyce-Codd normal form (BCNF). How does it differ from 3NF? Why is it considered a strong form of 3NF? | 7M |
| b) Give an example of a relation schema R and a set of dependencies such that R is in BCNF but is not in 4NF. | 7M |

UNIT-V

- | | |
|---|----|
| 9. a) What is locking and explain different types of locks? | 7M |
| b) What is indexing in data storage and how it is used in organization of data? | 7M |

OR

- | | |
|--|----|
| 10. a) Illustrate concurrent execution of transaction with examples? | 6M |
| b) Discuss briefly about the dynamic index structure with one example? | 8M |

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Code: 7G332

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)

UNIT-I

Marks

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 5M
 $F1(A,B,C,D) = (A+B)(B+C)(A+C)$ & $F2(P,Q,R) = (P+ Q')(P+R)$

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

Code: 7G234

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

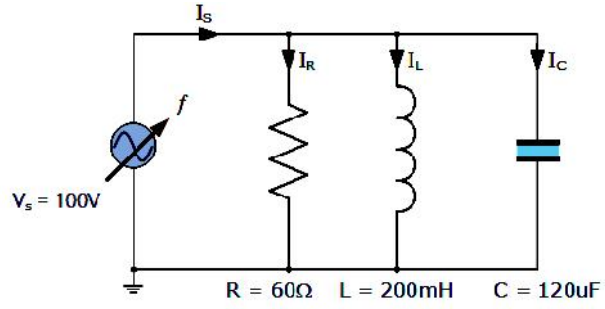
2. Explain source transformation and how can it be used to convert (i) a practical voltage source into a practical current source; (ii) a practical current source into a practical voltage source. 14M

UNIT-II

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

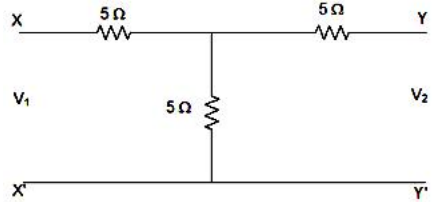
OR

4. A parallel resonance network consisting of a resistor of 60Ω , a capacitor of $120 \mu F$ and an inductor of $200 mH$ 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 0.3Ω 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
