

**Code: 7G331**

II B.Tech. I Semester Regular &amp; Supplementary Examinations November 2019

**Electronic Circuits**

( Electronics and Communication Engineering )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. Explain the four h-parameters of a transistor. How these parameters are found from the characteristics of the transistor amplifier?

Show that the voltage gain of CE amplifier with an emitter resistor  $R_E$  is

$$\frac{-h_{fe}R_L}{R_S + h_{ie} + h_{fe}R_L} \text{ by assuming } h_{fe} \gg 1. \text{ Neglect } h_{re} \text{ and } h_{oe}.$$

14M

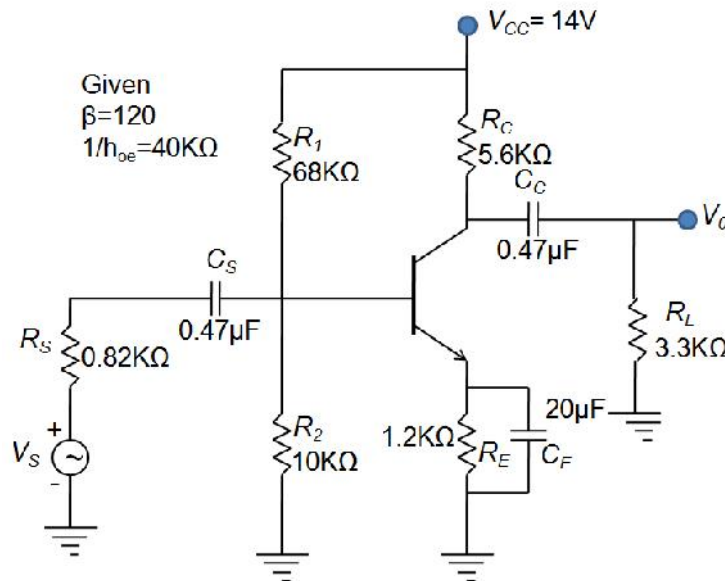
**OR**

2. Draw the equivalent circuit of a CE amplifier using Millers theorem. What is the upper 3-dB frequency of such circuit?

14M

**UNIT-II**

3. Given  $\beta=120$ ,  $1/h_{oe}=40K\Omega$ . Obtain the cutoff frequencies associated with  $C_S$ ,  $C_C$ , and  $C_E$ .



14M

**OR**

4. Consider a single stage CE transistor amplifier with the load resistor " $R_L$ ". Find out an approximation expression for the gain factor of this amplifier.

14M

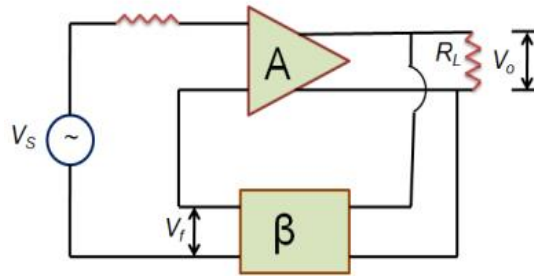
**UNIT-III**

5. Derive the input impedance ( $Z_i$ ) and output impedance ( $Z_o$ ) of a voltage series -ve feedback amplifier in terms of its open loop parameters.

14M

OR

6. What are the advantages of providing negative feedback to an amplifier? A series shunt feedback amplifier represented by figure using a basic voltage amplifier operates with  $V_S=100\text{mV}$  and  $V_o=10\text{V}$ . What are the values of  $A$  and  $\beta$  ?



14M

## UNIT-IV

7. Why +ve feedback is generally used in oscillator circuits? Derive the oscillation frequency of a RC Phase Shift Oscillator.

14M

OR

8. What are the primary requirements to obtain steady oscillation at a fixed frequency? Sketch the topology of a generalized resonant circuit oscillator, using impedance  $Z_1, Z_2, Z_3$ . Reduce this circuit to Hartley and Colpitts oscillator choosing components suitably? At what frequency will this circuit oscillate?

14M

## UNIT-V

9. Explain the working principle of a push pull power amplifier. Justify your answer mathematically

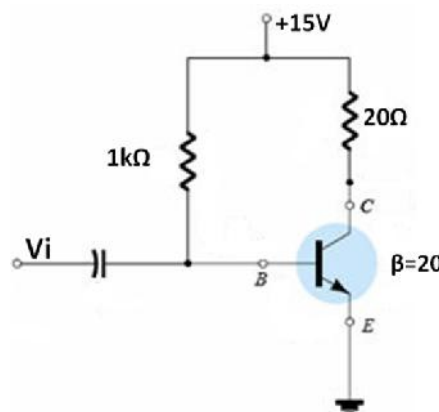
For a class-B Power Amplifier providing a 22V Peak signal to an 8  $\Omega$  load and a power supply of  $V_{CC}=25\text{V}$ . determine:

- Input Power,  $P_i(\text{dc})$
- Output Power,  $P_o(\text{ac})$  and
- Circuit efficiency, % .

14M

OR

10. a) Derive the maximum efficiency of a series fed class A Power amplifier.  
b) For the circuit shown, calculate the input power, the output power and efficiency of the amplifier for an input voltage resulting in a base current of 10mA peak.



14M

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Hall Ticket Number :										
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<b>R-17</b>
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**Code: 7GC32**

II B.Tech. I Semester Regular & Supplementary Examinations November 2019

**Engineering Mathematics – III**  
( Common to All Branches )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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<b>UNIT-I</b>
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1. a) Find a root of the equation  $x^3 - 2x - 5 = 0$  by using Bisection method.
- b) Find a root of the equation  $x \log_{10} x = 1.2$  by using Regula Falsi method.

**OR**

2. a) Solve  $y' = x + y$  given  $y(1) = 0$ . Find  $y(1.1)$  and  $y(1.2)$  by Taylor's method.
- b) Using Runge-Kutta method of order 4, find  $y(0.2)$  for the equation  $\frac{dy}{dx} = \frac{y-x}{y+x}, y(0) = 1$ .

<b>UNIT-II</b>
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3. a) Find the cubic polynomial which takes the following values. Hence find  $f(4)$ .

x	0	1	2	3
y	1	2	1	10

- b) Use Lagrange's Interpolation formula to the following data to find the values of  $y$  when  $x = 10$ .

x	5	6	9	11
y	12	13	14	16

**OR**

4. a) Apply Trapezoidal rule to evaluate  $\int_0^6 x \sec x dx$ .
- b) Use Simpsons  $\frac{1}{3}$ <sup>rd</sup> rule to find  $\int_0^{0.6} e^{-x^2} dx$ .

<b>UNIT-III</b>
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5. a) Fit a straight line of the form  $y = ax + b$  to the following data,

x	1	2	3	4	5	6	7	8
y	5.4	6.3	8.2	10.3	12.6	14.9	17.3	19.5

- b) Solve the Partial differential equation  $p^2 + q^2 = x + y$  by Charpit's method.

**OR**

6. a) Fit the second degree parabola to the following data.

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

- b) Using method of separation of variables, Solve  $3 \frac{\partial u}{\partial x} + 2 \frac{\partial u}{\partial y} = 0, u(x, 0) = 4e^{-x}$ .

## UNIT-IV

7. a) Expand the function  $f(x) = x \sin x$  as Fourier series in the interval  $-f \leq x \leq f$ .

Deduce that  $\frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - \frac{1}{7.9} + \dots = \frac{1}{4}(f - 2)$ .

- b) Expand  $f(x) = \frac{x}{2}$  as a Fourier series in the interval  $-f < x < f$ .

OR

8. a) Express  $f(x) = x$  as a half range cosine series in  $0 < x < 2$ .

- b) If  $f(x) = \begin{cases} x, & 0 < x < f/2 \\ f - x, & f/2 < x < f \end{cases}$  then show that

$$f(x) = \frac{4}{f} \left[ \sin x - \frac{1}{3^2} \sin 3x + \frac{1}{5^2} \sin 5x + \dots \right].$$

## UNIT-V

9. a) Using Fourier integral representation, show that  $\int_0^{\infty} \frac{\check{S} \sin x \check{S}}{1 + \check{S}^2} d\check{S} = \frac{f}{2} e^{-x}$ , ( $x > 0$ ).

- b) Find the Fourier cosine transform of  $f(x) = \frac{1}{1+x^2}$ .

OR

10. a) Find the Fourier sine transform of  $xe^x$ .

- b) Find the finite Fourier sine and cosine transform of  $f(x) = 2x$ ,  $0 < x < 4$ .

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**R-17**

**Code: 7GC31**

II B.Tech. I Semester Regular & Supplementary Examinations November 2019

**Environmental Science**

( Electronics and Communication Engineering )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) Briefly explain the scope and importance of environmental studies. 7M
- b) Categorize the disciplines of environment. Illustrate the significance of each. 7M

**OR**

2. a) Enumerate the need of public awareness in environmental protection. 7M
- b) Discuss the importance of public participation and institutions responsibilities in environmental activities. 7M

**UNIT-II**

3. a) Distinguish between traditional and modern agriculture. 7M
- b) Define Flood and Drought. Explain the causes for floods and drought. 7M

**OR**

4. a) Compare renewable and Non renewable energy sources with examples. 7M
- b) Enumerate the role of individuals in conservation of natural resources. 7M

**UNIT-III**

5. a) Explain forest ecosystem with their functional components. 7M
- b) Illustrate Food chain, Food web and ecological pyramid with example. 7M

**OR**

6. a) Outline the functional units of any one aquatic ecosystem with their components. 7M
- b) Categorize different values of biodiversity 7M

**UNIT-IV**

7. a) Classify air pollutants. Discuss the effects of air pollution on plants and monuments. 7M
- b) Summarise the causes and control methods of soil pollution. 7M

**OR**

8. a) What are the major Marine pollutants? Discuss how to control marine pollution. 7M
- b) Define Stratification. Explain the effects of stratification on aquatic animals. 7M

**UNIT-V**

9. a) Justify the role of ethics in environmental protection. 7M
- b) Explain briefly causes, effects and control measures for global warming. 7M

**OR**

10. a) Justify the need of value education in environmental protection. 7M
- b) Explain human rights and responsibilities in relation to environment. 7M

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**Code: 7G333**

II B.Tech. I Semester Regular & Supplementary Examinations November 2019

**Signals and Systems**

( Electronics and Communication Engineering )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

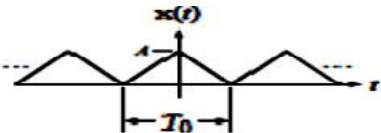
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**UNIT-I**

- 1. a) Explain how a function can be approximated by a set of orthogonal functions. 6M
- b) State and prove any four properties of Fourier Series 8M

**OR**

- 2. a) A rectangular function  $f(t)$  is defined by  $f(t) = 1$  for  $0 < t < 1$  and  $-1$  for  $1 < t < 2$ . Approximate this function by a waveform  $\sin t$  over the interval  $(0, 2)$  such that the mean square error is minimum 7M
- b) Obtain the trigonometric Fourier series for the signal  $x(t)$



**UNIT-II**

- 3. a) State and prove Differentiation and integration properties of Fourier Transform. 7M
- b) Discuss about Hilbert transform with required equations 7M

**OR**

- 4. a) Analyze how Fourier transform is derived from Fourier series. 7M
- b) State and prove time convolution and time differentiation properties of Fourier Transform. 7M

**UNIT-III**

- 5. a) State and derive the relationship between bandwidth and rise time. 7M
- b) Discuss about distortion less transmission to a system with an example. 7M

**OR**

- 6. a) State and prove sampling theorem for band limited signals using graphical approach. 7M
- b) Determine output of an LTI system whose input and unit sample response are given as follows:  $x(n) = b^n u(n)$  and  $h(n) = a^n u(n)$ . 7M

**UNIT-IV**

- 7. a) Determine the cross correlation between the two sequences  $x(n) = \{1,0,0,1\}$  and  $h(n) = \{4,3,2,1\}$  7M
- b) Graphically convolve the signals

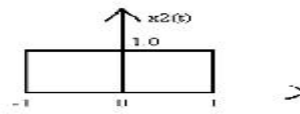
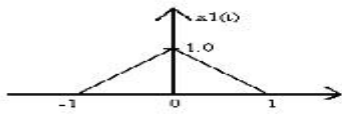
$$X_1(t) = \begin{cases} 1 & \text{for } -T \leq t \leq T \\ 0 & \text{else where} \end{cases} \quad \text{and}$$

$$X_2(t) = \begin{cases} 1 & \text{for } -2T \leq t \leq 2T \\ 0 & \text{else where} \end{cases}$$

7M

**OR**

- 8 a) A system with impulse response  $e^{-t} u(t)$  is excited by a signal  $x(t) = e^{-2t} u(t)$ . Find the output of the system using convolution in time property of Fourier transform. 7M
- b) Find the Cross correlation between triangular and gate function as shown in below figure.



7M

<b>UNIT-V</b>
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- 9 a) 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 7M
- b) State and prove initial value and final value theorems of Laplace transform 7M
- OR**
- 10 a) 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 and iii) Convolution method 9M
- b) Find the inverse Laplace transform of  $F(s) = (s + 4) / (s + 3)(s + 2)$ ;  $-3 < \text{Re}(s) < -2$ . 5M

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Hall Ticket Number :

R-17

Code: 7G332

II B.Tech. I Semester Regular & Supplementary Examinations November 2019

## Digital Design

( Electronics and Communication Engineering )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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### UNIT-I

1. a) Explain how to subtract BCD numbers, by stating the rules for generating borrows and applying the correction factor with suitable examples 7M
- b) Write the **Gray** and **XS-3** codes of a given decimal number 512. 7M

OR

2. a) What are Logic Gates? 4M
- b) Discuss the laws of Boolean algebra with proofs 10M

### UNIT-II

3. a) Draw the truth table and write Boolean expression for the following:
  - i) F is a 1 only if X is a 1 and Y is a 1 or if X is 0 and Y is a 0.
  - ii) G is a 0 if any of the three variables X, Y and Z are 1s. G is a 1 for all other conditions.Implement the expressions using NAND gate only 7M
- b) Simplify the following using Tabular method.  
 $F(A,B,C,D) = (1,5,6,12,13,14)+ d (2,4)$  7M

OR

4. a) Reduce the following expression in SOP and POS forms using mapping  
 $f = m(0,2,3,10,11,12,13,16,17,18,19,20,21,26,27)$  6M
- b) For the given function  $T(w,x,y,z) = (0,1,2,3,4,6,7,8,9,11,15)$ 
  - i. Show the map
  - ii. Find all prime implicants and indicate which are essential.
  - iii. Find a minimal expression for T and realize using basic gates. Is it unique? 8M

### UNIT-III

5. a) Construct a combinational logic circuit which converts a decimal number into an equivalent Excess -3 number. Implement the same using Multiplexer 7M
- b) Implement the following expression using ROM, PAL and PLA  
 $F_0 = A$  and  $F_1 = A'B' + AB$  7M

OR

6. a) Design a 4 bit parallel adder using Full adder modules. 7M
- b) Design a 64:1 MUX using 8:1 MUXs. 7M



<b>UNIT-IV</b>
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7. a) What is excitation table? Write the excitation table for the following flipflops  
 a) SR flipflop    b) JK flipflop    c) D flipflop    d) T flipflop 7M
- b) Design a modulo 10 counter using JK flipflops. 7M

**OR**

8. a) Write the conversion procedures of the Flip Flops. Convert (i) T flip flop to JK flip flop. (ii) Convert D flip flop to T flip flop (iii) SR to JK flip flop. 8M
- b) Draw the block diagram of modulo 10 ripple counter and explain. 6M

<b>UNIT-V</b>
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9. a) What are the salient features of ASM chart? Explain with an example. 6M
- b) What is the difference between Mealy and Moore machine? For the machine shown, find the equivalent partition and a corresponding reduced machine in standard form.

PS	NS,Z	
	X = 0	X = 1
A	F,0	B,1
B	G,0	A,1
C	B,0	C,1
D	C,0	B,1
E	D,0	A,1
F	E,1	F,1
G	E,1	G,1

8M

**OR**

10. a) Convert the following Moore machine to a Mealy machine

Present State	Next State		Output
	X=0	X=1	
A	D	B	0
B	B	C	1
C	C	D	0
D	D	B	0

5M

- b) Draw the State diagram of a sequence detector which is designed to detect the pattern 1001 and allowing the overlapping in the input sequence. Draw the ASM chart for the state diagram. Explain the sequence of operations of each block. Also design the Data path circuit and control circuit. 9M

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**Code: 7G234**

II B.Tech. I Semester Regular & Supplementary Examinations November 2019

**Electrical Circuits and Technology**  
( Electronics and Communication Engineering )

Max. Marks: 70

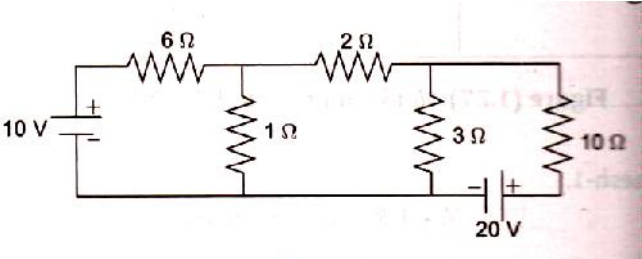
Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

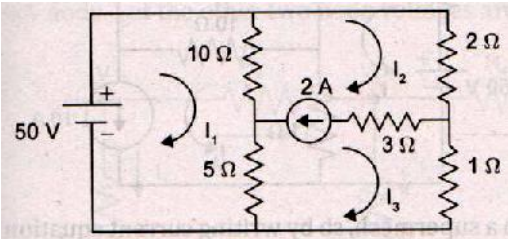
1. a) Write steps to be followed in mesh analysis. 4M
- b) Find the mesh currents for the circuit shown in the figure below:



10M

**OR**

2. a) What is a super mesh? 4M
- b) Determine the current in the 5 Ω resistor in the network shown in the figure below:



10M

**UNIT-II**

3. a) Find the power delivered and current from a sinusoidal voltage source with  $V=220\text{ V}$  to an impedance of  $Z=(6+j8)$  . 6M
- b) Determine the RMS value of a semi circular current wave which has a maximum value of  $r$ . 8M

**OR**

4. a) Define quality factor and band width. 4M
- b) An RLC circuit has  $R=1\text{ K}$  ,  $L=100\text{ mH}$  and  $C=10\text{ pF}$ . If a voltage of  $100\text{ V}$  is applied across the series combination, determine (i) resonant frequency (ii) Q factor and (iii) half power frequencies. 10M

**UNIT-III**

5. a) Establish the relations between z and y parameters of a four terminal network. 6M
- b) Two four terminal networks are connected in series. Find the z parameters of the combined network. 8M

**OR**

6. a) What are the transmission parameters? Deduce the relation  $A^2 - BC = 1$  for a symmetrical and reciprocal four terminal network. 6M
- b) The z parameters of a symmetrical four terminal network are  $z_{11} = z_{22} = 20$  and  $z_{12} = z_{21} = 5$  . Find the ABCD parameters of the network. 8M

<b>UNIT-IV</b>
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7. a) Explain the type of armature windings used in dc generators. 6M
- b) A 2 pole lap wound generator has 200 conductors on armature. It is driven by prime mover at a constant speed of 600 rpm. If the flux per pole is 0.1 Wb, calculate the generated emf. 8M

**OR**

8. a) Derive the torque equation of dc motor. 6M
- 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. 8M

<b>UNIT-V</b>
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9. a) What are various losses in a transformer? 6M
- b) Explain the way of determination of losses in the transformer experimentally. 8M
- OR**
10. a) Define torque. Give an expression for torque determination of three phase induction motor. 4M
- b) Draw and explain the torque-slip characteristics of three phase induction motor. What is its significance? 10M

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