Hall Ticket Number :										

R-15

Code: 5G331

II B.Tech. I Semester 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

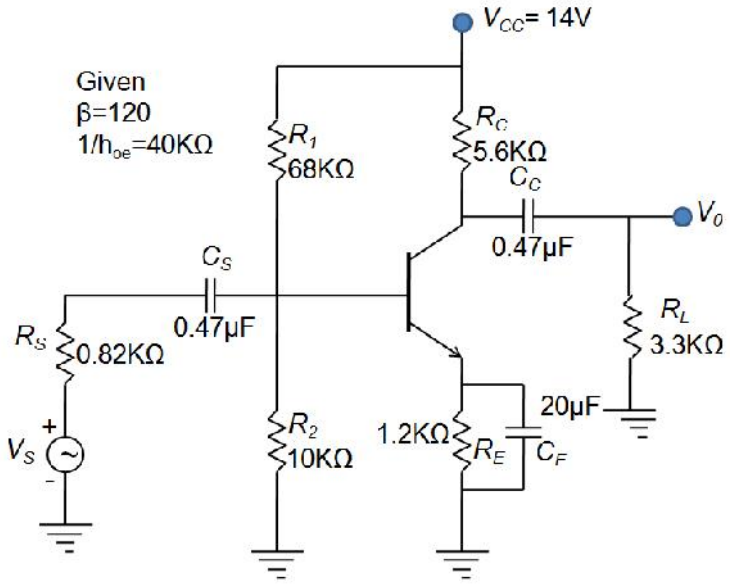
   $$\frac{-h_{fe}R_L}{R_S + h_{ie} + h_{fe}R_L}$$ by assuming hfe>>1. Neglect h_{re} and h_{oe}. 14M

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 β=120, 1/hoe=40KΩ.Obtain the cutoff frequencies associated with C_S, C_C, and C_E.



14M

OR

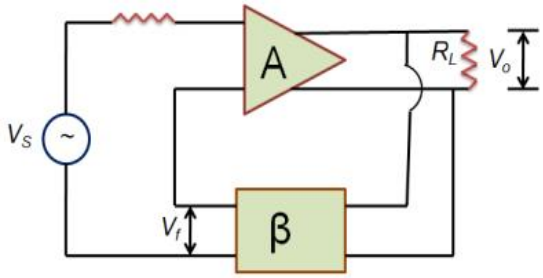
4. Consider a single stage CE transistor amplifier with the load resistor "R_L". Find out an approximation expression for the gain factor of this amplifier. 14M

UNIT–III

5. Derive the input impedance (Zi) and output impedance (Zo) 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=100mV and Vo=10V. What are the values of A and β?



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

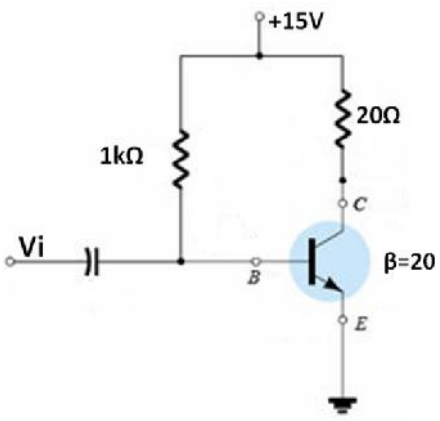
9. Explain the working principle of a push pull power amplifier. Justify your answer mathematically

   For a class-B Power Amplifier providing a 22V Peak signal to an 8Ω load and a power supply of VCC=25V. determine:

   (a) Input Power, Pi(dc)
   (b) Output Power, Po(ac) and
   (c) Circuit efficiency, %η. 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 :										

R-15

Code: 5G235

II B.Tech. I Semester Supplementary Examinations November 2019

Electrical Circuit Theory

(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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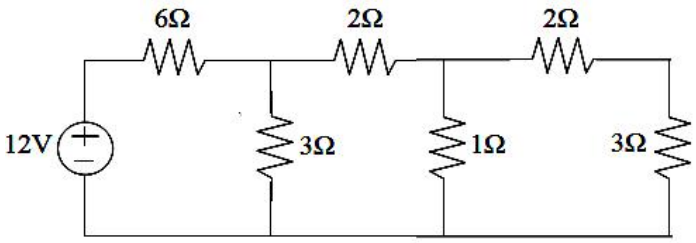
UNIT–I

1. Determine the loop currents using Mesh Analysis and also the branch voltages

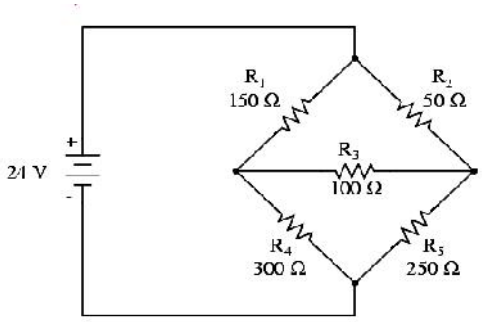


14 M

OR

2. a) Explain Current & Voltage Division Rules with examples. 6M

   b) Determine the power delivered by the 24V source.



8M

UNIT–II

3. a) Define Average & RMS Value, Form Factor & Peak Factor. 7M

   b) Explain about the sinusoidal response of series RL circuit. 7M

OR

4. Determine Average, RMS of a Sinusoidal waveform and prove that the form factor of a Sinusoidal waveform is 1.11. 14M

UNIT–III

5. A steel ring of 180cm mean diameter has a cross-sectional area of 250mm^2. Flux developed in the ring is 250μWb when a 4000 turns coil carries certain current. Calculate i) MMF required ii) Reluctance iii) current in the coil. Assume relative permeability of steel is 1100. 14M

OR

6. a) Define self & mutual inductance. Derive the expression for coefficient of coupling. 7M

   b) A coil of 100 turns is wound uniformly over an insulator ring with a mean circumference of 2m and a uniform cross sectional area of 0.025cm^2.If a coil is carrying a current of 2A.Calculate MMF, Magnetic field intensity, Flux density, total flux. 7M

UNIT–IV

7. a) What are the advantages of 3-Φ System over 1-Φ System? 7M

   b) Explain about three phase system with necessary equations and draw the three phase waveforms 7M

OR

8. A delta connected load has a parallel combination of resistance 5 ohm and capacitive reactance (-j5 ohm) in each phase. If a balanced three phase 400 V supply is applied between lines find the phase currents and line currents and also draw the phasor diagram. 14M

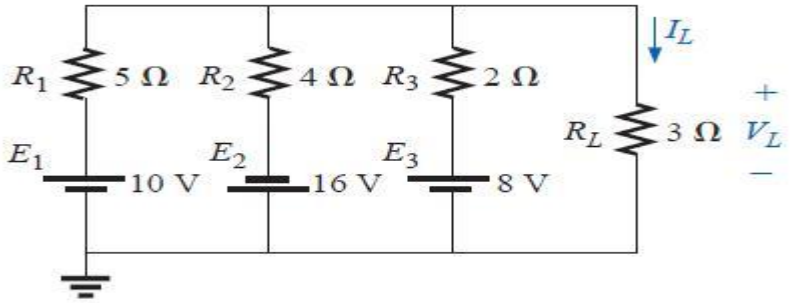
UNIT–V

9. a) State and explain Superposition theorem with an example 7M

   b) State and explain Millman's theorem. 7M

OR

10. a) Determine I_L , V_L and P_L using Millmans Theorem for the circuit shown below.



10M

   b) What are the applications of Maximum power transfer theorem? 4M

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Hall Ticket Number :										

R-15

Code: 5GC34

II B.Tech. I Semester Supplementary Examinations November 2019

Environmental Science

(Common to ECE & IT)

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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Hall Ticket Number :										

R-15

Code: 5GC32

II B.Tech. I Semester Supplementary Examinations November 2019

Mathematical Methods-III

(Common to EEE & ECE)

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) Reduce the matrix $\begin{bmatrix} -1 & -3 & 3 & -1 \\ 1 & 1 & -1 & 0 \\ 2 & -5 & 2 & -3 \\ -1 & -2 & 6 & -7 \end{bmatrix}$ to Echelon form and find its rank. 7M

b) Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 6 & 2 & 1 \\ 6 & 1 & 2 \\ 7 & 2 & 2 \end{bmatrix}$ and find its inverse. 7M

OR

2. a) State Cayley-Hamilton theorem and verify Cayley-Hamilton theorem for $A = \begin{bmatrix} 3 & 1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 5 \end{bmatrix}$ and hence find A^{-1}. 8M

b) Prove that A^m has the eigen values $a_1^m, a_2^m, a_3^m, \ldots\ldots, a_n^m$ if $a_1, a_2, a_3, \ldots\ldots, a_n$ are the eigen values of A, where m being a positive integer. 6M

UNIT–II

3. a) Evaluate $\sqrt[3]{24}$ by Newton Raphson method 7M

b) Employ Taylor's method to obtain appropriate value of *y* at *x* = 0.2 for the differential equation $\frac{dx}{dy} = 2y + 3e^x$, $y(0) = 0$. Compare the numerical solution obtained with the exact solution. 7M

OR

4. a) Find a root of the equation $x^3 - 2x - 5 = 0$, using the Bisection method correct to three decimal places. 7M

b) Using R-K method of IV order, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with $y(0) = 1$ at *x* = 0.2, 0.4 7M

UNIT–III

5. a) Find the missing term in the table

x	0	1	2	3	4
f(x)	1	3	9	-	81

7M

b) Find first and second derivatives of y at x=1.5 if

x	1.5	2	2.5	3	3.5	4
y	3.375	7.000	13.625	24.000	38.875	59.000

7M

OR

6. a) Use Lagrange's interpolation formula to find the value of y when $x=10$,if the following values of *x* and y are given

x	5	6	9	11
y	12	13	14	16

7M

b) Use Trapezoidal rule and Simpson's $1/3$ rule to estimate $\int_0^1 \frac{1}{1+x^2}dx$

7M

UNIT–IV

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

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

7M

b) Solve $x^2(y-z)p+y^2(z-x)q=z^2(x-y)$ 7M

OR

8. a) Fit the curve of the form $y=ae^{bx}$ to the following data

x	0	1	2	3
y	1.05	2.10	3.85	8.30

7M

b) Solve $(mz-ny)p+(mx-lz)q=(ly-mx)$ 7M

UNIT–V

9. a) Obtain the Fourier series for the function $f(x)=x-x^2$ in the interval $[-\pi,\pi]$ Hence show that $\frac{1}{1^2}-\frac{1}{2^2}+\frac{1}{3^2}-\frac{1}{4^2}+---+\infty=\frac{\pi^2}{12}$ 7M

b) Show that $e^{-\frac{x^2}{2}}$ is a self-reciprocal with respect to Fourier Transform. 7M

OR

10. a) Obtain Fourier series for the function $f(x)=\begin{cases}\pi x, 0\le x\le 1\\ \pi(2-x), 1\le x\le 2\end{cases}$ and hence $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+---+\infty=\frac{\pi^2}{8}$ 7M

b) Find the Fourier sine transform of $\frac{x}{x^2+a^2}$ and the Fourier cosine transform of $\frac{1}{x^2+a^2}$ 7M

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Hall Ticket Number :										

R-15

Code: 5G333

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

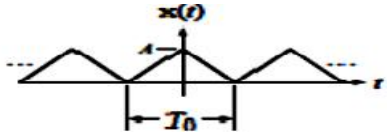
1. a) Explain how a function can be approximated by a set of orthogonal functions. 6M

   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 <π and -1 for π<t<2π. Approximate this function by a waveform sint over the interval (0, 2π) such that the mean square error is minimum 7M

   b) Obtain the trigonometric Fourier series for the signal x(t)



7M

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

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

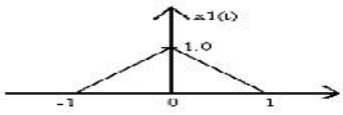
$$X_2(t) = \begin{cases} 1 & for -2T \le t \le 2T \\ 0 & else\ where \end{cases}$$

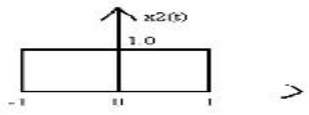
7M

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

UNIT–V

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 < Re(s) < –2. 5M

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Hall Ticket Number :										

R-15

Code: 5G332

II B.Tech. I Semester 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.

   $F(A,B,C,D) = \sum(1,5,6,12,13,14) + d\sum(2,4)$ 7M

OR

4. a) Reduce the following expression in SOP and POS forms using mapping

   $f=\sum m(0,2,3,10,11,12,13,16,17,18,19,20,21,26,27)$ 6M

   b) For the given function $T(w,x,y,z) = \sum(0,1,2,3,4,6,7,8,9,11,15)$
   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

UNIT–IV

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

UNIT–V

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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