Hall Ticket Number :										

R-17

Code: 7G234

II B.Tech. I Semester Supplementary Examinations May 2019

Electrical Circuits and Technology

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

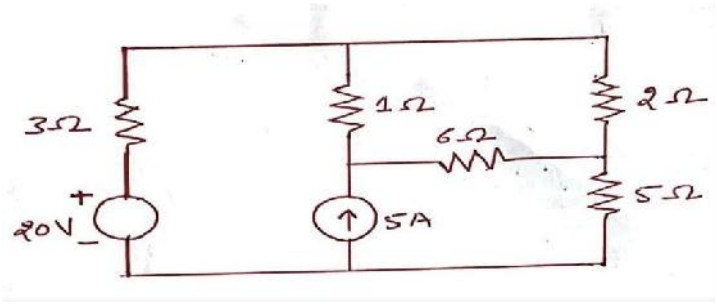
Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

****

UNIT–I

1. a) Explain in detail Y-Δ and Δ –Y Transformation and derive the corresponding formulae 8M

   b) Use nodal analysis to find the power dissipated in the 6Ω resistor for the circuit shown in figure below.



6M

OR

2. a) By taking one example explain super node analysis in detail 7M

   b) Derive an expression for current in terms of steady state and transient parts for R-L series circuit excited by a DC voltage source. Also find the voltage across resistor and inductor. 7M

UNIT–II

3. a) Derive an expression for resonant frequency of a parallel circuit, one branch consists of a coil of inductance L henrys and resistance RΩ and other branch consists of a capacitor C farads. 7M

   b) Find the average value, effective value, form factor, peak factor for half wave rectified voltage waveform such that

   For $0 < wt < \pi$, $V = VmSinwt$

   For $\pi < wt < 2\pi$, $V = 0$. The period is 2π 7M

OR

4. a) Find the average value, effective value, form factor and peak factor for the square waveform such that

   For $0 < t < 0.01$, $Y = 10$

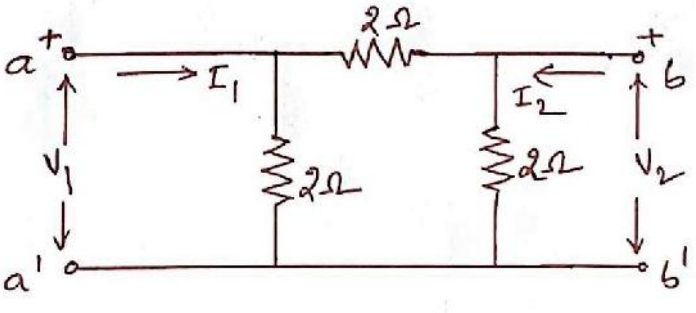
   For $0.01 < t < 0.03$, $Y = 0$. The period is 0.03 Sec 7M

   b) A Coil of resistance 50Ω and inductance of 0.5H is connected in parallel with a capacitor of 100μF.Calculate the frequency at which the circuit acts as a non- inductive resistance. Calculate the value of non-inductive resistance 7M

UNIT–III

5. a) Derive the relations for expressing impedance parameters in terms of Y-parameters. 8M

   b) Find the transmission parameters for the circuit shown in figure below.

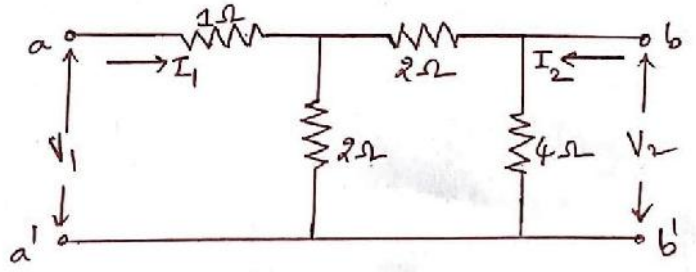


6M

OR

6. a) Explain series and parallel interconnection of two port networks. 7M

   b) Find the h-parameters of the network shown below.



7M

UNIT–IV

7. a) Explain in detail the constructional features of a DC machine. 6M

   b) A 4 pole DC shunt generator with lap connected armature supplies a load of 100A at 200V. The armature resistance is 0.1Ω and shunt field resistance 80Ω. Find (i) Total armature current (ii) Current per armature path. (iii) emf generated 8M

OR

8. a) Derive the torque equation of a DC motor. 7M

   b) Explain in detail the characteristics and applications of a DC motor. 7M

UNIT–V

9. a) Derive an expression for induced emf in a single phase transformer. 7M

   b) Discuss various losses occur in the transformer also write the expression for regulation and efficiency of transformer. 7M

OR

10. a) Explain the principle of operation of three phase induction motor. 7M

    b) Derive the torque equation of a three phase induction motor 7M

***

Hall Ticket Number :										

R-17

Code: 7G331

II B.Tech. I Semester Supplementary Examinations May 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)

****

UNIT–I

1. a) Draw the small signal hybrid equivalent model of a transistor. Derive the expressions for A_I, Z_i, Av and Y_o. 8M

   b) A CE amplifier is drawn by a voltage source of internal resistance R_s = 800 Ω and the load impedance is a resistance R_L = 1000 Ω. The h-parameters are h_{fe} = 50, h_{ie} = 1 kΩ, h_{oe} = 25 μA/V and hre = 2 x 10^{-4}. Calculate A_i, A_v, Z_i and Z_o using exact analysis. 6M

OR

2. Draw the circuit diagram of two stage RC coupled transistors amplifiers. Explain the operation and calculate the mid frequency range and low frequency range. 14M

UNIT–II

3. Determine high frequency parameters of Hybrid – π model in terms of low frequency parameters. 14M

OR

4. a) Define Gain Bandwidth product and derive the relation between f_T and f_β. 7M

   b) Derive the expression for CE Short circuit current gain with the help of necessary circuit diagrams and approximations. 7M

UNIT–III

5. a) Derive the expression for feedback gain, input resistance and output resistance for voltage series feedback amplifier. 8M

   b) A voltage series negative feedback amplifier has a voltage gain without feedback of A=50, input resistance R_i= 2KΩ, output resistance R_o= 15KΩ and feedback ratio of 0.01. Calculate the voltage gain, input resistance and output resistance of the amplifier with feedback? 6M

OR

6. a) Prove that negative feedback increases the bandwidth and decreases the distortion. 7M

   b) An amplifier has a gain of 400, f_1=50Hz,f_2=200KHz and a distortion of 10% without feedback. Determine the amplifier voltage gain f_{1f}, f_{2f} and D_f when a negative feedback is applied with feedback ratio of 0.01. 7M

UNIT–IV

7. a) With a neat circuit diagram, explain the generalized analysis of LC oscillator. 8M

   b) Colpitt's oscillator is designed with C_2=100 pF, C_1= 7500pF and a variable inductance. Determine the range of inductance values, if the frequency of oscillation is varied between 950 KHz and 2050 KHz. 6M

OR

8. a) Classify various types of oscillators. Explain in brief. 6M

   b) Show that the gain of Wein-bridge oscillator using BJT amplifier is at least 3 for oscillations to occur. 8M

UNIT–V

9. a) Show the conversion efficiency of transformer coupled class A amplifier is 50%. 8M

   b) Explain the operation of Class B push pull amplifier. 6M

OR

10. Describe the operation of a single tuned capacitive coupled amplifier and derive the expression for bandwidth. 14M

***

Hall Ticket Number :										

R-17

Code: 7GC31

II B.Tech. I Semester Supplementary Examinations May 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)

****

UNIT–I

1. a) What is the need for mass public awareness concerning environmental safety and what are the steps regarding the same. 7M
   b) What are environmental studies and Why is it interdisciplinary 7M

OR

2. a) How nature is productive to human welfare and in what ways. 7M
   b) Comment on various people who contributed to the welfare of environment 7M

UNIT–II

3. a) Explain with relevant examples on Human Development Index. 7M
   b) Explain the over exploitation of forest resources and its effect on the environment 7M

OR

4. a) Write a detailed note on water resources. 7M
   b) Write a note on Sustainable water management. 7M

UNIT–III

5. a) Explain food chains, food webs and ecological pyramids. 7M
   b) What is a forest ecosystem and explain the various features. 7M

OR

6. a) What are the threats of the forest eco-system 7M
   b) Explain aquatic eco system. 7M

UNIT–IV

7. a) What are the various types of pollution and causes of it? 7M
   b) Explain the fate of the pollutants discharged to the atmosphere. 7M

OR

8. a) Explain greenhouse effect. 7M
   b) What are the measures taken to control air pollution? 7M

UNIT–V

9. a) Explain Watershed Management 7M
   b) Write a note on environmental ethics. 7M

OR

10. a) Write a note on ozone layer depletion 7M
    b) What is wasteland reclamation? Write briefly about it. 7M

***

Hall Ticket Number :										

R-17

Code: 7G333

II B.Tech. I Semester Supplementary Examinations May 2019

Signal 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)

****

UNIT–I

1. a) Obtain the condition under which two signals $f_1(t)$ and $f_2(t)$ are said to be orthogonal to each other. Hence prove that Sin nw_ot and Cos mw_ot are orthogonal to each other for all integer values of m,n 7M

   b) Derive the necessary expression to represent the function f(t) using Trigonometric Fourier Series 7M

OR

2. a) Compute the Fourier Transform of i) f(t) = (1/2) - n u(-n-1) ii) f(t) = sin (n π/2)+cos (n) 8M

   b) State and prove sampling theorem for band limited signals using graphical approach. And What is aliasing? Explain its effect on sampling. 6M

UNIT–II

3. a) Find the Fourier transform of a gate pulse of unit height, unit width and centered at t=0. 7M

   b) Determine the Fourier Transform for double exponential pulse whose function is given by y (t) = $e^{-2|t|}$ Also draw its magnitude and phase spectra 7M

OR

4. a) Find the Fourier Transform of (i) Triangular pulse with period T = 8Sec and amplitude A = 10V. (ii) One cycle of sine wave 8M

   b) What is aliasing? Explain its effect on sampling. 6M

UNIT–III

5. a) What are the requirements of a system to allow the distortion less transmission of a signal? 7M

   b) What is the impulse response of two LTI systems connected in parallel? State the convolution Integral for CT LTI systems? 7M

OR

6. a) A stable LTI system is characterized by the differential equation $d^2y(t)/dt^2+6\ dy(t)/dt+8\ y(t)=2\ x(t)$ Find the frequency response & Impulse response using Fourier transform. What is the response of this system if $x(t) = t\ e^{-2t}\ u(t)$ 8M

   b) Find the impulse response of series RL circuit. What is an LTI system? Explain its properties 6M

UNIT–IV

7. a) Find the convolution of the following signals using graphical analysis: $x(t) = e^{-2t}\ u(t)$ and h(t) = u(t + 2). 7M

   b) Show that the auto-correlation function at the origin is equal to the energy of the function. 7M

OR

8. a) Show that the cross correlation of f(t) with $\delta(t - t_0)$ is equal to $f(t - t_0)$. Where $\delta(t-t_0)$ is delayed unit impulse function. 7M

   b) Prove that auto correlation function and energy/power spectral density function forms Fourier Transform pair. 7M

UNIT–V

9. a) Find the Inverse Z transform of

$$X(z) = \frac{z+2}{4z^2 - 2z + 3} \; |Z| < \sqrt{3/4}$$

7M

   b) Find inverse Z-transform of

$$X(Z) = (1 - 1/3z^{-1})(1 - 1/6z^{-1}) \; ROC: |Z| > 1/3$$

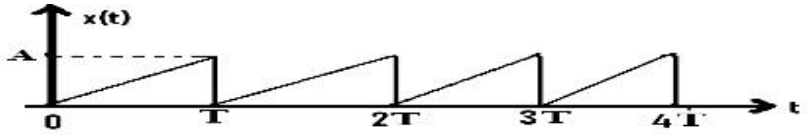
7M

OR

10 a) Determine the inverse Laplace of the following functions

$i)\ 1/s(s+1)(s+3)$ $\quad ii)\ 3s^2 + 8s + 6/(s+8)(s^2 + 6s + 1)$ 8M

   b) Find out the Laplace transform of the signal shown in below figure.



6M

*****

Hall Ticket Number :										

R-17

Code: 7GC32

II B.Tech. I Semester Supplementary Examinations May 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)

****

UNIT–I

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

   b) Find the real root of the equation $\sin^2 x + 1 = x^2$ using Newton-Raphson method. 7M

OR

2. a) Employ Euler's method to obtain the approximate value of y at $x = 1.0$ for the differential equation $\frac{dy}{dx} = x - y^2,\ y(0) = 1.$ 7M

   b) Apply Runge-Kutta method of order 4, compute $y(0.2)\ and\ y(0.4)$ from the equation $\frac{dy}{dx} = x + y,\ y(0) = 1.$ 7M

UNIT–II

3. a) The population of a town in the decennial census was given below

Year : x	1891	1901	1911	1921	1931
Population: y (in thousands)	46	66	81	93	101

   Estimate the population for the year 1925. 7M

   b) Use Lagrange's interpolation formula to find the value of y when $x = 3.5$ from the following table

x	0	1	3	4
y	-12	0	12	24

7M

OR

4. a) Find the first and second derivatives of the function tabulated below at the point $x = 1.5$

x	1.5	2.0	2.5	3.0	4.0
y	3.375	7.0	13.625	38.875	59

7M

   b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using

   (i)Trapezoidal rule (ii)Simpson's $\frac{1}{3}$ rule and (iii)Simpson's $\frac{3}{8}$ rule with $h = 0.5\ and\ 0.125$ 7M

UNIT–III

5. a) Determine the values of a and b by the method of least squares such that $y = ae^{bx}$ fits the following data

x	2	4	6	8	10
y	4.077	11.084	30.128	81.897	222.62

7M

b) Solve $\left(p^2 + q^2\right)y = qz$ using Charpit's method. 7M

OR

6. a) Fit a second degree polynomial to the following data by the method of least squares

x	10	12	15	23	20
y	14	17	23	25	21

7M

b) Using the method of separation of variables,

solve $\frac{\partial u}{\partial x} = 4\frac{\partial u}{\partial y}$, *when* $u(0, y) = 8e^{-3y}$ 7M

UNIT–IV

7. Prove that $x^2 = \frac{®^2}{3} + 4\sum_{n=1}^{\infty}(-1)^n \frac{\cos nx}{n^2}$, $-® < x < ®$ by using Fourier series and hence show that $\sum_{n=1}^{\infty}\frac{1}{n^2} = \frac{®^2}{6}$ 14M

OR

8. Obtain a half range cosine series for $f(x) = \begin{cases} kx, & 0 \le x \le l/2 \\ k(l-x), & l/2 \le x \le l \end{cases}$

and deduce the sum of the series is $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots = \frac{®^2}{8}$ 14M

UNIT–V

9. Find the Fourier sine and cosine transforms of $e^{-ax}\,(a > 0)$. Hence Evaluate the integrals $\int_0^{\infty}\frac{x\sin ax}{x^2 + a^2}dx$ and $\int_0^{\infty}\frac{\cos ax}{x^2 + a^2}dx$ 14M

OR

10. Obtain the Fourier sine transfromation of

$$f(x) = \begin{cases} 4x, & for\ 0 < x < 1 \\ 4 - x, & for\ 1 < x < 4 \\ 0, & for\ x > 4 \end{cases}$$

14M

***

Hall Ticket Number :										

R-17

Code: 7G332

II B.Tech. I Semester Supplementary Examinations May 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)

****

UNIT–I

1. a) Convert the following numbers:
   (i) $(7562.45)_{10}$ to octal
   (ii) $(175.175)_{10}$ to binary
   (iii) $(11010111)_2$ to decimal and octal 6M

   b) Define a self-complementing code, give the examples of self complementing codes and explain about Excees-3 code. 8M

OR

2. a) (i) Using 10's complement, subtract 72532-3250
   (ii) Using 2's complement, subtract 1010100-1000011
   (iii) Convert the binary code 10010011 into Gray code 6M

   b) Give the examples of non-weighted codes and explain about Hamming code 8M

UNIT–II

3. a) Reduce the following Boolean expressions to the indicated number of literals
   (i) A'C' + ABC + AC' to three literals
   (ii) (x'y' + z)' + z + xy + wz to three literals
   (iii) A'B(D' + C'D) + B(A + A'CD) to one literal 9M

   b) Using K-map method, simplify the following 4-variable function
   $F(A,B,C,D) = \sum (0, 2, 4, 5, 6, 7, 8, 10, 13, 15)$ 5M

OR

4. a) Simplify the following Boolean function using k-map method and implement with NAND gates
   $F(w,x,y,z) = xz + w'xy' + wxy + w'yz + wy'z$ 6M

   b) Simplify the following Boolean function using tabulation method
   $F(A,B,C,D) = \sum (0, 1, 2, 5, 7, 8, 9, 10, 13, 15)$ 8M

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) Write short notes on
   (i) ROM
   (ii) PROM 6M

   b) Implement the following Boolean functions with PAL
   $w(A, B, C, D) = \sum(2, 12, 13)$
   $x(A, B, C, D) = \sum(7, 8, 9, 10, 11, 12, 13, 14, 15)$
   $y(A, B, C, D) = \sum(0, 2, 3, 4, 5, 6, 7, 8, 10, 11, 15)$
   $z(A, B, C, D) = \sum(1, 2, 8, 12, 13)$ 8M

UNIT–IV

7. a) Draw the logic circuit of SR Flip-Flop and explain its operation with the help of its truth table 6M

   b) Draw the diagram for 4-bit up-down counter and explain its operation 8M

OR

8. a) Draw the excitation table and write the characteristic equation of SR Flip-Flop and JK Flip-Flop 6M

   b) Explain the operation of Johnson counter with the help of neat diagram 8M

UNIT-V

9. a) Minimize the following machine using partition technique and draw its reduced state table

Present State	Next State, output(z)	
	x = 0	x = 1
A	E, 0	C, 0
B	C, 0	A, 0
C	B, 0	G, 0
D	G, 0	A, 0
E	F, 1	B, 0
F	E, 0	D, 0
G	D, 0	G, 0

8M

   b) Explain the basic building blocks of ASM chart 6M

OR

10. a) Design a sequence detector to detect the binary sequence 1111 using T Flip-flop 8M

    b) Explain the salient features of ASM chart 6M

***