Hall Ticket Number :										

Code: 5G332

R-15

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2017

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) Use 1's complement arithmetic to subtract
   i) $(54)_{10}$ from $(231)_{10}$
   ii) $(-27)_{10}$ - $(87)_{10}$ 6M

   b) Determine the largest and smallest Hexadecimal numbers that can be used in a 16-bit digital system 8M

OR

2. a) List out the postulates of Boolean algebra. State and prove Demorgan's theorem of Boolean algebra 6M

   b) What is Hamming code? How is Hamming code word is tested and corrected? 8M

UNIT–II

3. a) Simplify the following Boolean function for minimal SOP form using K-map and implement using NAND gates.
   $F(W,X,Y,Z) = \sum(1,3,7,11,15) + d(0,2,5)$ 10M

   b) What are universal gates? Why they are so called? Give the truth tables 4M

OR

4. a) For the given function $F(W,X,Y,Z)=\sum m(0,1,5,7,8,10,14,15)$
   i) Show the map
   ii) find all the prime implicants and indicate which are essential
   iii) Find minimal expression and realize using basic logic gates 10M

   b) Simplify the Boolean function, using K- map $F(x, y, z) = \sum(2, 3, 6, 7)$ 4M

UNIT–III

5. a) Realize full adder using two adders and logic gates 10M

   b) Define magnitude comparator. Explain one-bit the basic comparator 4M

OR

6. a) Explain the significance of multiplexer. Design a 64 x 1 MUX using only 8:1 MUXs. 8M

   b) Compare between PLA, PAL and ROM 6M

UNIT–IV

7. a) Covert the following
   i) JK flip-flop to T flip-flop
   ii) SR flip-flop to D flip-flop — 9M

   b) Explain race-around condition — 5M

OR

8. a) Design modulo 10 counter using JK flip-flops — 10M

   b) Give the design steps of asynchronous counters — 4M

UNIT–V

9. a) Explain merge chart methods of minimal convertible — 4M

   b) Find the equivalence partition for the machine shown below

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

   Show a standard form of the corresponding reduced machine — 10M

OR

10. a) State the salient features of ASM chart — 4M

   b) A sequential circuit has tree D flip-flops, A, B, C and one output. The minterms of the D flip-flop are given below. Construct the state table and Draw an ASM chart.

   $D_A(X,A,B,C)=\sum(0,3,4,7,9,10,13,14)$

   $D_B(X,A,B,C)=\sum(4,5,6,7,12,13,14,15)$

   $D_C(X,A,B,C)=\sum(2,3,6,7,10,11,14,15)$ — 10M

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Hall Ticket Number :										

R-15

Code: 5G331

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2017

Electronic Circuits

(Electronics & Communication Engineering)

Max. Marks: 70 Time: 3 Hours

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

****

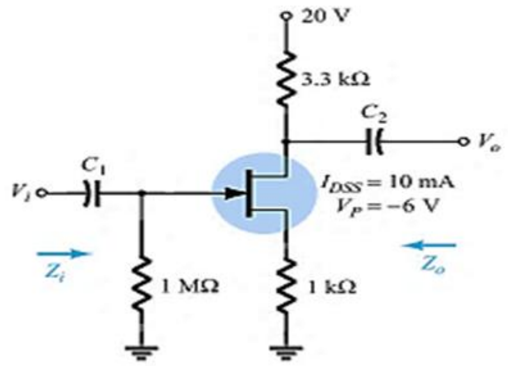
UNIT–I

1. a) The self bias configuration of JFET is given below; the trans-conductance g_m is 1.51mS & drain resistance r_d is 50KΩ.

   i. Find Z_i.

   ii. Calculate Z_o with and without the effects of r_d. Compare the results.

   iii. Calculate A_v with and without the effects of r_d. Compare the results.

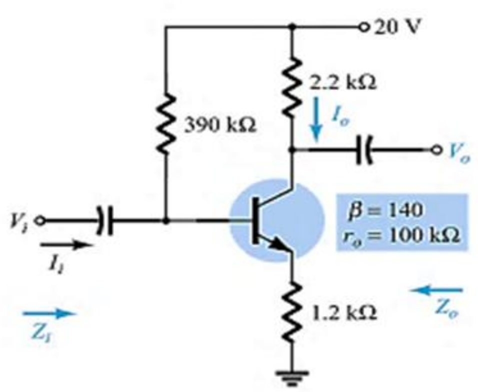


8M

   b) Draw the circuit diagram of a two stage RC coupled amplifier. Explain the need of using multi-stage amplifiers. 6M

OR

2. a) The CE amplifier with fixed bias is shown in the figure. Calculate input impedance, output impedance and voltage gain.



8M

   b) Compare the input impedance, output impedance and voltage gain of CE, CB and CC configurations. Why CE amplifiers are widely used? 6M

UNIT–II

3. a) Plot the frequency response and explain the reasons for fall of gain at high and low frequencies in the case of a RC coupled CE amplifier. 8M

   b) What is the significance of 3dB bandwidth? 6M

OR

4. a) Explain the role of coupling capacitors and Bypass capacitors in a RC Coupled Amplifier Circuit. 7M

   b) Draw the hybrid –pi model of BJT. Explain the circuit elements in this model. 7M

UNIT–III

5. a) Derive the expressions for input impedance and output impedance for voltage series feedback (negative). Is this changes in input and output impedances are favorable for an amplifier? 8M

   b) What is the impact of negative feedback on bandwidth? If an amplifier with gain of A = 1000 and feedback of β = 0.1 has a gain change of 20% due to temperature, calculate the change in gain of the feedback amplifier if negative feedback is introduced. 6M

OR

6. a) Derive the expressions for input impedance, output impedance for voltage series feedback (positive). 8M

   b) Explain the advantages of negative feedback over positive feedback. 6M

UNIT–IV

7. a) Explain the Barkhausen criteria for oscillations. 7M

   b) Explain with a circuit diagram the working of Hartley Oscillator. 7M

OR

8. a) Explain with a circuit diagram the working of RC phase shift oscillator. Derive the expression for frequency of oscillation of RC phase shift oscillator. 10M

   b) Design the R & C elements of a Wien bridge oscillator for operation at f_o = 10 KHz of Wien bridge oscillator. 4M

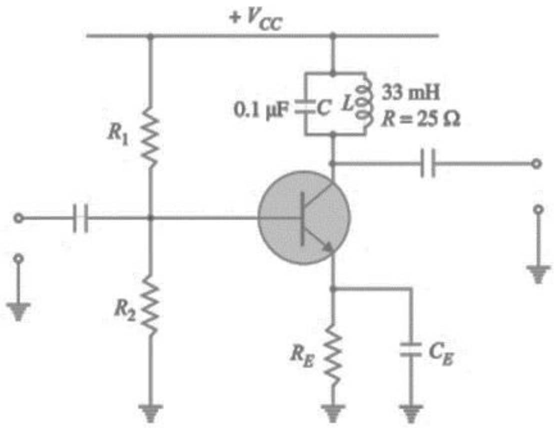
UNIT–V

9. a) Derive the efficiency of Class A Amplifier 7M

   b) Explain crossover distortion in Class B power amplifier 7M

OR

10. a) For the tuned amplifier shown in Fig. determine (i) the resonant frequency (ii) the Q of tank circuit and (iii) bandwidth of the amplifier.



8M

   b) Explain any two applications of the tuned amplifier. 6M

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Hall Ticket Number :										

R-15

Code: 5G235

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2017

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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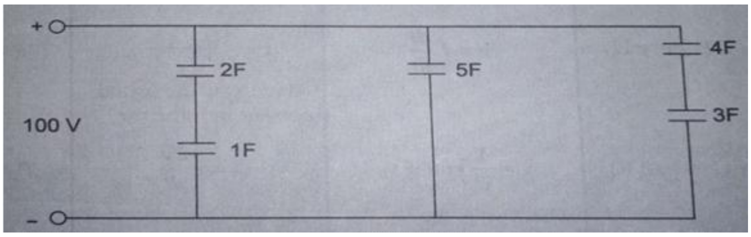
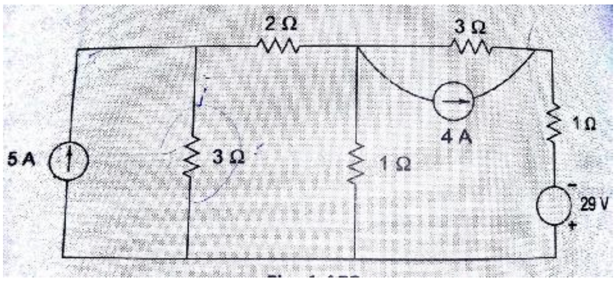
UNIT–I

1 a) Find the total equivalent capacitance, total energy stored if the applied voltage is 100V for the circuit as shown in Fig.



7M

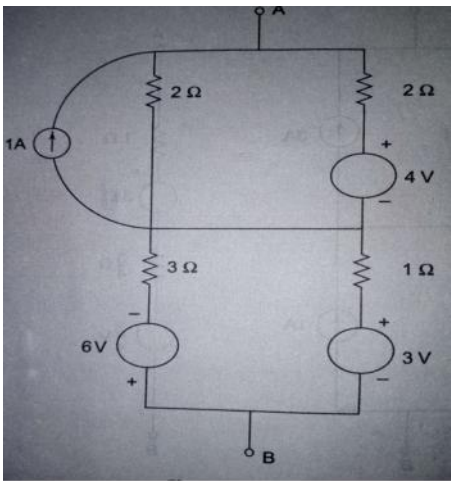
b) Write and solve the equation for mesh current in network.



7M

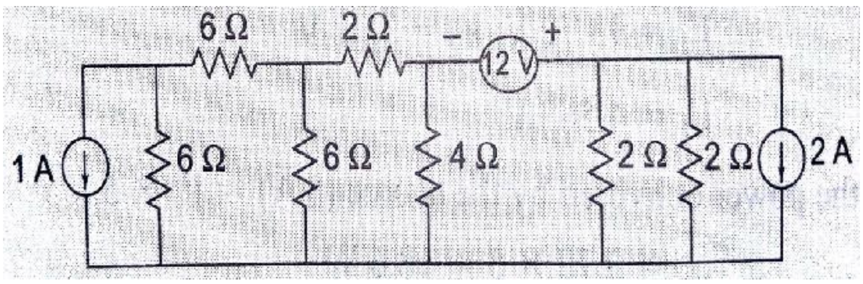
OR

2. a) Using source transformation, reduce the network between A and B into an equivalent voltage source.



7M

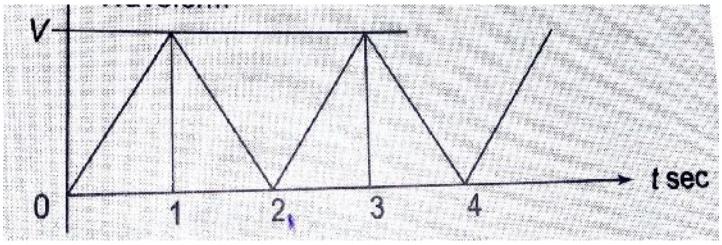
b) Find the power supplied by 12V source as shown in fig. below



7M

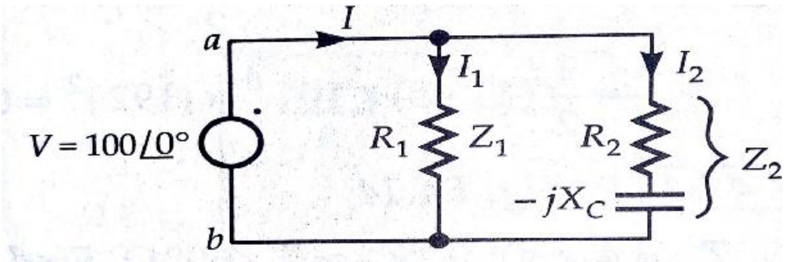
UNIT–II

3. a) Find the form factor for the following waveform.



6M

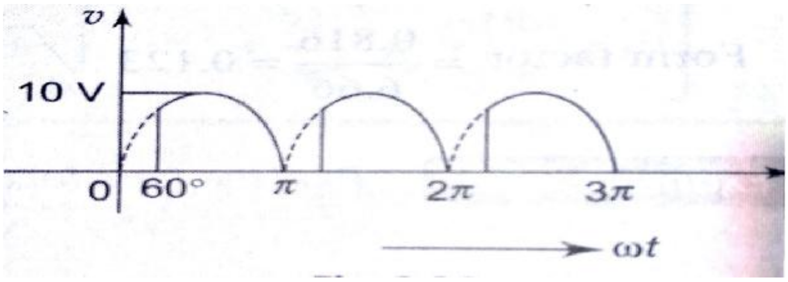
b) In below fig R_1=3 ohms, R_2=10 ohms, and $-jX_c$=-j8 ohms. Find I_1, I_2 and I. also obtain Z_{eq} across a-b.



8M

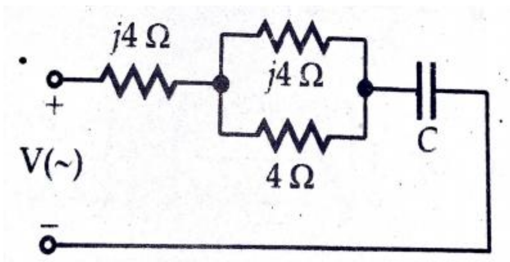
OR

4. a) The full wave rectified sine wave shown in below fig. has a delay angle of 60°. Calculate V_{avg} and V_{rms}.



8M

b) What should be the value of C such that the input power factor is unity for any frequency of the source?

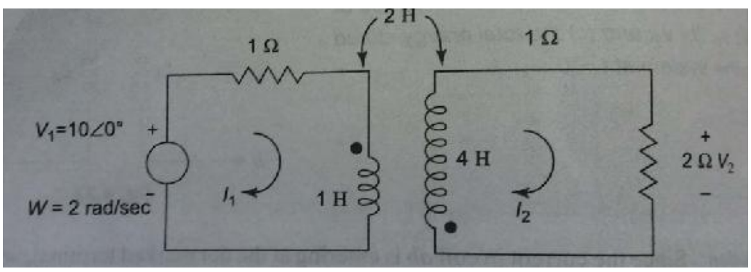


6M

UNIT–III

5. a) Derive the expression for coefficient coupling between pair of magnetically coupled coils. **6M**

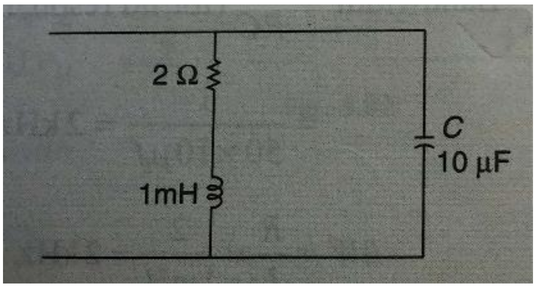
b) Solve for the currents I_1 and I_2 in the circuit shown in Fig. Also, find the ratio of V_2/V_1.



8M

OR

6\. a) In the parallel resonant circuit, determine the resonance frequency, dynamic resistance and bandwidth for the circuit shown in Fig. 3.



6M

b) In a series RLC circuit R=1KΩ, L-120mH, and c=12μμF. If a voltage of 200V is applied across the combination, determine

i) Resonant frequency
ii)Q factor
iii) Half Power Frequencies
iv) Band width and
v) The voltage across the inductance and the capacitance **8M**

UNIT–IV

7\. a) A three phase balanced system supplies 110V to a delta connected load whose phase impedances are equal to (3.54+j3.54) ohm. Determine the line currents and draw the phasor diagram. **7M**

b) A star connected alternator supplies a delta connected load. The impedance of each branch is (6+j8) ohm. The line voltage is400V. Obtain the current in phase of the load. Also find the current in each phase of the alternator. What is the power drawn by the load and its power factor? Determine the reactive power of the load. **7M**

OR

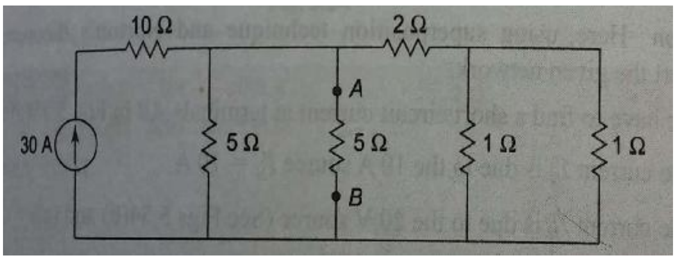
8\. a) The phase impedance of a delta connected load is (15+j20) ohms. What is the line current if the applied line voltage is 220V? Obtain the amount of power consumed per phase. What is the phasor sum of the three line currents? **7M**

b) A star-connected alternator has 231V/Ph. It supplies a set of lighting loads at phase R, having phase impedance of $40\angle 0^o$ ohms, a capacitive load of $10\angle -60^o$ ohm at phase Y and an inductive load of $5\angle 45^o$ ohm at phase B. The loads are connected in delta. Obtain the phase currents, line currents and line voltages. **7M**

UNIT–V

9\. a) Explain the steps to apply Thevenin's theorem and draw the Thevenin's equivalent circuit. **6M**

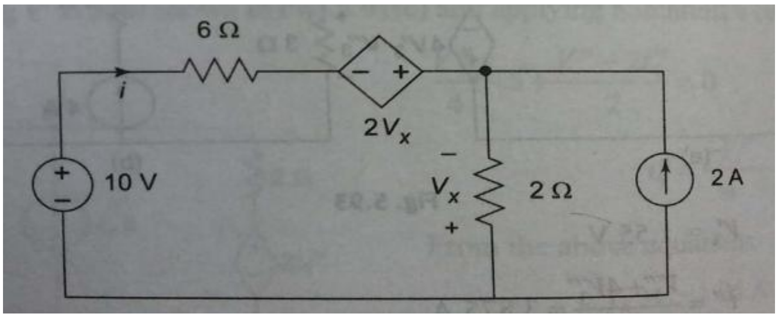
b) Determine the current flowing through the 5ohms resistor in the circuit shown in Fig. by using Norton's theorem.



8M

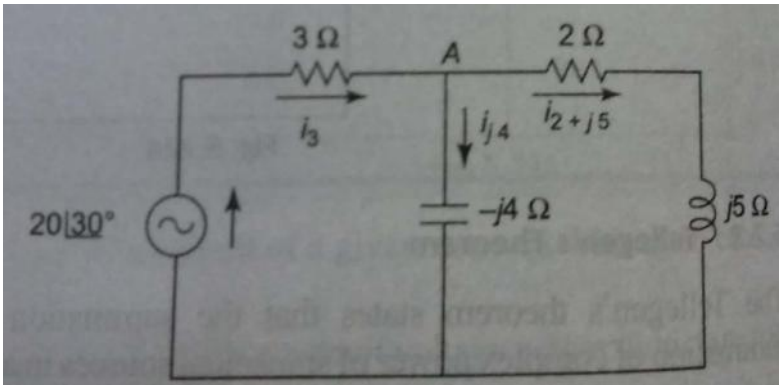
OR

10. a) Find the current I in the circuit shown in Fig. using superposition theorem.



8M

b) Verify Tellegen's theorem for the network shown in Fig



6M

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Hall Ticket Number :										

R-15

Code: 5GC34

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2017

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) Explain the root cause of the current environmental crisis through the four spikes 7M
   b) Why do we say that any study of the environment becomes an interdisciplinary one? 7M

OR

2. a) Why is there a general lack of public awareness about environmental issues? 7M
   b) Explain the concept of ecological footprint through an example 7M

UNIT–II

3. a) With a help of case study explain dam construction effects on forest and tribal people 7M
   b) Outline the conflicts of floods and droughts over water resource. 7M

OR

4. a) Summarize the effects of extracting the mineral resources 7M
   b) Differentiate between traditional agriculture and modern agriculture 7M

UNIT–III

5. a) Explain food chain and food web. 7M
   b) Explain the energy flow as we move up the tropic levels. 7M

OR

6. a) Distinguish between in situ and ex situ conservation. Explain the advantages and disadvantages of each approach. 7M
   b) Explain the hot spots of biodiversity. Predict the treats on biodiversity. 7M

UNIT–IV

7. a) Explain the sources and effects of outdoor air pollution 7M
   b) Explain the sources and effects of noise pollution 7M

OR

8. a) Explain causes, effects and control measures of urban solid wastes. 7M
   b) Explain causes, effects & control measures soil pollution 7M

UNIT–V

9. a) Write a note on i)wet land reclamation ii)global warming 7M
   b) Explain the practice of rain water harvesting. 7M

OR

10. a) Write a note on value based education in relation to environment. 7M
    b) Summarize the salient features of the Environmental protection act? 7M

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Hall Ticket Number :										

R-15

Code: 5GC32

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2017

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 following matrix into its normal form and hence find its rank

$$A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$$ 7M

b) Test for consistency and solve

$5x+3y+7z=4,\quad 3x+26y+2z=9,\quad 7x+2y+10z=5$ 7M

OR

2. a) Solve $2x-y+3z=9,\quad x+y+z=6,\quad x-y+z=2$ by Gauss elimination method. 7M

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

UNIT–II

3. a) Find a real root of the equation $3x=\cos x+1$ by Newton-Raphson method correct to four decimal places. 7M

b) Apply Runge-Kutta method to find an approximate value of y for $x=0.2$ in steps of 0.1 if $\frac{dy}{dx}=x+y^2$, given that $y=1$, where $x=0$. 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) Find by Taylor's series method the value of y at $x=0.1$ and $x=0.2$ to five decimal places from $\frac{dy}{dx}=x^2y-1,\quad y(0)=1$. 7M

UNIT–III

5. a) Estimate the value of $f(22)$ and $f(42)$ from the following table by Newton's forward and backward interpolation formula:

x	20	25	30	35	40	45
$f(x)$	354	332	291	260	231	204

7M

b) Use Simpson's $(1/3)rd$ rule and Simpson's $(3/8)th$ rule to estimate $\int_0^6 \frac{dx}{(1+x^2)}$ 7M

OR

6. a) Use Lagrange's Interpolation formula to estimate $f(10)$ from the following table:

x	5	6	9	11
$f(x)$	12	13	14	16

7M

b) 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

7M

UNIT–IV

7. a) Fit a second degree parabola to the following data by the method of least squares:

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

7M

b) Form the partial differential equations (by eliminating the arbitrary constants and arbitrary functions) from

$(i)\, z = ax + by + a^2 + b^2$ and $(ii)\, z = f(x + ay) + g(x - ay)$ 7M

OR

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

x	1	2	3	4
y	1.65	2.7	4.5	7.35

7M

b) Solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$ where $u(x,0) = 6e^{-3x}$ by variable separable method. 7M

UNIT–V

9. a) Obtain the Fourier series for the function $f(x) = x - x^2$ in the interval $[-\text{®}, \text{®}]$.

Hence show that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \cdots\cdots = \frac{\text{®}^2}{12}$. 7M

b) Find the Fourier sine transform of the function $f(x) = \frac{e^{-ax}}{x}$, $a > 0$. 7M

OR

10. a) Find the half-range Cosine series for the function $f(x) = (x-1)^2$ in the interval $(0,1)$. Hence show that $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \cdots\cdots = \frac{\text{®}^2}{6}$ 7M

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

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Hall Ticket Number :

R-15

Code: 5G333

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2017

Signals & Systems

(Electronics & 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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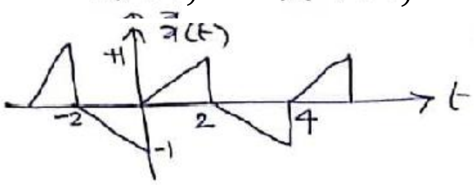
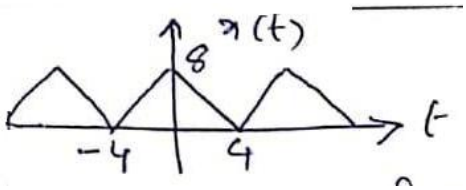
UNIT–I

1. a) Define and Sketch
   i. $\delta(t+2)$ ii. $\mu(-t+1)$ iii. Signum function — 6M

   b)


   Find T.F.S. — 8M

OR

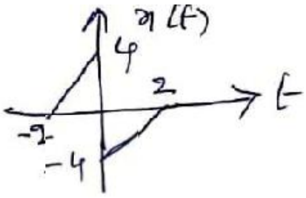
2. a)


   Find Enpoutial Fourier Series and Draw the spectrum — 8M

   b) Plot for $x(n) = \{1,2,3,4\}$
   i. $x(2n)$ ii. $x(0.5n)$ iii. $x(n-2)$ — 6M

UNIT–II

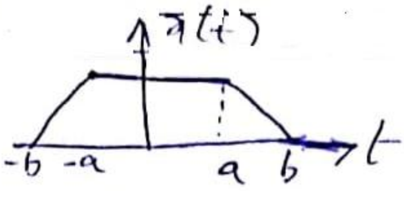
3. a) State and prove Frequency convolution property. — 6M

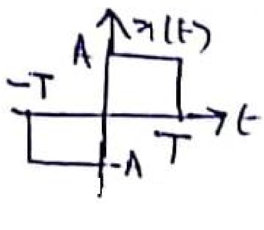
   b)


   Find $x(w)$ — 8M

OR

4. Find Fourier Transformation using Fourier Properties.

   i.


   ii.


14M

UNIT–III

5. a) Test for Linearity, Time variance and causality for
i. $y(t)=[x(t)]^2$ ii. $y(t)=\log_{10}|x(t)|$ iii. $y(t)=\sin at$ 6M

b) Explain Paley-Weiner Criterion. 8M

OR

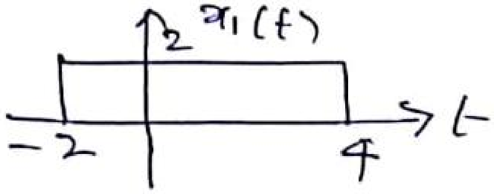
6. a) Test for Linearity, Time variance and causality for
i. $y(t)=x(at)$ $if\ i.\ \alpha<1$ $ii.\ \alpha>1$ 6M

b) Derive the condition for Distortion less Transmission and draw the magnitude & phase characteristics. 8M

UNIT–IV

7. a) Write Differences between auto and cross correlation and state any four properties of auto correlation. 6M

b)



Find autocorrelation. 8M

OR

8. a) Find the energy spectral density of the signal $x(t)=10\ sinc\ 10t$. Also find its total energy. 6M

b) Define sampling theorem for time limited signal and find the Nyquist rate for
i. rect 300t ii. $10\sin 10\pi t\cos 300\pi t$ 8M

UNIT–V

9. a) $F(S)=\frac{10}{s(s+10)}$. find unit ramp response of the system. 8M

b) $X(Z)=\frac{1+2Z^{-1}+Z^{-2}}{1-\frac{3}{2}Z^{-1}+\frac{1}{2}Z^{-2}}$ $find\ x(n)of\ i.\ |Z|>1$ $ii.\ \frac{1}{2}<|Z|<1$ 6M

OR

10. a) State and prove initial and final value theorem using L.T. 6M

b) $i.\ x(n)=2^n u(-n-1)$ $ii.\ x(n)=u(n)-u(n-10)$
Find $X(Z)$ and show Region of Convergence. 8M

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