

Code : 1G331

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)

II B.Tech. I Semester Regular Examinations, January 2014

Electronic Circuits

(ECE)

Time: 3 hours

Max Marks: 70

Answer any FIVE of the following
All questions carry equal marks (14 Marks each)

* * * * *

1. a) For a single stage transistor amplifier, $R_s = 5K$ and $R_L = 10 K$. The h-parameter values are $h_{fe} = 50$, $h_{ie} = 1.1 K\Omega$, $h_{re} = 2.5 \times 10^{-4}$, $h_{oe} = 25 \mu A/V$. Find A_i , A_v , A_{vs} , R_i and R_o for the CE transistor configuration. 7M
- b) With the help of necessary equations, discuss the variation of A_i , A_v , R_i , and R_o with R_s and R_L in Common Emitter configuration. 7M
2. a) How multistage amplifiers are classified depending upon the type of coupling. 7M
- b) Three identical non-interacting amplifier stages in cascade have an overall gain of 1 dB down at 30 Hz compared to mid band. Calculate the lower cut off frequency of the individual stages. 7M
3. a) Derive the expression for the CE short-circuit current gain A_i as a function of frequency. 7M
- b) The following low-frequency parameters are known for a given transistor at $I_C = 10mA$, $V_{CE} = 10 V$, and at room temperature, 7M
 - $h_{ie} = 500$
 - $h_{oe} = 4 \times 10^{-5} A/V$
 - $h_{fe} = 100$
 - $h_{re} = 10^{-4}$.
 At the same operating point, $f_T = 50 MHz$ and $C_c = 3 PF$, compute the values of all the Hybrid - π parameters .
4. a) Explain general characteristics of negative feedback amplifiers. 7M
- b) Draw and explain the circuit of voltage-shunt feedback amplifier. 7M
5. a) Draw and explain the circuit of a crystal-controlled oscillator. 7M
- b) Draw and explain the circuit of a phase-shift oscillator using FET. 7M
6. a) Explain why even harmonics are not present in a push-pull amplifier and give two advantages of this circuit over that of a single-transistor amplifier. 7M
- b) Derive an expression for the output power of an idealized class B push-pull power amplifier. 7M
7. a) Draw and explain the circuit diagram of a single tuned Capacitance coupled amplifier. Also explain its operation? 7M
- b) Explain with neat circuit diagram about stagger tuned amplifier. 7M
8. Design a series-regulated power supply to provide a nominal output voltage of 25 V and supply load current $I_L \leq 1 A$. The un-regulated power supply has the $V_I = 50 \pm 5 V$ and $R_o = 10 \Omega$. Find input regulation factor S_v and output resistance R_o , also compute the change in output voltage ΔV_o due to input voltage changes of $\pm 5 V$ and load current I_L variation from zero to 1 A. 14M

Code : 1GC32

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)

II B.Tech. I Semester Regular Examinations, January 2014

Engineering Mathematics

(Common to EEE & ECE)

Time: 3 hours

Max Marks: 70

Answer any FIVE of the following
All questions carry equal marks (14 Marks each)

* * * * *

1. a) Find the rank of

$$\begin{pmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{pmatrix}$$

b) Find the values of a and b for which the equation $x+ay+z=3$, $x+2y+2z=b$, $x+5y+3z=9$ are consistent. When will these equations have a unique solutions?

2. a) Find a real root of $xe^x=3$, using regular falsi method.

b) Using Newton's method, compute $\sqrt{41}$ correct to 4 decimal places.

3. Given $y' = x(x^2 + y^2)e^{-x}$, $y(0)=1$. Find y at $x=0.1$, 0.2 and 0.3 . by taylors series method and compute $y(0.4)$ by Milne's method.

4. a) Fit a straight line to the following data

| | | | | | |
|--------------|------|------|------|------|------|
| Year x | 1961 | 1971 | 1981 | 1991 | 2001 |
| Production y | 8 | 10 | 12 | 10 | 16 |

And find expected production in 2006.

b) Find the curve of best fit of the form $y=ab^x$ to the following data by the method of least squares

| | | | | | |
|---|-----|------|------|------|-------|
| x | 2 | 3 | 4 | 5 | 6 |
| y | 8.3 | 15.4 | 33.1 | 65.2 | 127.4 |

5. Solve a) $p \tan x + q \tan y = \tan z$.

b) $x(y - z)p + y(z - x)q = z(x - y)$.

6. a) Find the Fourier series to represents $f(x)=|x|$ when $-\pi < x < \pi$ and deduce that

$$\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}.$$

- b) Find the half range cosine series for the function $f(x)=x$, when $0 < x < \pi$
7. a) Find Fourier sin and cosine transform of $f(x)=\frac{e^{-ax}}{x}$
- b) Find Fourier sin and cosine transform of $2e^{-5x}+5e^{-2x}$
8. a) Find the maximum n such that the probability of getting no head in tossing in fair coin in n times is greater than 0.1.
- b) A random sample of 400 items is found to have mean 82, and standard deviation 18, find the maximum error of estimation at 95% confidence interval?

Code : IGC34

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)

II B.Tech. I Semester Regular Examinations, January 2014

Environmental Science

(Common to ECE & IT)

Time: 3 hours

Max Marks: 70

*Answer any FIVE of the following
All questions carry equal marks (14 Marks each)*

* * * * *

- | | | |
|-------|---|-----|
| 1. a) | Explain the importance of Environmental Education. | 7M |
| b) | Explain the scope of Environmental Engineering. | 7M |
| 2. a) | Discuss the importance of Alternate Energy Resource. | 7M |
| b) | Discuss the effects of modern agriculture on food resources of the world. | 7M |
| 3. a) | Briefly discuss the types of soil erosion. | 7M |
| b) | Explain the land conservation Measures. | 7M |
| 4. a) | Define the term Solid Waste Management and explain various methods of Municipal Solid Waste Management. | 14M |
| 5. a) | Explain the Nitrogen cycle with diagram. | 7M |
| b) | Write a Short note on | |
| | (i) Energy Flow | |
| | (ii) Food Chain. | 7M |
| 6. a) | Define the term Hot Spot, Give an account of Hot Spots of India. | 7M |
| b) | Discuss the Conservation Measures of Bio-Diversity. | 7M |
| 7. a) | Write a short note on Waste Land reclamation. | 6M |
| b) | Write about the effects and control measures of Ozone Layer depletion. | 8M |
| 8. a) | Explain the steps that are being taken India to impact value education from school days. | 8M |
| b) | What are the modes of transmission of HIV and how it can be prevented? | 6M |

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)

II B.Tech. I Semester Regular Examinations, January 2014

Pulse and Digital Circuits
(ECE)

Time: 3 hours

Max Marks: 70

*Answer any FIVE Questions from the following
All questions carry equal marks (14 Marks each)*

1. a) Explain the response of a high pass circuit to an exponential input. 7M
b) A pulse of 5v amplitude and pulse width 0.5 msec is applied to high pass RC circuit consisting of R=22Kohms and C=0.47 micro farads. Determine the % tilt in the output waveform. 7M
2. a) With the help of a neat circuit explain the working of biased negative clamping circuit. 7M
b) Explain the operation and transfer characteristics of different types of shunt clippers with circuits. 7M
3. Write short notes on:
a) Diode switching times. 3M
b) Switching characteristics of transistor 6M
c) FET as a switch 5M
4. a) Design a collector coupled bistable multivibrator with specifications $V_{CC}=10v$, $V_{BB}=6v$, $I_{C\ sat}=5mA$, neglect I_{CBO} , transistor is silicon npn type. Assume junction voltages. 7M
b) Draw the collector coupled astable multivibrator and explain its operation. 7M
5. a) Explain the basic principles of Miller and bootstrap time base generators. 7M
b) Draw and explain sweep circuit using UJT. 7M
6. a) Explain the synchronization of a sweep generator with a pulse synchronizing signal. 7M
b) With the help of waveform explain the synchronization with frequency division. 7M
7. a) What is pedestal? How it effects the output of a sampling gate? 7M
b) Draw the sampling gate with four diodes and explain its operation. 7M
8. a) Realize two inputs TTL NAND gate truth table and explain its operation with suitable circuit diagram. 7M
b) With the help of neat circuit diagram and truth table, explain the working of diode logic AND gate and RTL AND gate. 7M

Code : 1G333

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)

II B.Tech. I Semester Regular Examinations, January 2014

Random Variables and Random Processes

(ECE)

Time: 3 hours

Max Marks: 70

Answer any FIVE Questions from the following
All questions carry equal marks (14 Marks each)

1. a) Explain the various ways to define the probability. 6M
b) Define the cumulative distribution function and the probability density function, and list out their properties. 8M
2. a) Write about the characteristic functions and the moment generating functions. 8M
b) Show that the characteristic function of the random variable $X \sim N(0,1)$ is
$$\Phi_X(w) = e^{-\frac{w^2}{2}}$$
 6M
3. a) State and Prove the Central Limit Theorem 7M
b) Two random variables X and Y are independent, uniformly distributed over an interval (-1, 1). Define $Z=X+Y$, determine the density function of random variable Z. 7M
4. a) A WSS random process $X(t)$ is applied to the input of an LTI system with impulse response $h(t) = 3e^{-2t}U(t)$. Find the mean value of $Y(t)$ of the system if $E[X(t)] = 2$. 7M
b) Prove that the output Power Spectral Density equals the input Power Spectral Density multiplied by the squared magnitude of the transfer function of the linear filter. 7M
5. a) Define Band Limited Processes and list out the properties of Band Limited processes. 8M
b) Explain the Effective noise temperature with the help of example. 6M
6. a) Define Random Process? Explain the classification of Random processes. 7M
b) Consider the Random Process $X(t)$, defined by $X(t) = A\cos(2\pi f_c t + \Theta)$, where A and f_c are constants and Θ is a uniformly distributed random variable
$$f_\Theta(\theta) = \begin{cases} 1/2\pi, & 0 \leq \theta \leq 2\pi \\ 0, & \text{elsewhere} \end{cases}$$
 Show that this Random process is Ergodic in both the mean and autocorrelation. 7M
7. a) State and Prove the properties of an Auto-correlation function. 7M
b) Two random processes X(t) and Y(t) are given by $X(t) = A\cos(\omega t + \theta)$, $Y(t) = A\sin(\omega t + \theta)$, where A and ω are constants, and θ is a uniform random variable over $(0, 2\pi)$. Find the Cross-correlation function of X(t) and Y(t). 7M
8. a) Write a short note on the Power spectrum. Also list out its properties. 7M
b) If $R_{XX}(\tau) = \tau^2 e^{-a\tau} u(\tau)$, Find $S_{XX}(\omega)$. 7M

Code : 1G236

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)

II B.Tech. I Semester Regular Examinations, January 2014

Electrical Circuit Theory

(ECE)

Time: 3 hours

Max Marks: 70

Answer any FIVE of the following
All questions carry equal marks (14 Marks each)

1. a) Explain source transformation. 6M
- b) Use the technique of star to delta transformation find the resistance between AB terminals in fig1(b).

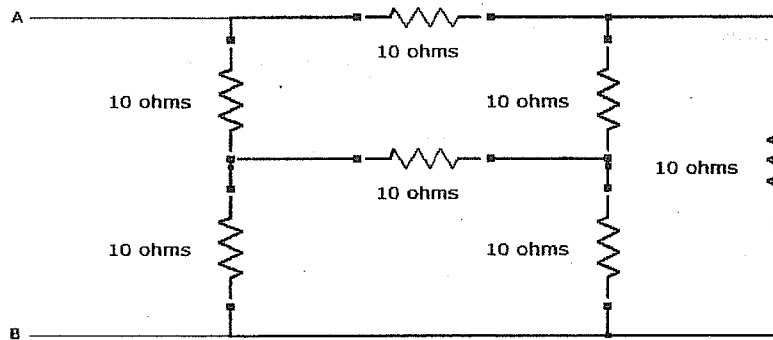


Figure 1(b)

8M

2. a) With three node general circuits explain the nodal analysis to find node voltages 4M
- b) Use mesh analysis to find the current I_0 in the circuit of figure 2(b).

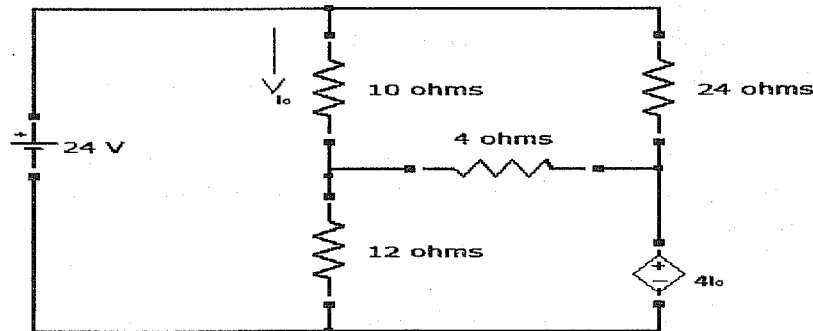


Figure 2(b)

10M

3. a) Define i) RMS value ii) Average value iii) peak factor iv) Form factor. 4M
- b) Calculate the Form factor and Peak factor of the current wave form shown in figure 3(b).

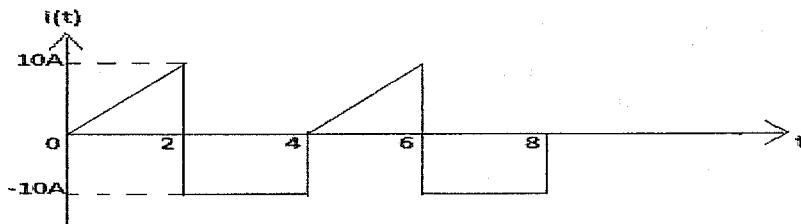


Figure 3(b)

10M

4. a) Define i) Impedance ii) Admittance iii) Susceptance and write the difference between the Resistance and reactance. 6M
- b) Define phase angle and calculate the power factor of the circuit of figure 4(b) as seen by the source. What is the average power supplied by the source.

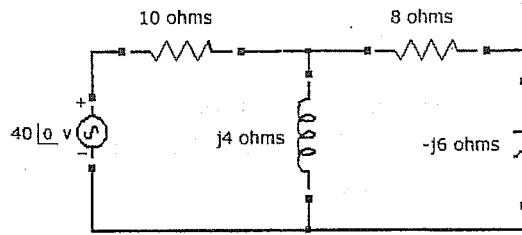


Figure 4(b)

8M

5. a) Explain the significance of the time constant in transient analysis of RL and RC circuits. 4M
- b) In figure 5(b) the switch is closed at position 1 at $t=0$. At $t=0.5\text{msec}$ the switch is moved to position 2. Find the expression for the current in both the conditions. And sketch the transient

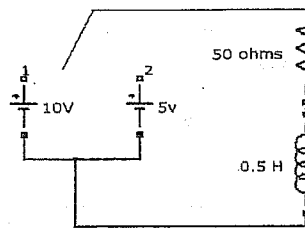


Figure 5(b)

10M

6. a) Explain Dot convention with examples. 7M
- b) Two identical coils connected in series gave an inductance of 800 mH and when one of the coil is reversed gave an inductance of 400 mH determine self and mutual inductance between the coils and coefficient of coupling. 7M
7. a) State and explain Thevenin's theorem . State for what type of problem this theorem is useful. 6M
- b) Determine the voltage source equivalent of the network given in figure 7(b). Also determine the impedance to be connected between the terminals AB for maximum power transfer to it.

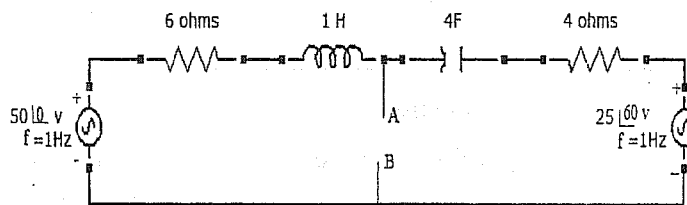
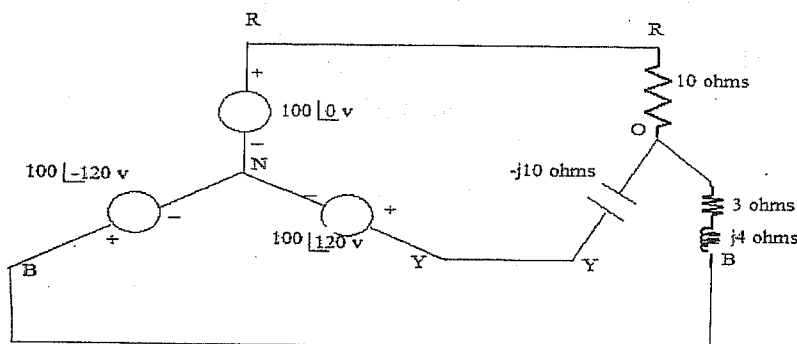


Figure 7 (b)

8M

8. a) State and explain Tellegen's theorem 4M
- b) Using Millimans theorem find the neutral shift voltage v_{on} in the following network.



10M