

Code: 1G246

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2019

Electrical Technology

(Electronics and Communication Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questionsAll Questions carry equal marks (**14 Marks** each)

1. a) Show that current in a series RL circuit excited by a dc source of voltage V is $I = (V/R)(1 - e^{-(R/L)t})$ A.
- b) In the circuit shown in fig.1, find the expression for current $i(t)$

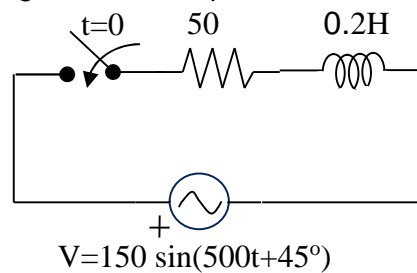


Fig.1

2. a) Define and obtain open circuit impedance parameters by taking any one example.
- b) A two port network has the following parameters: $Z_{11}=20$, $Z_{12} = 5$, $Z_{21}= 20$ and $Z_{22}= 15$. Calculate Short circuit parameters
3. Design a T-section constant K- high pass filter having cut-off frequency of 12 kHz and nominal impedance $R_o= 500$. Also find: (i) Its characteristic impedance and phase constant at 24 kHz and (ii) attenuation at 4 kHz.
4. a) Design T-type attenuator.
- b) Design a symmetrical T-type attenuator to provide attenuation of 20 dB. Take characteristic impedance=75 .
5. a) Explain the operating principle of a DC generator in detail.
- b) A 4-pole wave connected DC generator having 60 slots on its armature with 6 conductors per slot, runs at 750 rpm and generates an open circuit voltage of 230 V. Find the useful flux per pole.
6. Explain the characteristics of DC shunt and series motors.
7. Explain the principle of operation of single phase transformer under no load and load conditions with neat phasor diagrams.
8. Write a short notes on :
 - (a) Synchros.
 - (b) AC tachometer.

Code: 1G244

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2019

Linear Control Systems

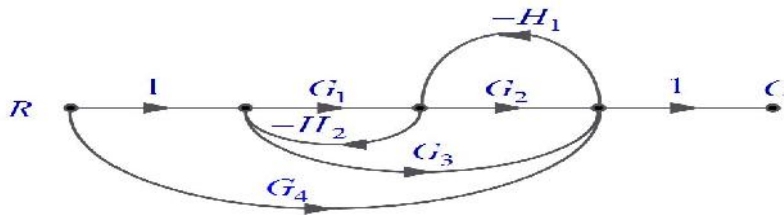
(Common to EEE & ECE)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questionsAll Questions carry equal marks (**14 Marks** each)

1. Explain in detail about the classification Systems.
2. a) Explain Masons gain formula in detail
b) And also obtain the transfer function using Masons gain formula for the signal flow graph shown below.



3. a) Explain in detail about Test Signals with figures and also discuss their importance.
b) A servomechanism has its moment of inertia 10×10^{-6} Kg-m², retarding friction 400×10^{-6} Nm/rad/sec. The output torque is 0.004 Nm/rad error. Find the natural frequency and damping factor of the system.
4. a) Determine the stability using Routh Criterion of the closed loop transfer function

$$G(s) = \frac{10}{s^5 + 2s^4 + 3s^3 + 6s^2 + 5s + 3}.$$

- b) Explain about BIBO stability.
5. a) Define Bode plot.
b) Discuss about basic factors while drawing the bode plot
6. a) Define Type number and order number of a system.
b) Sketch the polar plot for the feedback system whose OLTF is

$$G(s) = \frac{1}{s(1+s)(1+2s)}.$$

7. Explain the procedure for the design of lag compensator in Frequency Domain.

8. a) Obtain the Solution of homogeneous state equation.

- b) Obtain the state space representation for the System $\frac{Y(S)}{U(S)} = \frac{S+6}{S^2+5S+6}$.

Code: 1GC41

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2019

Mathematics-III

(Common to EEE & ECE)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions

All Questions carry equal marks (**14 Marks** each)

1. a) Show that $\Gamma\left(\frac{1}{2}\right) = \sqrt{f}$ 7M

b) Evaluate $\int_0^{f/2} \sqrt{\tan u} \, du$ 7M

2. Given $f(z) = u + iv$ is an analytic function of z and if $u = \frac{1}{2} \log(x^2 + y^2)$ find $f(z)$ in terms of z . 14M

3. a) Given $\sin(x + iy) = u + iv$ then show that $u^2 \operatorname{Cosec}^2 y = v^2 \operatorname{Sec}^2 x = 1$ 7M

b) Prove that $4(a^2 - b^2) = \frac{x}{a} + \frac{y}{b}$ if $(x + iy)^{1/3} = a + ib$ 7M

4. a) Using Cauchy's integral formula evaluate $\int_C \frac{\sin^2 z}{\left(z - \frac{f}{6}\right)^3} dz$ where C is unit circle. 7M

b) Find $\int_c z^2 dz$ along the straight line from $z = 0$ to $z = i$ 7M

5. Obtain Taylor Series to represent the function $f(z) = \frac{e^z}{z(z+1)}$, in the region $|z| = 2$ 14M

6. Evaluate the real integral $I = \int_{-\infty}^{\infty} \frac{1}{1+x^2} dx$ by the method of Residue Theorem 14M

7. Show that one root of the equation $z^4 + z + 1 = 0$ lies in the first quadrant of the complex plane. 14M

8. Define bilinear transformation. Find the bilinear transformation that maps the points $z = 2, i, -2$ into the points $w = 1, i, -1$ respectively. 14M

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R-11 / R-13

Code: 1G341

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2019

Signals and Systems

(Electronics and Communication Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions

All Questions carry equal marks (**14 Marks** each)

1. a) Enumerate the Basic operations on signals with examples and diagrams
b) Explain the concept of Signal approximation using orthogonal functions with necessary derivations
2. a) Write short notes on Dirichlet's conditions for Fourier series
b) State and prove following properties of DTFS: (i) Time shifting. (ii) Frequency shifting.
3. Define Fourier Transform Pair. State and Prove any three properties of Fourier Transform.
4. a) Find whether the following system are static or dynamic
i) $y(t) = x(t^2)$ ii) $y(t) = e^{x(t)}$
b) Explain Transmission of signals through LTI systems
5. a) Evaluate the convolution of the two signals $x(t) = e^{-2t} u(t)$ $h(t) = u(t+2)$
b) Derive the Convolution property of Fourier transforms
6. State and Prove Sampling Theorem with appropriate equations and sketches
7. a) Find the laplace transform of the following signal $x(t) = \sin^2 \pi t$ for $0 < t < 1$ & 0 otherwise
b) Derive the relationship between Laplace and Fourier Transform
8. a) Describe about the Periodicity of discrete time using complex exponential signal
b) Enlist the properties of Z-transforms and explain any three.

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R-11/R-13

Code : 1G245

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2019

Switching Theory and Logic Design

(Electronics & Communication Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions
 All Questions carry equal marks (**14 Marks** each)

1. a) Encode BCD numbers in 5421, and 84-2-1 weighted codes
 b) Perform following operations using 2's complement
 - i) $(25)_{10} - (19)_{10}$
 - ii) $(33)_{10} - (43)_{10}$
2. a) List out the properties of XOR gate and draw the various symbols of it.
 b) Realize given Boolean function using NAND gates
 $F = ab + bc + ca$
3. Derive the minimal solution for a given Boolean function using tabulation method
 $F(a, b, c, d, e, f) = (6, 9, 13, 18, 19, 25, 27, 29, 41, 45, 57, 61)$ and find out the essential and selective prime implicants.
4. a) Design 4-bit Ripple carry adder and explain operation of it.
 b) Design Full adder using decoder and additional logic
5. a) Differences between ROM, PLA and PAL
 b) Realize a circuit which generates the square of a 4-bit binary number by using ROM
6. a) Derive characteristic equations of RS-FF and T-FF
 b) Design a circuit which generate the following sequence 0,1,3,5,6 and repeat using JK-FFs
7. a) What is meant by implication table?
 b) Determine a minimal state table equivalent to the given state table using merger chart method

PS	NS,Z	
	X=0	X=1
1	1,0	1,0
2	1,1	6,1
3	4,0	5,0
4	1,1	7,0
5	2,0	3,0
6	4,0	5,0
7	2,0	3,0

8. a) Explain basic building blocks of ASM chart
 b) Draw the ASM chart for 3-bit synchronous counter

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R-11 / R-13

Code: 1G342

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2019

Electromagnetic Waves and Transmission Lines

(Electronics and Communication Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions

All Questions carry equal marks (**14 Marks** each)

1. a) State and explain the coulomb's law with suitable equations and diagram 7M
b) Point charges of 1mC and -2mC are located at (3,2,-1) and (-1,-1,4) respectively. Calculate the electric force on a 10nC charge located at (0,3,1). 7M
2. Elaborate Polarization in Dielectrics 14M
3. a) State and explain Biot savart law 10M
b) List Maxwell's Equations for Static EM Fields 4M
4. a) Derive the displacement current density 7M
b) List and explain Maxwell's equations in final forms 7M
5. a) Write equations of \vec{E} and \vec{H} . Explain Planes waves in Lossless dielectrics 7M
b) Compare the propagation of waves in Lossy and lossless dielectrics 7M
6. Express Pointing Vector and Pointing Theorem with neat diagram and equations 14M
7. Derive Transmission line equation in terms of voltage and current 14M
8. a) Define input impedance and list its relations 7M
b) Write a short note on VSWR 7M
