

FOR EVALUATOR'S USE ONLY

Sub. Code : **14**

Optional Paper

Electronics & Telecommunication Engineering : Paper – I

Time : 3 Hours / Maximum Marks : 200 / Total Pages : 32

Evaluation Table													(For Evaluator's Use Only)
PART-A				PART-B				PART-C				Grand Total	
QN	E-1	E-2	AC	QN	E-1	E-2	AC	QN	E-1	E-2	AC	PART-A	
1				21				33				PART-B	
2				22				34				PART-C	
3				23				35				Total	
4				24				36				(-) Marks	
5				25				37				Final Total	
6				26				38				Marks in Words	
7				27				39					
8				28									
9				29									
10				30								Remarks of Evaluator/Chief Evaluator	
11				31									
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18												Remarks of Scrutiniser	
19													
20													
Total													
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PART - A

Marks : 40

Note : Attempt all the **twenty** questions. Each question carries 2 marks. Answer should not exceed 15 words.

1 Define Fermi-Dirac energy distribution.

2 What is Hall Effect ?

3 Differentiate between Field effect transistors and Bipolar junction transistor.



4 What is forward blocking voltage of an SCR ?

5 Given the following facts about a sequence $x[n]$:

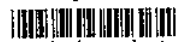
(a) $x[n]$ is periodic with period $N=6$

(b)
$$\sum_{n=0}^5 x[n] = 2$$

(c)
$$\sum_{n=2}^7 (-1)^n x[n] = 1$$

(d) $x[n]$ has the minimum power per period among the set of signals satisfying the preceding three conditions.

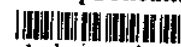
Determine the sequence $x[n]$.



6 Whether $x_1(t) = 2e^{j(t+\pi/4)}u(t)$ is a periodic signal ?

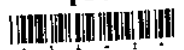
7 Plot the impulse response of a low pass filter $h(t) = (1/\pi t) \sin \omega_c t$

8 What will be z-transform of $s(n) = \delta(n)$?

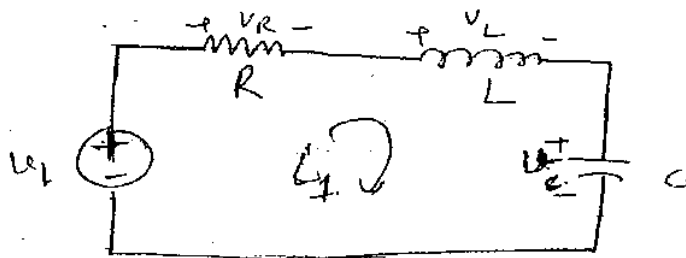


- 9 Three resistors, R_1 , R_2 and R_3 are connected in series to a 100 V, DC supply. The combined voltage drop across R_1 and R_2 is 40 V, and that across R_2 and R_3 is 90 V. If the total resistance of the circuit is $20\text{ K}\Omega$, find the value of R_1 , R_2 and R_3 .

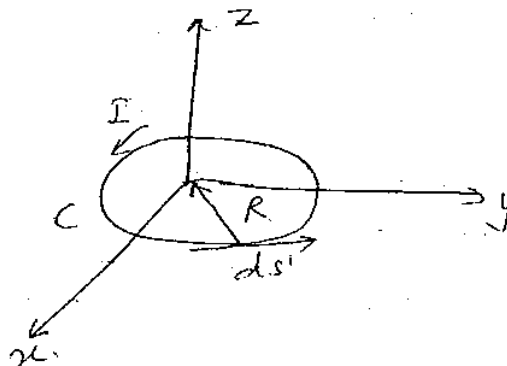
- 10 State the principle of reciprocity.



- 11 Determine the steady state response of the following network if $v_1 = \cos \omega t$.



- 12 Find the field at the center of a circular loop shown below :

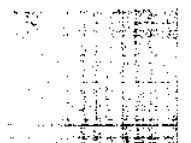




- 13 The cross section of a rectangular wave guide is 2 cm in width and 1 cm in height. What will be the cut-off frequency of this wave guide ?

- 14 What is micro-strip line and what is the use of it ?

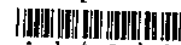
- 15 How do you differentiate between accuracy and preciseness ?



16 What is the application of Wein's Bridge ?

17 What are basic measurements available in a multi-meter ?

18 A moving-coil instrument has a resistance of $10\ \Omega$ and gives a full scale deflection when carrying a current of 50 mA. Show how it can be adopted to measure voltage upto 750 V and current upto 1000 A.



- 19 Find the Laplace transform of $x(t) = te^{-at}u(t)$

- 20 The disc of an energy meter makes 600 revolutions per unit of energy. When a 1000 watt load is connected, the disc rotates at 10.2 rps if the load is on for 12 hours, how many units are recorded as error ?



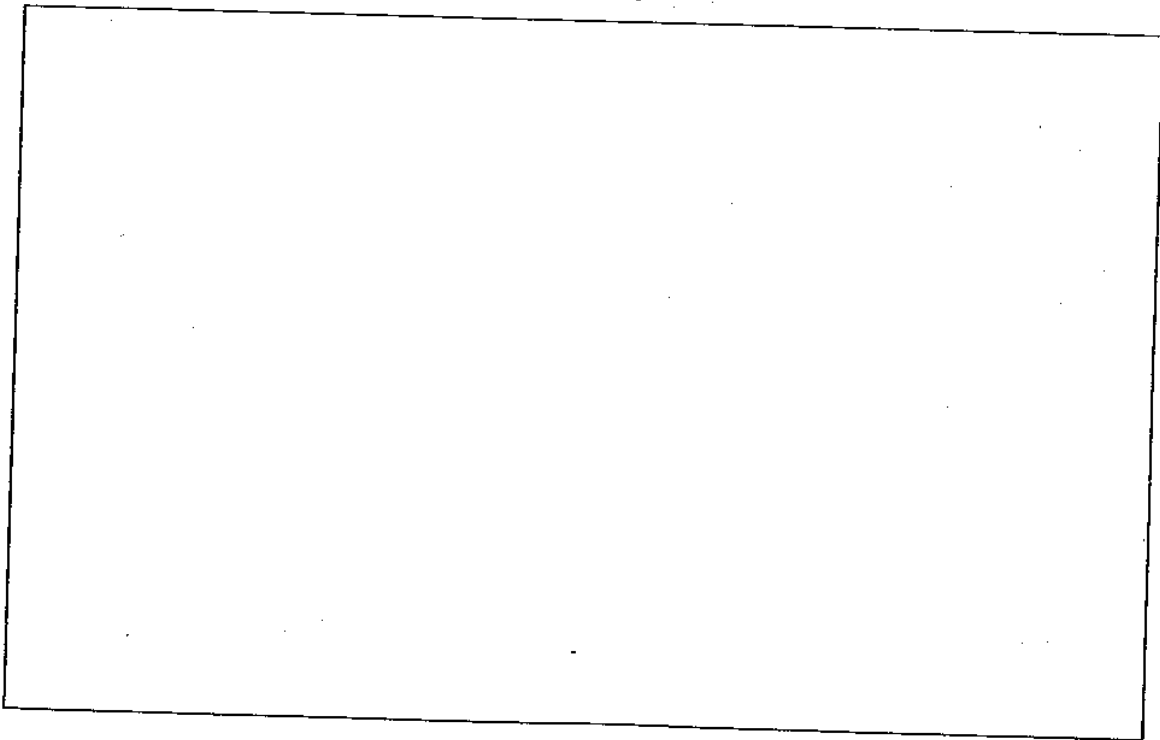
PART - B

Marks : 60

Note : Attempt all the **twelve** questions. Each question carries 5 marks. Answer should not exceed 50 words.

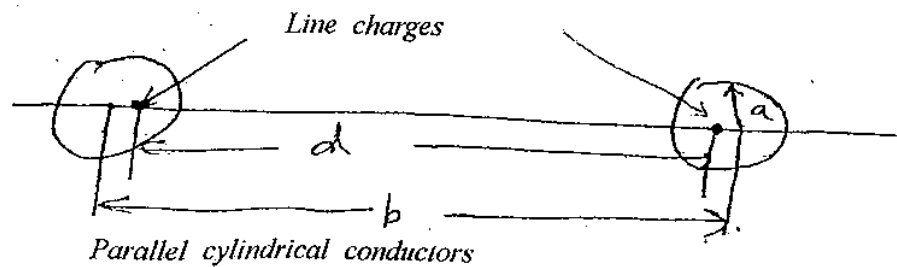
21 What is Gunn Effect ? Give V-I characteristics of GUNN diode.

22 Sketch a CMOS inverter and explain its operation.

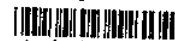


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- 24 A pair of line charges, appropriately located, would make the surfaces occupied by the parallel cylindrical conductors equipotentials. If the radius of the cylinders is "a" and the separation between their axes is "b", then determine the capacitance per unit length.



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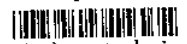


- 25 Following two signals $x(t)$ and $h(t)$ are available. Find convolution integral $y(t)$.

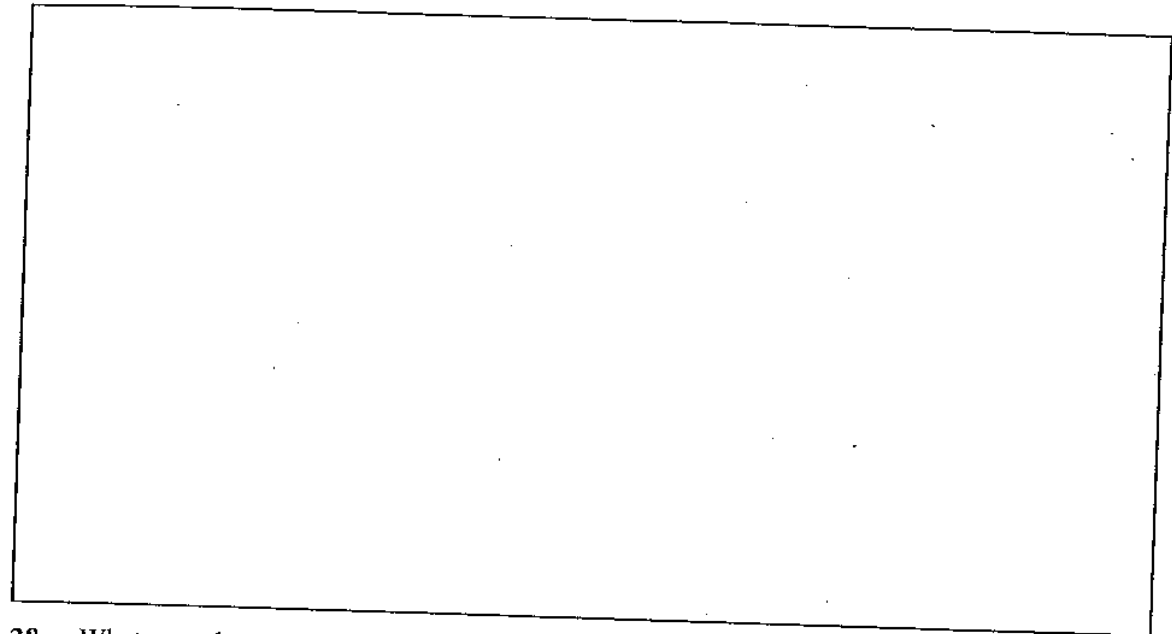
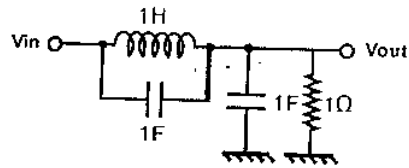
$$x(t) = e^{2t} u(-t)$$

$$h(t) = u(t-3)$$

- 26 Give details of a two elements array of non-directional radiators.



- 27 Draw pole-zero plot of following circuit :

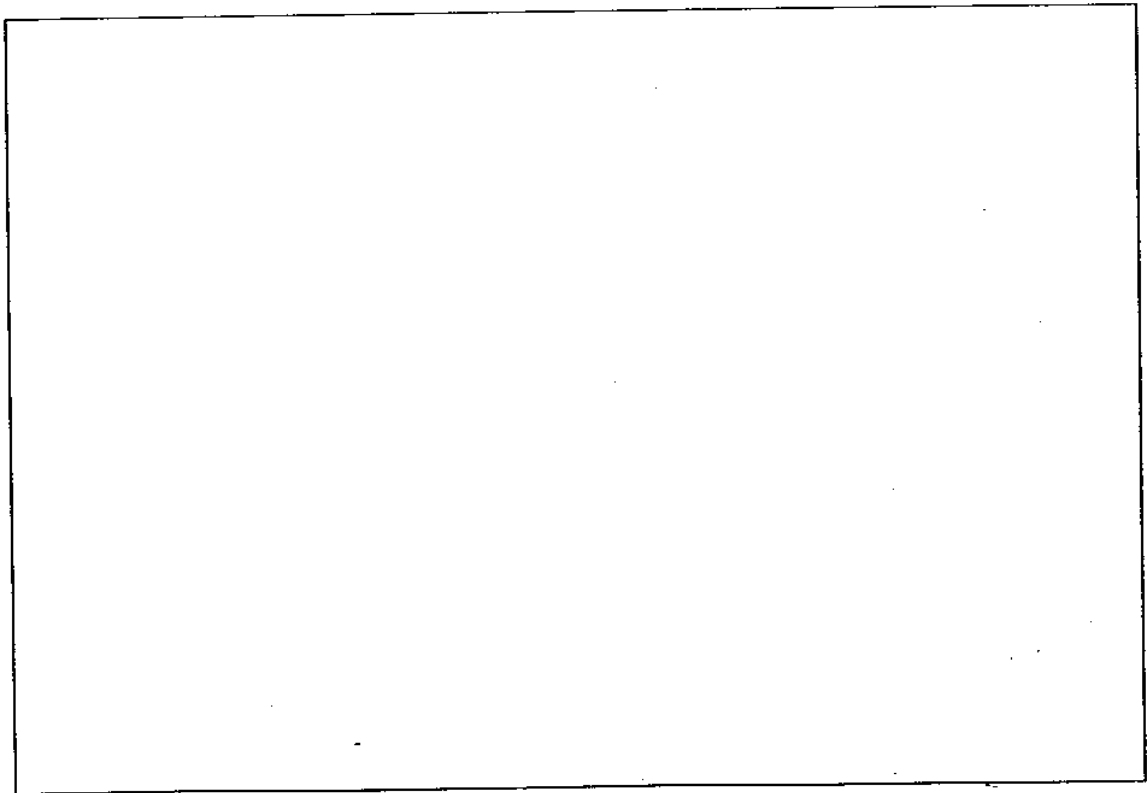


- 28 What are the types of passive matching networks ? List the advantages of impedance matching.



29 List advantages of Rhombic antennas.

30 Give the circuit of Hay's bridge for measurement of inductance.

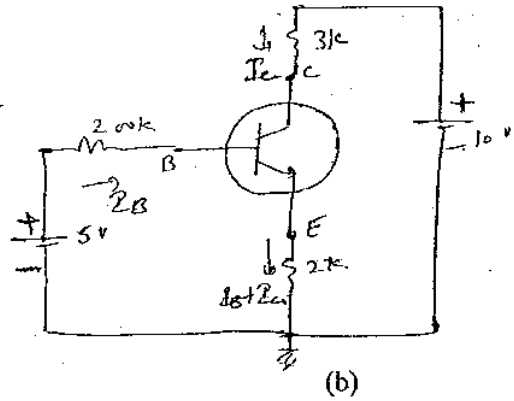
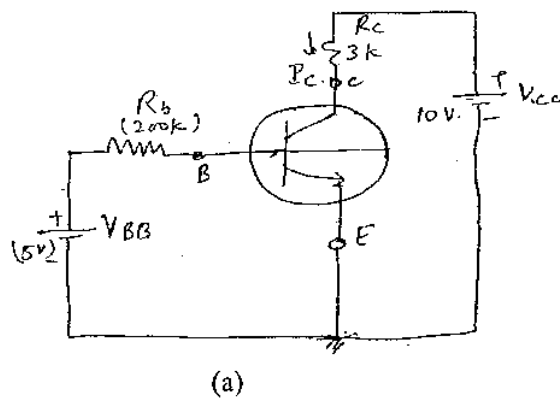


- [illegible]

- [illegible]

Note : Attempt any 5 questions. Each question carries 20 marks. Answer should not exceed 200 words.

- 33 (a) Find the transistor currents in the circuit shown below. A silicon transistor with $\beta = 100$ and $I_{CO} = 20 \text{ nA}$ is under consideration
 (b) Repeat part (a), if a 2 K emitter resistor is added to the circuit as shown below.





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35 Autocorrelation function of a stationary random process $X(t)$ is :

$$R_x(\tau) = \sigma^2 e^{-\mu|\tau|}$$

where μ and σ^2 are constants. It is passed through a filter whose impulse response is :

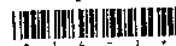
$$h(\tau) = \alpha e^{-\alpha \tau} u(\tau)$$

where α and $u(\tau)$ is a step function.

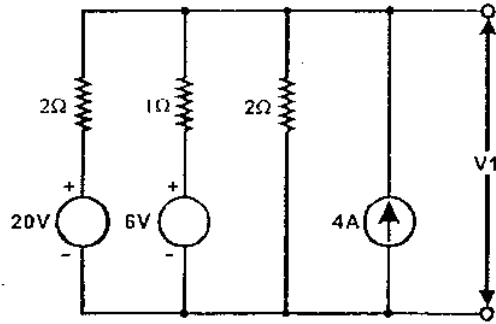
Determine the power spectral density of random signal $X(t)$ and of the output random signal $Y(t)$.

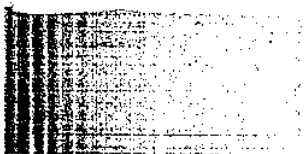
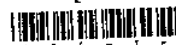
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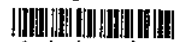
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36 Find the current in all branches and voltage V_1 of the following circuit :





- 37 A metallic conductor has a circular cross section of radius 1.0 cm and $\sigma = 1 \times 10^7 \text{ S/m}$. The conductor carries uniformly distributed current of 100 Amp. D.C. in the \hat{a}_z direction.
- (a) Calculate power loss per meter length.
- (b) Calculate \vec{J} , \vec{E} , \vec{H} and poynting vector within the conductor.



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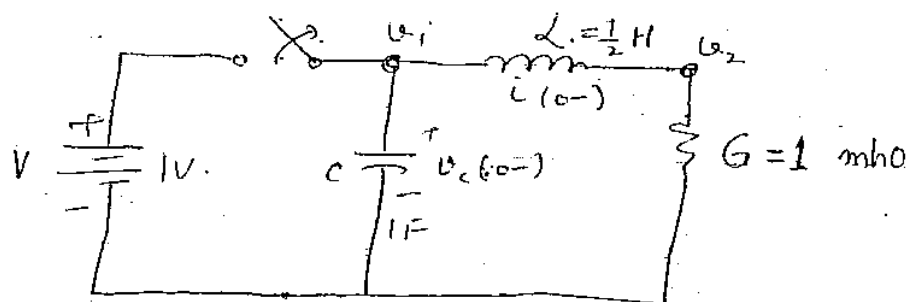


- 38 Explain the construction and working of an electro-dynamometer type power meter. Why are current and potential transformers used in this measurement ?

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- 39 Consider the network shown. At $t=0$ the switch is opened, find the node voltages $v_1(t)$ and $v_2(t)$ for the circuit.





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Electronics & Telecommunication Engineering : Paper – III

Time : 3 Hours / Maximum Marks : 200 / Total Pages : 32

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6				26				38				Marks in Words	
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12				32								Remarks of Evaluator/Chief Evaluator	
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PART – A

Marks : 40

Note : Attempt all the **twenty** questions. Each question carries **2** marks. Answer should not exceed **15** words.

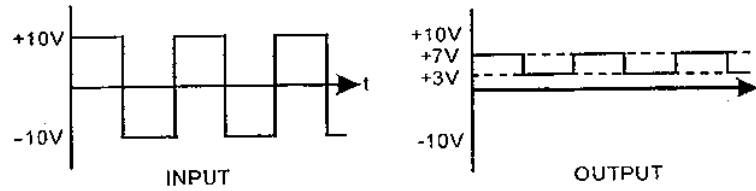
- 1 Using small signal model of a transistor amplifier determine the expression for output admittance y_0 .

- 2 What will be the effect of current series feedback in an amplifier on input impedance, output impedance, gain, bandwidth and internal noise ?

- 3 Which pass filters can be used as differentiator and integrator ?



- 4 Draw the circuit diagram of a clipper whose input and output waveforms are given below. Assume all components are ideal.



- 5 Simplify the Boolean function : $F = A'B'C' + B'CD' + A'BCD' + AB'C'$

- 6 Draw and explain CMOS as inverter.



7 What is the advantages of Master Slave flip flop over normal flip flop ?

8 Obtain a 16×8 memory using 16×4 memory ICs.

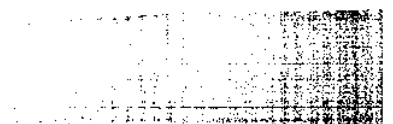
9 Illustrate that the input-output relation is approximately linear over a much wider range for the closed loop system compared to its open-loop behaviour.



- 10 List three major standard test input signals used in control systems.

- 11 The characteristics equation of a control system is given below. Is this system stable ?
 $3s^5 + 6s^4 + 2s^2 + s + 7 = 0$

- 12 Illustrate the basic time division multiplexing scheme. Which is used to convey multiple signals over telephone lines using wide band coaxial cable ?



13 What is dispersion in optical signal propagation ?

14 What is Vestigial Sideband transmission ?

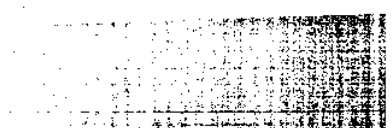
15 List the advantages higher bandwidth fibre optic communication offers, compared to copper wires.



16 If the power gain of an antenna is 1.32, find the effective aperture at 4 GHz frequency.

17 Explain the principle of operation of a microwave negative resistance parametric amplifier.

18 How can we write -34.6_{10} as signed floating point binary number in 8 bit mantissa and 8 bit exponent ?



19 How instruction code is mapped to a microinstruction address ?

20 Show the sequence of events in the execution of CALL instruction by the 8085.



23 Illustrate the working of successive approximation A/D converter.

24 Draw the logic circuit diagram of Johnson's counter and write its output sequence.

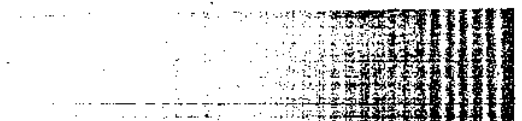
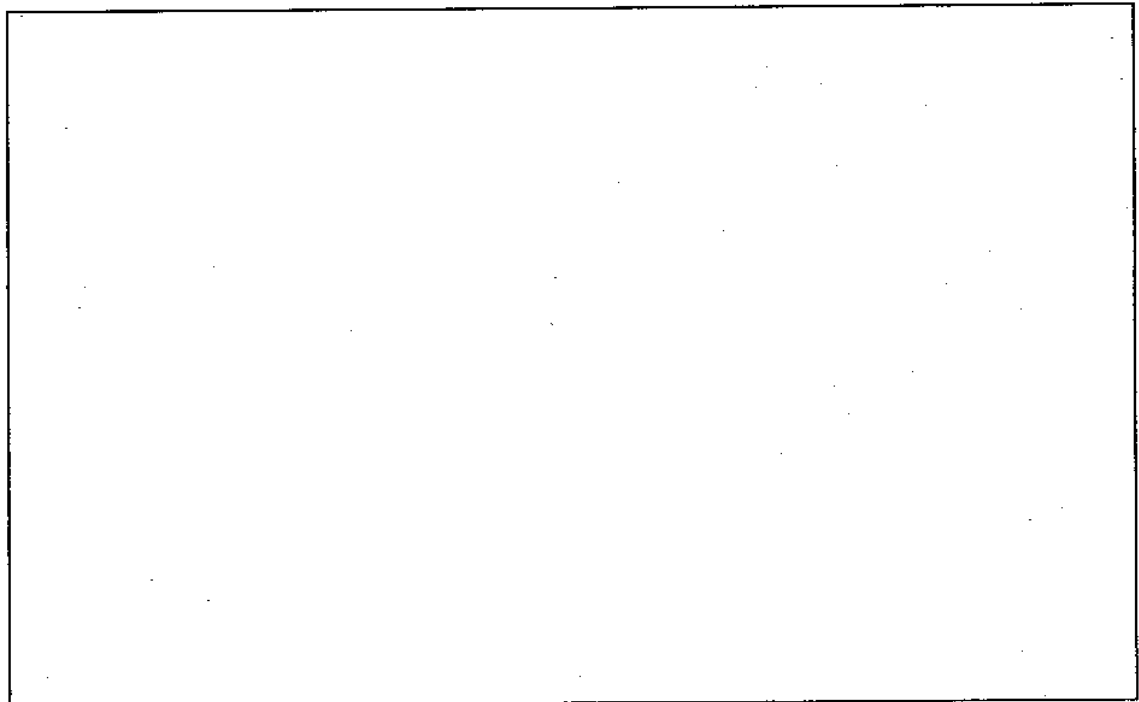


25 How can we obtain Gain and Phase margin from Nyquist plot ?

26 Obtain the state diagram of a single input single output system represented by equations :

$$\frac{dX_1(t)}{dt} = p_1 X_1(t) + q_1 u(t), \quad \frac{dX_2(t)}{dt} = p_2 X_1(t) + p_3 X_2(t) + q_2 u(t) \quad \text{and}$$

$$Y(t) = r_1 X_1(t) + r_2 X_2(t)$$



27 Explain the nature of SSB spectrum if the modulating signal is

$m(t) = \cos 2\pi \cdot 1000t + \cos 2\pi \cdot 2000t$ and carrier is given by $C(t) = \cos 2\pi \cdot 10000t$.

28 Draw the block diagram of QPSK modulator and show the output phases for bits transmission.



(c) Estimate the negative electron mobility.

[illegible]

30 How can we measure microwave power by bolometer technique ? Give appropriate circuit.

31 Six bytes of data are stored in memory locations starting at XX50H. Add all the data bytes. Use register B to save any carries generated, while adding the data bytes. Display the entire sum at two output ports or store the sum at two consecutive memory locations XX70H and XX71H. Data (H) A2, FA, DF, E5, 98, 8B



32 Explain various page replacement methods used for memory management.

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Note : Attempt any 5 questions. Each question carries 20 marks. Answer should not exceed 200 words.

- 33 A single ended transformer coupled class-A audio amplifier is to deliver a maximum of 10 Watts of audio power to a 4Ω resistive load. A 12 Volts DC power supply is to be used. Assume ideal characteristics, $R_e = 0\Omega$, ideal transformer and a quiescent point adjusted for symmetrical clipping, determine :
- (a) Output transformer turns ratio
 - (b) Operating point of the transistor
 - (c) +DC power requirement without input signal and
 - (d) Peak collector current



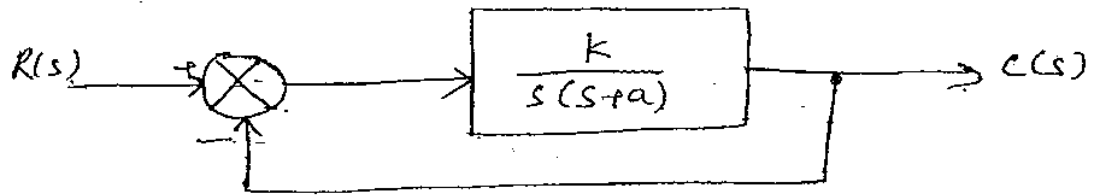
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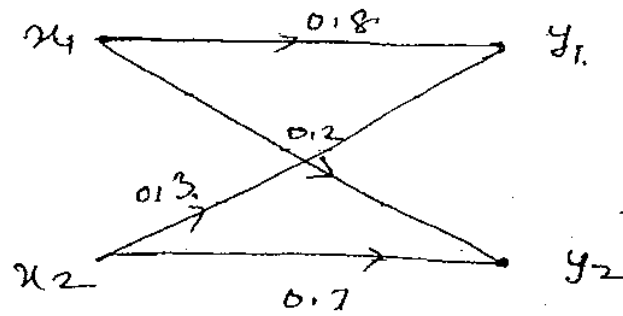
- 35 Find K and α for the feedback system shown below so that $M_p = 1.25$ and $\omega_p = 12.65$ rad/sec will be satisfied. Also determine the settling time and bandwidth.



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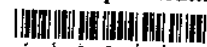
- 36 Find the mutual information and channel capacity of the channel shown below. Given $p(x_1) = 0.6$, $p(x_2) = 0.4$.



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- 37 In satellite communication, distinguish between left hand and right hand circular polarizations. What is depolarization ? Discuss the causes of depolarization.

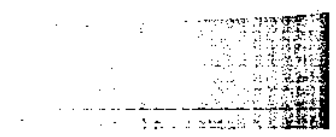


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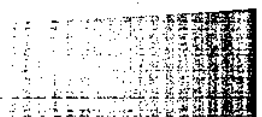
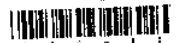
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39 Explain various addressing modes of 8086 microprocessor.

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