

## 2011

COMMUNICATION CIRCUITS \& SYSTEMS
Time Allotted : 3 Hours
Full Marks : 70

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

GROUP - A
( Multiple Choice Type Questions )

1. Choose the correct alternatives for the following : $10 \times 1=10$
i) For critical modulation, the value of modulation index is
a) $<1$
b) $=1$
c) $>1$
d) $\quad \sim 1$.
ii) Baseband transmission is the transmission of ............. signal.
a) Modulated
b) Carrier
c) Broadband
d) Information.
iii) The angle modulation is
a) only AM
b) both PM \& FM
c) both AM \& FM
d) only FM.
iv) The distortion of the signal occur when
a) $\quad V_{m}=V_{c}$
b) $\quad V_{m}<V_{c}-2 \sim$ groneminib
c) $\quad V_{m}>V_{c}$
d) $\quad V_{c}=0$.
v) The single sideband power is
a) $\quad\left(P_{c} M^{2}\right) / 4$
b) $\quad\left(P_{c} M^{2}\right) * 4$
c) $\left(P_{c} M^{3}\right) / 4$
d) $\quad\left(P_{c} M^{4}\right) / 4$.
vi) In NBFM phasor diagram the Resultant has $\qquad$ amplitude with carrier but / and $\qquad$ phase.
a) same, in
b) different, out of
c) different, in
d) same, out of.
vii) PLL is the application of
a) Amplitude Demodulator
b) Frequency Demodulator
c) Amplitude Modulator
d) Frequency Modulator.
viii) Class $A B$ amplifier conducts for
a) $90^{\circ}$
b) greater than $180^{\circ}$
c) less than $360^{\circ}$
d) less than $360^{\circ}$ but more than $180^{\circ}$
ix) The length of antenna to transmit a signal must be at least
a) $\frac{1}{3} \mathrm{rd}$ wavelength
b) $\frac{2}{3} \mathrm{rd}$ wavelength
c) $\frac{1}{4}$ th wavelength
d) none of these.

x)

An FM signal with deviation $\Delta f$ is passed through a mixer, and has its frequency reduced five-fold. The deviation in the output of the mixer is
a) $5 \Delta f$
b) $7 \Delta f$
c) $\frac{\Delta f}{5}$
d) $\Delta f$.

## GROUP - B

(Short Answer Type Questions )

Answer any three of the following

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3 \times 5=15
$$

2. An AM transmitter uses high-level modulation of the final RF power amplifier, which has a DC supply voltage $V_{c c}$ of 48 V with a total current $I_{T}$ of 3.5 A . The efficiency is $70 \%$.
a) What is the RF input power to the final stage ?
b) How much AF power is required for $100 \%$ modulation ?
c) What is the carrier output power ?
d) What is the power in one sideband for $67 \%$ modulation?
e) What is the maximum \& minimum DC supply voltage swing with $100 \%$ modulation?5
3. What is Pseudo Noise Sequence ? What are the properties of it ?
$2+3$
4. Generate SSB signal phasing by Balanced Modulator with a neat sketch.
5. How a ferrite core and Hartley oscillator are used to measure pressure?
6. How can you produce FM using PM modulator ? What are the frequencies used in medical telemetry ? $3+2$
7. a) Distinguish between analog, digital, bio-signal telemetry.
b) Explain briefly how the physiological signals can be transmitted over telephonic line.
$3+2$
 ( Long Answer Type Questions)
Answer any three of the following. $3 \times 15=45$
8. With a neat sketch explain the operating principle of Class $B$ power amplifier. What are the advantages and disadvantages of tuned circuit over untuned ? Draw the circuit of a double tuned power amplifier.
$6+5+4$
9. Draw a block diagram of general communication system. Why is modulation necessary ? Explain the operating principle of any amplitude demodulator. What are the advantages and disadvantages of FM over AM ? Find out the percentage of modulation index if an antenna current changes from $4 \cdot 8 \mathrm{~A}$ un-modulated carrier to $5 \cdot 1 \mathrm{~A}$.

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3+3+5+2+2
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10. Explain the frequency division multiplexing and de-multiplexing with a neat sketch. What do you mean by lock range and capture range of phased lock loop ? Find out the Image Frequency and its Rejection Ratio at 1000 kHz and 25 MHz for a broadcasting Super-heterodyne Receiver with no RF amplifier with the input of loaded $Q$ of the antenna coupling circuit is 100 and the intermediate frequency is 455 kHz
$8+3+4$
11. Write down the definition of Sampling theorem and proof it mathematically. Explain the modulation and demodulation of any of its application. What is the significance of Code Division Multiplication? $7+6+2$
12. How will you convert analog signal to its digital from by Successive approximation ? Explain the Delta modulation with a neat sketch. What are the limitations of it and how will you overcome it? $7+4+4$
13. What are the different components of biotelemetry? What are the typical applications of telemetry in biomedicine ? Describe a single channel biotelemetry system with a neat sketch.

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6+4+5
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