

Name :
Roll No. :
Invigilator's Signature :

**CS/B.Tech (BME)/SEM-5/BME-505/2009-10
2009**

COMMUNICATION CIRCUITS AND 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) ~ 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 single sideband power is
- a) $(P_c m^2)/4$ b) $(P_c m^2) * 4$
c) $(P_c m^3)/4$ d) $(P_c m^4)/4$.
- v) In NBFM phasor diagram the resultant has amplitude with carrier but/and phase.
- a) same, in b) different, out of
c) different, in d) same, out of.
- vi) PLL is the application of
- a) amplitude demodulator
b) frequency demodulator
c) amplitude modulator
d) frequency modulator.
- vii) TRF works in the range of
- a) 535 — 1640 Hz b) 535 — 1640 MHz
c) 535 — 1640 KHz d) 535 — 1640 mHz.
- viii) Class AB amplifier conducts for
- a) 90°
b) greater than 180°
c) less than 360°
d) less than 360° but more than 180° .
- ix) The length of antenna to transmit a signal must be at least
- a) $\frac{1}{3}$ rd wavelength b) $\frac{2}{3}$ rd wavelength
c) $\frac{1}{4}$ th wavelength d) none of these.
- x) The minimum sampling frequency is called
- a) Carlson frequency b) Pulse sampling rate
c) Nyquist sampling rate d) none of these.



GROUP – B
(Short Answer Type Questions)

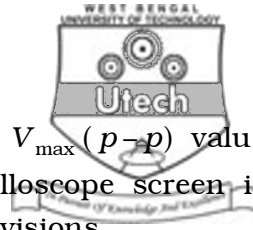
Answer any *three* of the following. $3 \times 5 = 15$

2. An SSB transmitter produces a peak-to-peak voltage of 178 V across a 75Ω antenna load. What is the value of peak envelope power (PEP) ? What are the applications of DSB and SSB signals ? $3 + 2$
3. What are the advantages and disadvantages of FM over AM ? What are the lock range and capture range of PLL ? $2 + 3$
4. Write the generation and detection of PSK.
5. What are the applications of telemetry ?
6. Explain briefly how the physiological signals can be transmitted over telephonic line.
7. a) What is companding ?
b) With a suitable block diagram, explain the principle of DM. $2 + 3$

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

8. Draw a block diagram of general communication system. Why is modulation necessary ? Explain the operating principle of any amplitude demodulator. Write a short note on superheterodyne receiver. $3 + 3 + 5 + 4$
9. a) Briefly describe the generation of SSB (phasing) signal by balanced modulator.
b) Write down the operating principle of VCO.



- c) Suppose that on an AM signal, the $V_{\max}(p-p)$ value read from the graticule on the oscilloscope screen is 5.9 divisions and $V_{\min}(p-p)$ is 1.2 divisions.
- i) What is modulation index ?
- ii) Calculate V_c, V_m and m if the vertical scale is 2V per division. 5 + 5 + 5
10. Write down the sampling theorem. Explain the TDM with a neat sketch. Why is PCM necessary ? Explain the process of PCM with diagram. 3 + 5 + 2 + 5
11. What is power amplifier ? With a neat sketch explain the operating principle of Class B power amplifier. What are the advantages and limitations of tuned power amplifier ? 3 + 7 + 5
12. a) A video signal 5 MHz is to be transmitted through a PCM system. The signals are sampled at a rate of 20% more than the Nyquist rate. There are 1024 quantization levels. What will be the transmission rate ?
- b) Draw ASK, FSK & PSK signals to transmit data stream 1111000111.
- c) Explain the generation of ASK and FSK with expression. 3 + 6 + 6
13. a) State & explain sampling theorem.
- b) Draw the block diagram of PAM transmitter & explain its working principle.
- c) Explain the generation and demodulation of PWM signal. 3 + 6 + 6
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