

**Government College of Engineering, Amravati**  
(An Autonomous Institute of Government of Maharashtra)

**Third Semester B. Tech. (Information Technology)**

**Winter – 2014**

**Course Code: ITU301**

**Course Name: Communication Engineering**

**Time: 2 Hrs. 30 Min.**

**Max. Marks: 60**

**Instructions to Candidate**

- 1) All questions are compulsory.
- 2) Assume suitable data wherever necessary and clearly state the assumptions made.
- 3) Diagrams/sketches should be given wherever necessary.
- 4) Use of logarithmic table, drawing instruments and non-programmable calculators is permitted.
- 5) Figures to the right indicate full marks.

**1. Solve the Following**

- a) Explain the Electromagnetic frequency Spectrum **05** used in communication system. Using the parameter frequency band, wave length and applications.
- b) i) Define signal to noise ratio and noise figure of **02** receiver.
- ii) The first stage of a two-stage amplifier has a **05** voltage gain of 10, a  $600\Omega$  input resistor, a  $1600\Omega$  equivalent noise resistance and a  $27-k\Omega$  output resistor. For the second stage, these values are 25, 81k,  $10k\Omega$  and 1 megaohm ( $1M\Omega$ ), respectively. Calculate the equivalent input-noise resistance of this two-stage amplifier.

*Contd.*

**2. Solve any TWO**

- a) i) Explain the need for modulation in 3 communication system?
- ii) The positive  $R_f$  peaks of an AM voltage wave rise to a maximum value of 15 v and drop to a minimum value of 5V. Determine the modulation index and the unmodulated carrier amplitude, assuming sinusoidal modulation. 3
- b) Derive the formulas for the instantaneous value of a FM voltage and define the modulation index. 6
- c) Explain with the help of block schematic the phase-shift method of Single Sideband (SSB) generation. 6

**3. Solve any TWO**

12

- a) Give the difference between phase modulation and frequency modulation.
- b) Describe generation of Dsb-sc by using FET modulator and derive the necessary expression.
- c) Draw and explain the working of Superheterodyne receiver. What are the advantages that the Superheterodyne receiver has over the TRF receiver?

**4. Solve any TWO**

12

- a) Draw a neat circuit diagram of foster-seeley discriminator and explain the working with the help of voltage phasor diagrams.

- b)** Explain the varactor diode circuit used for frequency modulation with the help of neat diagram.
- c)** With respect to the AM radio receiver explain the following term
- i) Selectivity
  - ii) Sensitivity
  - iii) Fidelity

**5. Solve the following**

12

- a)** Draw the block diagram of FM receiver and explain the function of each block.
- b)** Draw the complete block diagram of the Armstrong frequency modulation system and explain the function of the mixer and multiplier shown. In what circumstances can we dispense with the mixer.

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IV Semester B. Tech. (Information Technology)

Summer - 2010

Course Code: IT402

Course Name: Communication Engineering-I

Time: 2 Hrs. 30 Min.

Max. Marks: 60

**Instructions to Candidate**

- 1) All questions are compulsory.
- 2) Assume suitable data wherever necessary and clearly state the assumptions made.
- 3) Diagrams/sketches should be given wherever necessary.
- 4) Figures to the right indicate full marks.

1.

a) Draw the Block Diagram and explain communication system. 6

b) Explain the following terms: 6  
 i) External and Internal Noise  
 ii) Noise Figure  
 iii) Signal to Noise Ratio.

2. a) Define amplitude modulation and modulation index. Sketch modulating signal, Carrier signal and AM signal. 7

b) An AM signal contains 1KW in its carrier frequency and 200 watts in each sidebands 5  
 i) What is the percentage of modulation?

Contd./

- ii) Find allocation of power if percentage modulation is changed to 80%.
3. a) Draw the Block Diagram and explain DSB-FC AM transmitter. 6
- b) Describe the advantages and disadvantages of SSB-SC system. How is SSB-SC signal generated by phase shift method? 6
4. a) Explain the following terms: 4
- i) Sensitivity
  - ii) Selectivity
  - iii) Fidelity
- b) With the help of circuit diagram explain in details the indirect method of generation of FM. 8
5. a) Draw the Block Diagram for stereo FM receiver and explain its working. 7
- b) Draw and explain the limiter circuit used in FM receiver. 5

**Government College of Engineering, Amravati**  
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**III Semester B. Tech. (Information Technology)**  
**Course Code: ITU301**      **Winter -2015**

**Course Name: Communication Engineering**  
**Time: 2 hr.30min.**

**Max. Marks: 60**

**Instructions to Candidate**

- 1) All questions are compulsory.
- 2) Assume suitable data wherever necessary and clearly state the assumptions made.
- 3) Diagrams/sketches should be given wherever necessary.
- 4) Use of logarithmic table, drawing instruments and non-programmable calculators is permitted.
- 5) Figures to the right indicate full marks.

**01      Attempt any two**

(a) With the help of diagram explain communication system. **06**

(b) What are different external noise explain? What is the rms noise voltage at the input to this amplifier if the ambient temperature is  $27^{\circ}\text{C}$ ? An amplifier operating over the frequency range from 18 to 20 MHz has a  $10\text{k}\Omega$  input resistor. **06**

(c) What is need of modulation and its types? Explain any one type. **06**

Cont.

- 02**      **Attempt any two**

(a) Derive the power relation in the AM wave and calculate carrier power when the modulation percentage is 60 if a broadcast radio transmitter radiates 10kW power. 06

(b) With the help of neat sketches explain the representation of AM. 06

(c) Compare frequency and amplitude modulation. 06

**03**      **Attempt any two**

(a) In an FM system, when the audio frequency (AF) is 500Hz and the AF voltage is 2.4V, the deviation is 4.8kHz. If the AF voltage is now increased to 7.2V, what is the new deviation? If the AF voltage is raised to 10V while audio frequency is dropped to 200Hz, what is the deviation? Find the modulation index in each case. 06

(b) How to generate DSB-SC using balanced modulator? 06

(c) With the help of block diagram explain phase shift method for generation of SSB-SC. 06

**04**      (a) With the help of block diagram explain superheterodyne receiver and state the advantages over TRF receiver. 06

(b) With the help of neat sketch explain IF amplifier. 06

- 05 (a) What is noise triangle? Explain pre-emphasis and de-emphasis circuits and their use.
- (b) What is the job of amplitude limiter in FM receiver circuit explain with the help of neat sketch.

06

**Government College of Engineering, Amravati**  
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**Third Semester B. Tech. (Information Technology)**

**Winter – 2016**

**Course Code: ITU301**

**Course Name: Communication Engineering**

**Time: 2 Hrs. 30 Min.**

**Max. Marks: 60**

**Instructions to Candidate**

- 1) All questions are compulsory.
- 2) Assume suitable data wherever necessary and clearly state the assumptions made.
- 3) Diagrams/sketches should be given wherever necessary.
- 4) Use of logarithmic table, drawing instruments and non-programmable calculators is permitted.
- 5) Figures to the right indicate full marks.

**1. Attempt any two of the following**

- a) What are the basic components of communication system? Explain it with suitable diagram. 6
- b) Derive the relation between noise figure & temperature. 6
- c) Define the term modulation. Explain the need of modulation. 6

2

**Attempt any two of the following**

- a) Describe the DSBCS wave generation process using diode balanced modulator? 6
- b) The output current of a 60% modulated AM generator is 1.5A. To what value will this current rise if the generator is modulated additionally by another audio wave, whose modulation index is 0.7? What will be the percentage power saving if the carrier and one of the sidebands are now suppressed? 6
- c) A 500 Hz modulating voltage fed into a PM generator produces a frequency deviation of 2.25 kHz. What is the modulation index? If the amplitude. 6

3

**Attempt the following**

- a) Explain how the use of an RF amplifier improves the signal to noise ratio of a super heterodyne receiver. 6
- b) What is the function of mixer or frequency converter? Explain any one circuit of mixer. 6
- c) What do you mean by directly modulated FM transmitter & indirect modulated FM transmitter? 6

4

**Attempt the following**

- a) The carrier swing of frequency modulated signal is 75 kHz & modulating signal is 6 kHz sine wave. Determine modulation index of FM signal. 6

b) Explain the operation of ratio detector using neat diagram. 6

5      Solve any two:

a) The peak amplitude of DSBSC wave is given by 6

- i)  $V_c$
- ii)  $V_m$
- iii)  $V_c \sin \omega_c t$
- iv)  $V_m \sin \omega_m t$

b) Indicate which one of the following is not an advantage of FM over AM. 6

- i) Better noise immunity is provided.
- ii) Lower bandwidth is required.
- iii) The transmitted power is more useful.
- iv) Less modulating power is required.

c) The FM & PM waves can be differentiated in terms of their 6

- i) Deviation values
- ii) Modulation index values
- iii) Modulating frequency values
- iv) Modulating voltage values