

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-IV • EXAMINATION – SUMMER • 2014****Subject Code: 141102****Date: 25-06-2014****Subject Name: Communication Engineering****Time: 10:30 am - 01:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** What is modulation? Why modulation is important in communication system? Explain amplitude modulation, frequency modulation and phase modulation with help of waveforms. **07**
- (b)** Answer the following questions **07**
- [1] What is the main source of thermal noise?
  - [2] What is the modulation index and bandwidth of AM signal, if message signal  $e_m = 5\sin(2\pi \times 1000xt)$  is modulated on carrier signal  $e_c = 8\sin(2\pi \times 10^6 xt)$
  - [3] What is approximate bandwidth of FM signal using Carson's rule if message signal having maximum frequency 10 KHz is modulated on carrier of 100 MHz with peak frequency deviation 50KHz
  - [4] Power transmitted by FM Transmitter is 100W with modulation index 5. What is new power transmitted if modulation index increased to 10?
  - [5] Explain critical angle with reference to optical fiber.
  - [6] What is numerical aperture?
  - [7] What is the name of equipment which is used splicing of fiber optic cable?
- Q.2 (a)** Derive expression of total transmission power in Amplitude modulation. AM transmitter radiates carrier power 50W in absence of modulating signal, what is the power transmitted by this AM transmitter if modulation index is 0.8? **07**
- (b)** Draw and explain block diagram of super heterodyne AM receiver. Explain waveform at each point **07**
- OR**
- (b)** Explain pre-emphasis and de-emphasis techniques used in FM communication system with justification. **07**
- Q.3 (a)** Discuss choice of modulation for television system. What is modulation system suitable for television? Draw and explain composite video signal. **07**
- (b)** Explain operation of PAL-D TV receiver **07**
- OR**
- Q.3 (a)** Explain block diagram of television transmitter **07**
- (b)** Explain luminance (Y) signal, color difference signal and weighted color difference signals I and Q. Why color difference signals R-Y and B-Y are not transmitted directly? **07**
- Q.4 (a)** Explain principle of time division multiplexing. Sketch how interleaving of channels takes place. Show how first TDM signals are generated and de-multiplexed at the receiver order. **07**
- (b)** Explain PAM, PWM and PPM with help of waveforms. Compare PWM and PPM. **07**
- OR**
- Q.4 (a)** Explain principle of frequency division multiplexing. Explain how basic group (60-108 KHz) is formed with help of block diagram and frequency spectrum **07**

- (b) Message signal having frequency range 20 Hz to 4 KHz is sampled using 10,000 samples per second. Each sample is quantized using 128 intervals. What is the data transmission rate for this signal? What is memory required in Bytes to record this signal for 1 minute duration? What will be effect on quality and bandwidth of the signal, if we increase sampling rate and number of quantization levels? **07**
- Q.5** (a) Explain how power saving occurs in SSB transmitter? Explain block diagram of SSB transmitter. **07**
- (b) Discuss losses occurs in fiber optic communication. **07**
- OR**
- Q.5** (a) Explain block diagram of SSB receiver. Why less bandwidth is required in SSB compared to AM? **07**
- (b) Define signal to noise ratio and noise figure of a receiver. Calculate noise voltage at the input of RF amplifier using the device which has 200 ohm equivalent noise resistance and 300 ohm input resistance. Bandwidth of RF amplifier is 7 MHz and temperature  $17^{\circ}\text{C}$ . **07**

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