

4 Attempt any two of the following : $10 \times 2 = 20$

- (a) (i) Define the term power density, and explain why it is inversely proportional to the square of the distance from the source.
- (ii) Calculate the power density (a) 500 m from a 500 W source and (b) 36,000 km from a 3 kW source. Both are assumed to be omnidirectional point sources.
- (b) Explain ionospheric layers and their variation in atmosphere with respect to temperature.
- (c) Write note on cellular system.

5 Attempt any two parts of the following : $10 \times 2 = 20$

- (a) Describe camera and picture tube and explain what actually happens in them when a picture is scanned. Why is sync transmitted ?
- (b) Sketch the circuit of a blocking oscillator, and explain how it may be synchronised with either sync pulses or a dc voltage.
- (c) Write in detail on 'fiber characteristics and classification'.



(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2058

Roll No.

B. Tech.

(SEM. V) EXAMINATION, 2008-09
COMMUNICATION ENGG.

[Time : 3 Hours]

[Total Marks : 100

- Note : (1) Attempt all questions.
(2) All questions carry equal marks.
(3) Be precise in your answer.
(4) No second answer book will be provided.

1 Attempt any four parts of the following : $5 \times 4 = 20$

- (a) The antenna current of an AM transmitter is 8A when only the carrier is sent, but it increases to 8.93A when the carrier is modulated by a single sine wave. Find the percentage modulation. Compute the antenna current when percentage of modulation changes to 0.8.
- (b) What is J3E modulation ? What are its advantages with respect to A3E modulation ? What are disadvantages of J3E with respect to A3E ?
- (c) The collector modulated class C transmitter amplifier may experience a certain difficulty. What is this difficulty ? How can it be solved ? Show, with a circuit diagram, one of the solutions to this problem.



- (d) Explain the working of a basic superheterodyne principle with a neat sketch of block diagram of a simple receiver.
- (e) In a broadcast superheterodyne receiver having no RF amplifier, the loaded Q of the antenna coupling circuit (at the input to the mixer) is 100. If the intermediate frequency is 455 kHz, Calculate (a) the image frequency and its rejection ratio at 1000 kHz.
- (f) What are the functions fulfilled by the intermediate frequency amplifier in a radio receiver? Enlist and discuss the factors influencing the choice of intermediate frequency for a radio receiver.

2 Attempt any **four** parts of the following : $5 \times 4 = 20$

- (a) The audio frequency is 500 Hz and AF voltage is 2.4 V and the deviation is 4.8 kHz in an FM system. If the AF voltage is increased to 7.2V, find the new deviation. If the AF voltage is raised to 10V while the AF is dropped to 200Hz. What is the deviation? Find the modulation index in each case.
- (b) Determine the value of the capacity reactance obtainable from a reactance FET whose g_m is 12 millisiemens. Assume the gate-to-source resistance is one-ninth of the reactance of the gate-to-drain capacitor and that the frequency is 5 MHz.
- (c) Explain the operation of the balanced slope detector, using a circuit diagram and a response characteristics.

- (d) Calculate the noise voltage at the input of a television RF amplifier, using a device that has a 200Ω equivalent noise resistance and a 300Ω input resistor. The bandwidth of the amplifier is 6 MHz, and the temperature is 17°C .
- (e) In a single-tone modulation, consider sine wave frequency fm as the modulating signal and assume a peak frequency deviation Δf . Evaluate the figure of merit.
- (f) Discuss the types, causes and effects of the various forms of noise which may be created within a receiver.

3 Attempt any **two** parts of the following : $10 \times 2 = 20$

- (a) A narrow band signal has a bandwidth of 10 kHz centered on a carrier frequency of 100 kHz. It is proposed to represent this signal in discrete-time form by sampling its inphase and quadrature components individually. What is the minimum sampling rate that can be used for this representation? Justify your answer. How would you reconstruct the original narrow band signal from the sampled versions of its inphase and quadrature components?
- (b) Explain the method for generation and detection of coherent QPSK.
- (c) Explain the terms sampling, quantization and quantization error. What is adaptive delta modulation? Explain. How this modulation is advantageous over delta modulation?

