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**Question Paper Code: 53405**

B.E./B.Tech. DEGREE EXAMINATION, NOV 2022

Third Semester

Electronics and Communication Engineering

15UEC305- ANALOG COMMUNICATION

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

- Vestigial side band used in CO1- R
  - TV transmission
  - radio transmission
  - mobile phone communication
  - wireless internet
- An 80 MHz carrier is frequency modulated by a sinusoidal signal of 1V amplitude and the frequency sensitivity is 100 Hz/V. Find the approximate bandwidth of the FM waveform if the modulating signal has a frequency of 10 kHz. CO2-App
  - 22 KHz
  - 220 KHz
  - 20.2 KHz
  - 110 KHz
- The principles of autocorrelation is used CO3- R
  - in random signals
  - square wave signals
  - triangular wave signals
  - sine wave signals
- Capture effect is present in CO4- U
  - SSB Receivers
  - AM receivers
  - DSB receivers
  - FM receivers
- Sampling is a process of converting a continuous signal into CO5- R
  - discrete signal
  - random signal
  - sine wave signal
  - triangular wave signal

PART – B (5 x 3= 15Marks)

- Compute the bandwidth of the amplitude modulated signal given by CO1- App
$$S(t) = 23[1 + 0.8\cos(310t)]\cos(230000\pi t)$$
- Illustrate the relationship between FM and PM with Block diagrams CO2-U

8. Define a random variable .Specify the sample space and the random variable for a coin tossing experiment. CO3- U
9. Determine the range of tuning of a local oscillator of a super hetero dyne receiver  $f_{LO} > f_c$  .The broadcast frequency range is 540 KHz to 1600 KHz assume  $f_{IF} = 455$  KHz CO4- U
10. Explain quantization process. CO5- U

PART – C (5 x 16= 80Marks)

11. (a) A carrier of 8 MHz with peak value of 6 V is amplitude modulated by a 10 K Hz sine wave signal with amplitude 4 volts . determine the modulation index and draw the amplitude spectrum. CO1- U (16)
- Or
- (b) (i) Compare and contrast various Amplitude Modulation systems. CO1- Ana (8)
- (ii) Discuss any two methods of generating a SSB signal. CO1- U (8)
12. (a) A frequency modulated signal is given by  $x_c(t) = 10 \cos [2\pi \times 10^8 t + 5 \sin 2\pi \times 200 t]$  CO2- U (16)
- Determine
- (i) The Carrier frequency
- (ii) The modulating signal frequency
- (iii) The peak frequency deviation
- (iv) The modulation index  $\beta_f$
- Or
- (b) (i) Write about the basic principles of FM detection and explain about ratio detector. CO2- U (10)
- (ii) How can you generate FM from PM and PM from FM? CO2- U (6)
13. (a) (i) Summarize the different types of random process and give the definitions CO3-App (12)
- (ii) State and prove any two properties of Gaussian process. CO3- U (4)
- Or
- (b) (i) Briefly explain about noise measurements. CO3- U (12)
- (ii) An amplifier operating over the frequency range from 18 to 20 MHz has a 10K $\Omega$ input resistor. What is the rms noise voltage at the input to this amplifier if the ambient temperature is 27°C? CO3-App (4)

14. (a) With a neat block diagram, explain the operation of a Super heterodyne receiver. CO4- U (16)
- Or
- (b) Discuss the effects of noise on the carrier in a FM receiver with suitable mathematical derivations. CO4- Ana (16)
15. (a) Explain the various analog pulse communication system describing their advantages and drawbacks. . CO5- U (16)
- Or
- (b) Explain the process of quantization and obtain an expression for signal to quantization ratio in the case of a uniform quantizer CO5- U (16)

