ROLL NO. _____

Code: DE61 **Subject: ANALOG COMMUNICAT**

DipIETE – ET

Time: 3 Hours **DECEMBER 2012** **Max. Marks: 100**

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1 Choose the correct or the best alternative in the following: **(2×10)**

a. The bandwidth of speech frequency is

(A) 50 Hz to 15,000 Hz **(B)** 300 Hz to 3400 Hz
(C) 20 Hz to 20,000 Hz **(D)** 0 to 20,000 Hz

b. If a receiver has a noise figure of 1.6, then its equivalent noise temperature in Kelvin is

(A) 174 K **(B)** 464 K
(C) 290 K **(D)** 300 K

c. If a carrier of 400 W is amplitude modulated to depth of 75%, the total power in the modulated wave is

(A) 500 W **(B)** 486 W
(C) 512.5 W **(D)** 492.5 W

d. The type of sideband technique used for TV video transmission is

(A) DSB **(B)** SSB
(C) ISB **(D)** VSB

e. The significant disadvantage of FM as compared to AM is

(A) Wider bandwidth **(B)** Transmitter Power
(C) Reduction in noise **(D)** Use of limiters

f. The double spotting in a radio receiver is due to

(A) Poor front end selectivity **(B)** Adequate image frequency rejection
(C) Receiver's gain **(D)** Receiver's sensitivity

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g. The value of characteristic impedance of free space is

(A) 300 Ohm **(B)** 75 Ohm
(C) 377 Ohm **(D)** 120 Ohm

h. Which of the following antennas is used for TV signal reception

(A) Rhombic Antenna **(B)** Marconi Antenna
(C) Yagi Uda Antenna **(D)** Turnstile Antenna

i. A cavity resonator can be represented by

(A) An LCR circuit **(B)** An LC circuit
(C) Lossy Inductor **(D)** Lossy capacitor

j. Which of following modulation is digital in nature

(A) PAM **(B)** PWM
(C) PPM **(D)** PCM

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. Explain with a neat block diagram, the working of a communication system. **(6)**

b. Explain shot noise in amplifying devices. **(6)**

c. An amplifier operating over the frequency range from 18 to 20 MHz has a 10 kilo ohm input resistor. Calculate the rms voltage at the input of the amplifier, if the ambient temperature is 27 degree centigrade. **(4)**

Q.3 a. Derive an expression for Amplitude Modulated wave. Draw its waveform in Time domain for 100% modulation index. **(6)**

b. Derive an expression for the total transmitter power in the AM wave. Also obtain its efficiency. **(6)**

c. A broadcast radio transmitter radiates 10 KW when the modulation percentage is 60 calculate the carrier power and efficiency. **(4)**

Q.4 a. Obtain the mathematical expression for a narrow band frequency modulated wave and draw the block diagram of its generations. **(8)**

b. Explain the indirect method of generation of FM wave. **(8)**

Q.5 a. Explain, with a neat block diagram, the working of a superheterodyne AM radio receiver. **(8)**

b. In a broadcast superheterodyne receiver having no RF amplifier, the loaded of the antenna coupling circuit (at the input of the mixer) is 100. If the intermediate frequency is 455 kHz, calculate the following:
(i) the image frequency and its rejection ratio at 1000 kHz
(ii) the image frequency and its rejection ratio at 25 MHz **(8)**

Q.6 a. Explain the following in brief: **(8)**
(i) Resonant and non-resonant antennas.
(ii) Folded dipole antennas.

b. Define the following antenna terms:

(i) Bandwidth
(ii) Beamwidth
(iii) Polarization
(iv) Directive Gain **(8)**

Q.7 a. Explain the phenomena of sky wave propagation and describe the importance of each layer of ionosphere in day as well as in night. **(8)**

b. A rectangular waveguide has an internal width of 3 cm and carries the dominant mode of a signal of unknown frequency. If the characteristic impedance is 500 ohm, calculate the frequency of the signal. **(8)**

Q.8 a. State and explain the Shannon's channel capacity theorem. Calculate the capacity of a channel having infinite bandwidth. **(8)**

b. Differentiate between all types of pulse modulation. **(8)**

Q.9 Write short notes any **TWO** of the following: **(2×8)**

(i) Broadband Communication
(ii) Multiplexing Techniques
(iii) Long distance Telephony