



**College of Engineering, Science and Technology
School of Electrical and Electronics Engineering**

**Bachelor of Engineering
(Telecommunication and Networking)
BENG – Year 3**

EEE748 – Telecommunication Systems

Semester 1, 2015

Date: 10th June 2015 Time: 9:00AM to 12:10PM
Duration – 3 h 10 min (Including 10 min reading time)

Total Marks – 100

Instructions to candidates:

- 1) You are allowed 10 minutes extra reading time during which you are NOT allowed to write.
- 2) Begin each answer on a fresh page and use both sides of the sheet.
- 3) Write your candidate number at the top of each attached sheet.
- 4) Insert all written full-scapes, graph paper, drawing paper etc. in their correct sequence and secure with string.
- 5) For all sheets of paper on which rough/ draft work has been done, cross it through and you must attach all of them to your answer scripts.
- 6) Write clearly the number(s) of the questions(s) attempted on the top of each sheet.
- 7) There are two sections – both are compulsory.
- 8) There are alternative sub-questions within some questions.
- 9) Start your answer for a new question on new page.
- 10) Use of mobile phones or other programmable electronic gadget/storage device is NOT ALLOWED

- *Total Number of pages – 03 (Three) including this cover page*

SECTION A – SHORT ANSWER QUESTIONS

[Section A - Total 50 Marks]

Note: All questions in this section are compulsory.

- A1)** In an AM transmitter, a carrier with 1000W power is modulated to 100% level. Calculate the total power in the final AM wave and the power in each sideband. **[5 Marks]**
- A2)** Calculate the total power in each sidebands of an AM wave when a carrier with 50W power is modulated to 70% modulation level. **[5 Marks]**
- A3)** Compare the AM and FM modulations in Radio Communication **[5 Marks]**
- A4)** Explain with suitable circuit diagram the working of Varactor Diode based Frequency Modulator (FM) circuit. **[5 marks]**
- A5)** Draw the block diagram of a Tuned Radio Frequency (TRF) receiver and explain its working. **[5 Marks]**
- A6)** Explain the working of a Slope Detector as FM Demodulator **[5 Marks]**
- A7)** Write short notes on basic Software-Defined-Radio (SDR) **[5 Marks]**
- A8)** Explain the working of Class-C RF power amplifier **[5 Marks]**
- A9)** Calculate a) the reactance of an inductor L with inductance 22 μ H, b) the reactance of 1nF capacitor both at a signal frequency of 100kHz and c) also calculate the series resonant frequency of this L-C circuit. **[5 marks]**
- A10)** i) In an Amplitude Modulation (AM), a carrier of 792kHz is modulated with a modulating signal of 3kHz. Calculate the upper and lower sideband frequencies (F_{usb} and F_{lsb}) and graphically show the frequencies of this AM wave. **[2.5 Marks]**
- ii) In a Super-heterodyne receiver, a signal of 88MHz is input at the mixer. If the IF frequency is 10.7 MHz, what will be the Local Oscillator (LO) frequency? **[2.5 Marks]**

*** End of Section A ***

SECTION B – LONG ANSWER QUESTIONS

[Section B - Total 50 Marks]

Note: Attempt any FIVE out of the following SEVEN questions from this section.

- B1)** With the help of response curve describe various types of filters such as Low-Pass, High-Pass, Band-Pass and Band-Stop (Band-Reject). **[10 Marks]**
- B2)** Describe the process of Amplitude Modulation with proper definition, mathematical equations and associated waveforms. **[10 Marks]**
- B3)** Draw a well-labeled block diagram of Frequency Division Multiplexing (FDM) system and show the frequency spectrum. **[10 marks]**
- B4)** Describe Phase-Shift Method used in SSB (Single-Side-Band) generation. **[10 marks]**
- B5)** With a proper block diagram describe the working of a High-Power AM Radio Transmitter. **[10 marks]**
- B6)** Describe various receiver parameters such as Sensitivity, Selectivity, Noise, Dynamic Range and Signal-to-Noise-Ratio (SNR). **[10 Marks]**
- B7)** With a proper block diagram explain the working of the Super-heterodyne (Superhet) receiver and state function of each of the block. **[10 marks]**
- B8)** Draw the circuit diagram of a Balanced Modulator showing its signal waveforms and explain its working. **[10 Marks]**

*** End of Section B ***

***** End of Question Paper *****