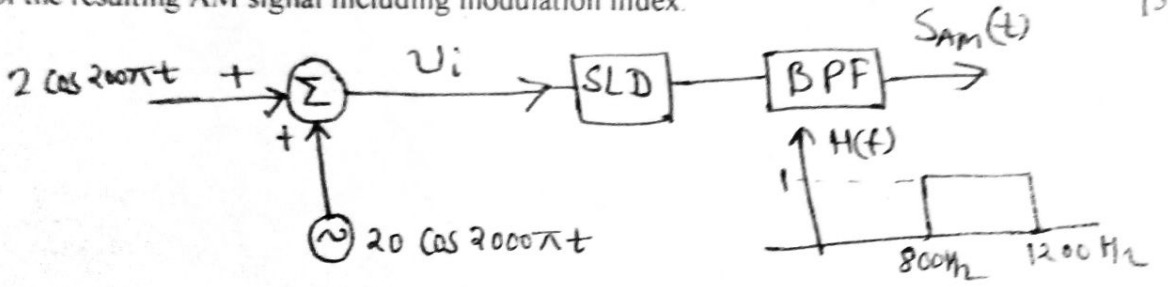
NATIONAL INSTITUTE OF TECHNOLOGY, KURUKSHETRA
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
SESSIONAL-1

COMMUNICATION ENGINEERING (ECPC35) — B Tech 3rd Sem
Date: 21/09/2022 — MAX. MARKS: 15 — TIME: 50min

Following information must be mentioned on the first page of the answer sheet
1. Section 2. Roll Number 3. Name of the student 4. Subject code (Test 1)

Q1. For the following square law modulator, square device is characterize as $v_o = v_i + 0.1v_i^2$. The pass band of the band pass filter extends from 800Hz to 1200 Hz. Find all the parameters of the resulting AM signal including modulation index. [5]



Q2. A carrier signal of frequency f_c is given to both AM and FM transmitter. Message signal frequency is given by 5KHz. Maximum frequency deviation of FM is two times to AM bandwidth. Find the modulation index of both AM and FM. Such that strength of frequency components "f_c +5KHz" is same in both AM and FM spectrum. Given that [4]

$$J_1(2) = 0.57;\ J_1(4) = 0.37;\ J_1(8) = 0.09;$$

Q3. An angle modulator (Frequency modulated) signal is given as: [3]

$$S(t) = cos[2\pi(2 \times 10^6 t + 30sin150t + 40cos150t)]$$

Find Δf and $\Delta\emptyset$.

Q4. An AM signal is given by

$$S(t) = [20 + 12cos2\pi \times 10^4 t + 16cos4\pi \times 10^4 t]cos2\pi \times 10^6 t$$

Find all the parameters of AM i.e. modulation index, amplitude of carrier and modulating signal, etc. Also, find the frequency components of the given AM signal. [3]