

## JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION - 2022

B.Tech. IV Semester ( ECE )

COURSE CODE: 18B11EC411

MAX. MARKS: 25

COURSE NAME: ANALOG INTEGRATED CIRCUITS

COURSE CREDITS: 03

MAX. TIME: 1 Hour 30 Min

*Note: All questions are compulsory. Marks are indicated against each question in square brackets.*

1. a) How does the high frequency model differ from the equivalent circuit of an op-amp?  
b) What determines the peak frequency  $f_p$  in the peaking amplifier? [2.5 + 2.5]
2. a) For a particular phase shift oscillator the following specifications are given as  $C = 0.1 \mu\text{F}$ ,  $R = 3.9 \text{ k}\Omega$ , and  $R_F/R_1 = 29$ . Determine the frequency of oscillations.  
b) Design a Wien bridge oscillator that will oscillate at 2.0 kHz. [2.5 + 2.5]
3. a) Show that the slope of the wave obtained at the output of integrator is proportional to the charging voltage and is inversely proportional to the RC times constant.  
b) Using single op-amp, generate the expression
 
$$V_{out} = - \int_0^t (V_{in1} + 2V_{in2}) dt$$
 [2.5 + 2.5]
4. a) For the voltage controlled oscillator, determine the output frequency if  $V_c$  is 9V. Assume that  $+V = 12\text{V}$ ,  $R_2 = 15\text{k}\Omega$ ,  $R_3 = 100 \text{ k}\Omega$ ,  $R_1 = 6.8\text{k}\Omega$ , and  $C_1 = 75\text{pF}$ .  
b) Siya wants to design an operational amplifier circuit. She wants to use compensation in the circuit. Help her in designing a circuit with external compensation. [2.5 + 2.5]
5. Design a practical differentiator circuit that will differentiate an input signal with the ideal frequency of 150Hz. [5]