Daffodil International University
Department of Electrical and Electronic Engineering, Faculty of Engineering
Final Examination, Spring – 2026

Course Code: 0714-221	Course Title: Electronics II	
Section: A, B, C, D, E	Level-Term: L2-T2	Teacher's Initial: SR, KAM
Full Marks: 40	Date: April 26, 2026	Time: 2.00 Hours

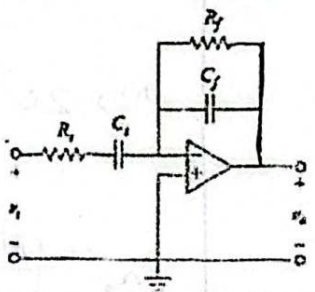
[Notes: Answer all the following questions. The right most column indicates COs and the allocated marks.]

Q1. i) Design a first order active high pass filter with a high-frequency gain of 5 and a cutoff frequency of 5 kHz. Use a 0.2 μF capacitor in your design.

ii) In a certain application, a simple *RC* lowpass filter needed to design to reduce high frequency noise. Design a first order lowpass active filter with a maximum gain of 10 and a cutoff frequency of 500 Hz.

CO: CO-3 (C6) | Marks: 10

Q2. i) Obtain the transfer function of the active filter in below Fig. What kind of filter is it? Also find the cutoff frequency if the value of R_f=R_i= 10 KΩ and C_f=C_i= 10 μF.



CO: CO-1 (C4) | Marks: 10

ii) Design and Analyze a series R-L-C Circuit based passive filter and find the transfer function and from transfer function determine what kind of Filter is it? Also find the cutoff frequencies and Resonance Frequency of the designed filter circuit.

Q3. (i) Design a Colpitt oscillator to produce a sine wave of frequency 88.6 MHz, use Capacitors of LC tank circuit C_1 =50 pF and C_2=100 pF. And find the feedback fraction m_v. (Find the parameter values and Draw the Complete Designed Circuit). And discuss Barkhausen Criterion ($A_v m_v$=1) for Oscillator.

CO: CO-3 (C4) | Marks: 10

(ii) Design an astable multivibrator using a 555 Timer IC to generate a square wave suitable for blinking an LED. Desired frequency, f=2 Hz, Duty cycle ≈ 60%, Supply voltage V_{cc}=9 V.

Q4. (i) Analyze that the Voltage gain with negative feedback of an amplifier is, $A_{vf} = \frac{A_v}{1+A_v m_v}$ where the gain of the amplifier without feedback is A_v and feedback fraction is m_v. And Discuss the advantages of Negative Voltage Feedback.

CO: CO-2 (C4) | Marks: 10

(ii) An amplifier has a voltage amplification A_v and a fraction m_v of its output is feedback in opposition to the input. If m_v=0.1 and A_v= 200, calculate the percentage change in the gain of the system if A_v falls 5 db due to ageing.

$$\Delta A_{V_{dB}} = 20 \log \left(\frac{A_V \text{ New}}{A_V \text{ old}} \right)$$

$$\Delta V_{dB} =$$