25/28 Ans.

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

Course Code: 0714- 221	Course Title: Electronics II	
Section: A, B, C, D	Level-Term: L2-T2	Teacher's Initial: SR, MH
Full Marks: 40	Date: 27-Aug., 2026	Time: 2.00 Hours

[Notes: Answer all the following questions]

[The second right most column indicates the course outcomes with respective Bloom's level and right most column indicates the allocated marks]

Q1. A series-tuned antenna circuit consists of a variable capacitor (60 pF to 380 pF) and a 200-μH antenna coil that has a dc resistance of 10 Ω. — **CO-3 C5** — 04

- Find the frequency range of radio signals to which the radio is tunable.
- Determine the value of Quality Factor, Q at each end of the frequency range

Q2. A biomedical signal acquisition system needs to pass only a specific frequency band of interest and suppress all other frequencies. The design requires a first-order active band-pass filter formed by cascading first-order high-pass and low-pass stages. — **CO-3 C5** — 04

Design specifications:

- Lower cutoff frequency: 100 Hz
- Upper cutoff frequency: 1 kHz
- Overall gain: 20
- Select capacitor values: High-pass stage: **0.3 μF** & Low-pass stage: **0.01 μF**

Determine:

a. Resistor values for both stages
b. The center frequency and bandwidth
c. **Design** the final band pass filter circuit for the required specifications.

Q3. (i) **Explain** the working principle of 555 timer in astable mode. — **CO-3 C2** — 04

(ii) **Design** a multivibrator with 555 timer in astable mode which produces a square wave of 2 MHz and duty cycle will be 60%. — **CO-3 C5** — 04

Q4. (i) **Explain**, with mathematics and graphical illustration, how positive feedback enables an oscillator to produce an undamped sinusoidal oscillation without any external input, explain based on the Barkhausen criterion. — **CO-3 C2** — 04

(ii) **Explain** the circuit operation of Colpitt's Oscillator. Focus how feedback circuit can produce a phase shift of 180^0 and show the frequency of oscillation and feedback fraction. — **CO-3 C2** — 04

(iii) **Design** a Hartley oscillator to produce a sine wave of frequency 96 MHz, use Capacitors of LC tank circuit C=12 pF. And consider the feedback fraction m_v=0.1 (Find the parameter values and **Draw** the Complete **Designed** Circuit) — **CO-3 C4** — 04

Q5. **Analyze** and find the transfer function and pass band gain (as a function corner frequency of low pass and high pass filter) of the below filter circuit given in Fig. 1. **What** kind of filter is it? | CO-3 C4 | 04

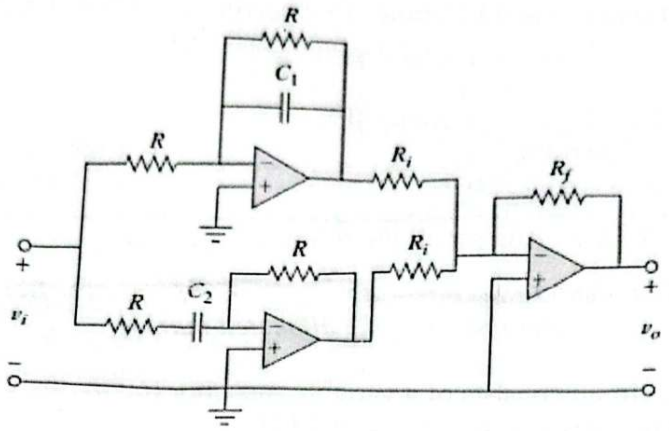

Fig. 1

(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-2 C4 | 04

(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= 300, **calculate** the percentage change in the gain of the system if A_v falls 8 db due to ageing. | CO-2 C3 | 04

$= V_o$

$) = V_o$

$m_v) = V_o$

$A_v m_v = V_o$

$V_o + V_o \cdot A_v m_v$

$V_o (1 + A_v m_v)$

$\frac{V_o}{i}$