Daffodil International University
Department of Electrical and Electronic Engineering, Faculty of Engineering
Final Examination, Spring– 2025

Course Code: 0714- 221	Course Title: Electronics II	
Section: A,B,C,D	Level-Term: L2-T2	Teacher's Initial: SR
Full Marks: 40	Date: Jun. 25, 2025	Time: 2.00 Hours

[Notes: Answer all the following questions]

Q1. A series-tuned antenna circuit consists of a variable capacitor (40 pF to 360 pF) and a 240-μH antenna coil that has a dc resistance of 12 Ω. **CO-3 C4** 05

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

Q2. (i) In a certain application, a simple RC lowpass filter needed to **design** to reduce high frequency noise. If the desired corner frequency is 20 kHz and C= 0.5 μF, find the value of R. **CO-3 C6** 05

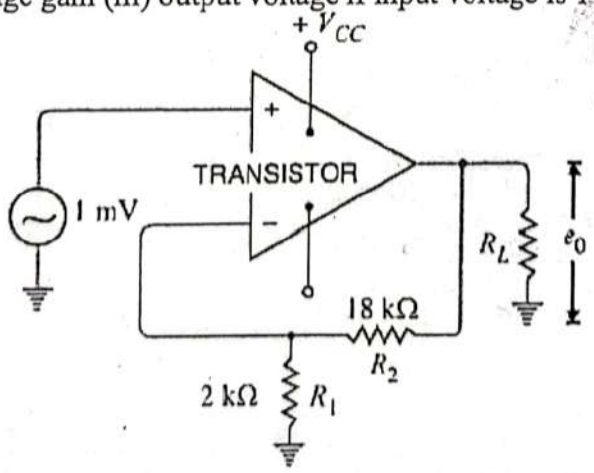
(ii) In an amplifier circuit, a simple RC highpass filter is needed to **design** to block the dc component while passing the time-varying component. If the desired rolloff frequency is 15 Hz and C = 10 μF, find the value of R.

Q3. (i) 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. **CO-2 C4** 05

(ii) **Explain** how negative voltage feedback improve the gain stability, reduce non-linear distortion and improve frequency response of an amplifier.

Q4. (i) **State** Barkhausen criterion and **explain** how a positive feedback amplifier can act as an Oscillator and show the essential components of a transistor oscillator. **CO-2 C4** 05

(ii) The below fig. shows the negative voltage feedback amplifier. If the gain of the amplifier without feedback is 10^6, **find**: (i) Feedback fraction (ii) overall voltage gain (iii) output voltage if input voltage is 1 mV.

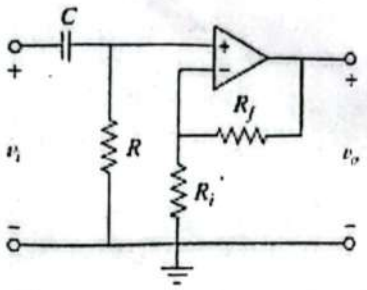


Q5. **Explain** the circuit operation of Colpitt's Oscillator. Focus how feedback circuit can produce a phase shift of 180^0 and show the frequency of oscillation and feedback fraction. **CO-3 C4** 05

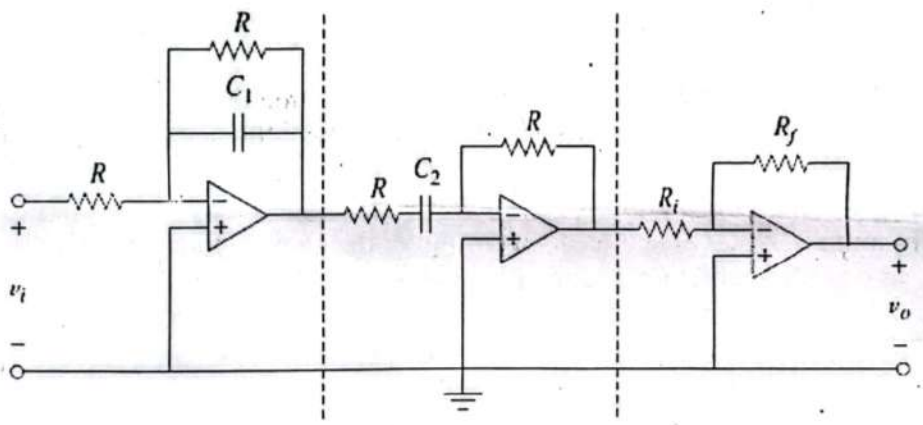
Q6. **Design** a Hartley oscillator to produce a sine wave of frequency 95 MHz, use Capacitors of LC tank circuit C=12 pF. And consider the feedback fraction m_v=0.1 (Find the parameter values and **Draw** the Complete **Designed** Circuit) **CO-3 C6** 05

Q7. A "general" first-order filter is shown in the below Fig. **CO3 C4** 05

(a) **Show** the transfer function of the Circuit. **What** kind of filter is it?
(b) **What** condition must be satisfied for the circuit to operate as a highpass filter?
(c) **What** condition must be satisfied for the circuit to operate as a lowpass filter?



Q8. **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. **What** kind of filter is it? **CO-3 C4** 05



Course Outcomes (Cos)

CO Number	Course Outcomes (Cos)	Corresponding PO	Learning Taxonomy Domain/Level
CO-1	**Understand** the working of both operational and power amplifiers for different application oriented circuits.	PO1	C2
CO-2	**Analyze** the characteristics of different series-shunt combinations of feedback amplifiers.	PO1	C4
CO-3	**Design** electronic filter and oscillator circuits for a given specifications.	PO3	C6

PO1: Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in K1 to K4 respectively to the solution of complex engineering problems.

PO3: Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations. (K5)

C2: Understanding
C4: Analyzing
C6: Creating/Designing