Name: **Enrolment No:**	

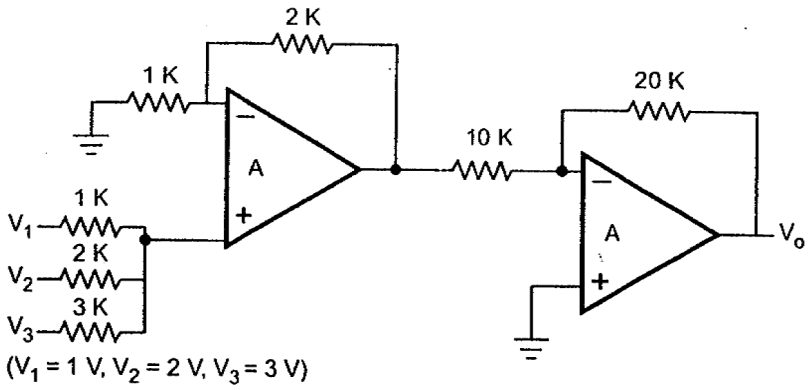
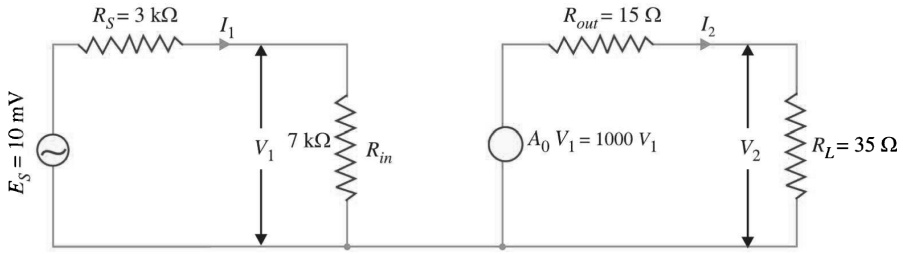
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2022

Course: Analog System and Application
Semester: III
Program: B.Sc H (Physics) & Int. B.Sc. MSc. Physics **Time: 03 hrs.**
Code: PHYS 2025 **Max. Marks: 100**

Instructions: All questions are compulsory. Internal choices are given in Q6 and Q10

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	List the basic conditions to be satisfied for faithful amplification.	**4**	**CO1**
Q2	For an ideal Op-Amp, value of input impedance, bandwidth, offset voltage and open loop voltage gain are (a)……., (b)……., (c)…….., and (d)…… respectively.	**4**	**CO1**
Q3	With the help of output characteristic curves of a common emitter amplifier, please define Active, Cutoff and Saturation regions.	**4**	**CO1**
Q4	State the law of mass-action and its significance.	**4**	**CO1**
Q5	Explain the principle and working of a solar cell in brief.	**4**	**CO2**
	SECTION B **(4Qx10M= 40 Marks)**		
Q6	State the principle and working of a light-emitting diode (LED) with suitable diagrams. How are LEDs employed as power indicators and seven-segment displays? OR What is a ZENER diode and how is it used as a voltage regulator? (Use appropriate diagrams and expressions)	**10**	**CO1**
Q7	Draw the circuit diagram and explain the working of a RC coupled transistor amplifier. Also mention its advantages and disadvantages.	**10**	**CO2**
Q8	Explain the working of Hartley's oscillator with the help of a circuit diagram and also write the expressions for feedback and frequency fractions. What are the drawbacks of L-C based oscillators?	**10**	**CO2**
Q9	(a) A transistor uses voltage divider bias method, with R_1= 50 kΩ, R_2 = 10 kΩ and R_E= 1 kΩ, If V_{CC}= 12 V and V_{BE} = 0.1 V, determine the value of Ic. (b) If negative voltage feedback fraction is 0.01 and gain after feedback is 50, the value of voltage gain without feedback will be…..	**5** **5**	**CO3**

SECTION-C (2Qx20M=40 Marks)			
Q10	Calculate the output voltage in the following circuit:  OR An amplifier has an open circuit voltage gain of 1000, an output resistance of 15Ω and an input resistance of 7k Ω. It is supplied from a signal source of e.m.f. 10 mV and internal resistance 3k Ω. The amplifier feeds a load of 35Ω. Determine (i) the magnitude of output voltage, and (ii) power gain.  	**20**	**CO3**
Q11	(a) Analyse the circuit of a single stage common-emitter amplifier as a two port network using h-parameter model. (b) Design an operational amplifier circuit to be used as (a) a differentiator, and (b) an integrator.	**10** **5+5**	**CO4**