



**K. K. Wagh Institute of Engineering Education & Research, Nashik**  
(An Autonomous Institute From A.Y. 2022-23)

	InSem Examination-IWinter 2023		
	Exam Seat No.:		
	Academic Year:2023-2024	Semester:III	
	Name of Programme: B.Tech	Pattern:2022	
	Name of Course:Electronic Circuits	Course Code: ETC222005	
	Max. Marks:30	Duration:1 Hour	

	<p><b>Instructions:</b> Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.</p> <ol style="list-style-type: none"><li>1. This question paper contains 2 page(s).</li><li>2. Answer to each new question is to be started on a new page.</li><li>3. Assume suitable data wherever required, but justify it.</li><li>4. Draw the neat labelled diagrams, wherever necessary.</li><li>5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question</li></ol>	
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**Question No. 1 Attempt following Question**

- a) Draw the n-channel enhancement MOSFET's drain and transfer characteristics and describe them. Also discuss how MOSFET operates in different regions. In which regions it can be used as ON and OFF switch? (7) CO1

**OR**

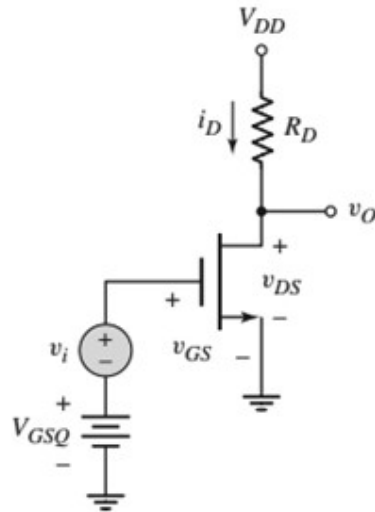
- b) Elaborate the following non ideal characteristics in detail. 1. Finite output resistance 2. Temperature effects 3. Subthreshold conduction (7) CO1

- c) Analyze drain current ,gate to source voltage and drain to source voltage of MOSFET CS circuit with voltage divider biasing without  $R_s$ . Consider n channel MOSFET with  $V_{TN} = 1\text{ V}$  and  $K_n = 0.1\text{ mA/V}^2$ . The circuit parameters are  $V_{DD} = 5.0\text{ V}$ ,  $R_1 = 30\text{ k}\Omega$ ,  $R_2 = 20\text{ k}\Omega$ , and  $R_D = 20\text{ k}\Omega$ . (8) CO1

**OR**

d)

For the circuit in Figure , assume parameters are:  $V_{GSQ} = 2.12$  V,  $V_{DD} = 5$  V, and  $R_D = 2.5$  k $\Omega$ . Assume transistor parameters are:  $I_{DQ} = 1$  mA,  $V_{TN} = 1$  V.  $K_n = 0.80$  mA/V<sup>2</sup> , and  $\lambda = 0.02$  V<sup>-1</sup> . Assume the transistor is biased in the saturation region. Analyze the small signal parameters  $g_m$  and  $r_o$ , the small-signal voltage gain.



(8) CO1

### Question No. 2 Attempt following Question

- a) Enlist four basic types of amplifiers. Explain them with the help of equivalent circuits. Also state desirable characteristics of four basic amplifiers.

(7) CO2

**OR**

- b) Explain the principle of an Oscillator. Enlist the types of Oscillator and explain Crystal Oscillator in detail.

(7) CO2

- c) Explain Barkhausen Criteria. Draw a RC phase Shift Oscillator and Analyze the frequency of oscillations for  $R=8.9$  K $\Omega$  and  $C=0.1$   $\mu$ F.

(8) CO2

**OR**

- d) Draw and explain Colpitts Oscillator circuit having two capacitors of 24nF and 240nF respectively are connected in parallel with an inductor of 10mH. Determine the frequency of oscillations of the circuit and the feedback fraction.

(8) CO2