B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Third Semester

Electrical and Electronics Engineering

20EEPC301 - ANALOG ELECTRONICS

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)
Answer ALL Questions

		Marks	K – Level	CO
1.	Which of the following FETs has a physical channel at zero gate bias? (a) Depletion-type MOSFET (b) Enhancement-type MOSFET (c) JFET (d) None of the above	1	K1	CO1
2.	The input of an IGBT is controlled by: (a) Gate current (b) Collector current (c) Gate voltage (d) Base voltage	1	K1	CO1
3.	Which amplifier class offers a compromise between linearity and efficiency? (a) Class A (b) Class B (c) Class C (d) Class AB	1	K1	CO2
4.	The frequency of a Wien bridge oscillator is determined by: (a) Capacitor only (b) Inductor only (c) Resistor and capacitor (d) Feedback resistor	1	K1	CO2
5.	Gain-bandwidth product of an Op-Amp is: (a) Constant for given Op-Amp (b) Variable with gain (c) Equal to input resistance (d) Maximum at low frequencies	1	K1	CO3
6.	A differentiator circuit produces an output proportional to: (a) Integral of input (b) Rate of change of input (c) Square of input (d) Inverse of input	1	K1	CO3
7.	In an ideal peak detector, the capacitor holds the peak voltage: (a) Indefinitely (b) For one cycle (c) Until the diode conducts again (d) Until reset manually	1	K1	CO4
8.	In a DAC, the full-scale output corresponds to: (a) All bits = 0 (b) LSB = 1 (c) MSB = 0 (d) All bits = 1	1	K1	CO4
9.	Which of the following components determines the timing interval in a 555 timer circuit? (a) The output voltage (b) The external resistor and capacitor (c) The trigger voltage (d) The power supply	1	K1	CO5
10.	A common problem with linear regulators is: (a) Low efficiency due to heat dissipation (b) High ripple voltage (c) Inconsistent output voltage under load (d) High frequency noise	1	K1	CO5

PART - B (12 × 2 = 24 Marks)
Answer ALL Questions

		Marks	K – Level	CO
11.	Compare FET and BJT.	2	K2	CO1
12.	Show the transfer characteristic for n-channel depletion type MOSFET.	2	K1	CO1
13.	Define the term Gate in IGBT.	2	K1	CO1
14.	Demonstrate the impact of cross over distortion in an amplifier.	2	K2	CO2
15.	Illustrate the need of complementary symmetry amplifiers.	2	K2	CO2
16.	Outline the features of crystal oscillator.	2	K2	CO2
17.	A 100 pF capacitor has a maximum charging current of 100 micro amps. Calculate its slew rate.	2	K2	CO3

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

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18.	For a non-inverting amplifier using an op-amp, assume R_1 = 470 ohm and R_2 = 4.7K ohm. Calculate the closed loop voltage gain of the amplifier.	2	K2 CO3
19.	Summarize the applications of an instrumentation amplifier.	2	K2 CO4
20.	Choose the number of comparators required for realizing an 8 bit ADC.	2	K2 CO4
21.	Summarize any two applications of 555 Timer in Monostable mode.	2	K2 CO5
22.	Infer the principle of switching regulator.	2	K2 CO5

PART - C (6 × 11 = 66 Marks)
Answer ALL Questions

23.	a)	Illustrate the circuit of emitter coupled BJT differential amplifier, and derive expressions for differential gain, common mode gain and CMRR.	11	K2 CO1
		OR		
	b)	Draw the circuit diagram of a common drain MOSFET amplifier. Derive the expression for its voltage gain, input resistance and output resistance.	11	K2 CO1
24.	a)	Infer about complementary symmetry class B amplifier and obtain its efficiency.	11	K2 CO2
		OR		
	b)	Explain the RC phase shift oscillator with a neat diagram by using BJT and also derive the condition for oscillation.	11	K2 CO2
25.	a)	Interpret the frequency response of op-amp. Give the frequency compensation techniques adopted in op-amps.	11	K2 CO3
		OR		
	b)	With the help of circuit diagrams explain the operation of I to V and V to I converters and their applications.	11	K2 CO3
26.	a)	Explain the Instrumentation amplifier using 3-Op-Amp and derive expression for overall gain.	11	K2 CO4
		OR		
	b)	Explain Successive Approximation ADC and give its advantages and disadvantages.	11	K2 CO4
27.	a)	Illustrate the functional block diagram of a 723 IC regulator and make the necessary changes to make it a low voltage regulator.	11	K2 CO5
		OR		
	b)	With neat block diagram explain the working of function generator IC8038.	11	K2 CO5
28.	a) (i)	Explain the operation of R-2R D/A converter.	6	K2 CO4
	(ii)	Explain the operation of a free running oscillator using IC555 with necessary waveforms.	5	K2 CO5
		OR		
	b) (i)	Demonstrate the operation of sample and hold circuit using IC741.	6	K2 CO4
	(ii)	Classify the various types of Fixed voltage regulators.	5	K2 CO5