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SARDAR PATEL UNIVERSITY

S.Y.B.Sc. Examination, FOURTH Semester

Wednesday, 10TH April 2019

Time: 10.00 am To 1.00 pm

Applied Physics Course Code: US04CAPH02

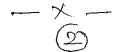
Course Title: Electricity, Magnetism and Solid State Electronics

Total	Marks	:	70
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		Total M	arks : 70
Q-1	Write	answers to the following multiple choice questions in your answer book by	[10]
~		ing the proper option.	
	(1)		
	, ,	(a) 0.85×10^{-12} (b) 88.5×10^{-12} (c) 8.85×10^{-12} (d) 885.0×10^{-12}	
	(2)	The tangent to the electric line of force at a point indicates of electric field.	
	, ,	(a) direction (b) angle (c) velocity (d) divergence	
	(3)	Two parallel current carrying wires placed close to each other will produce a	
		repulsive magnetic force if currents through them are	
		(a) equal (b) not equal (c) in same direction (d) in opposite direction	
	(4)	Coulomb force is an example of law.	
	. ,	(a) inverse cube (b) inverse square (c) exponential (d) logarithmic	
	(5)	Force on a test charge due to the presence of a unit charge is known as	
	` ,	(a) electric field (b) magnetic field (c) gravitational field (d) nuclear field	
	(6)	Transistors are generally used in	
		(a) Amplifiers (b) Zener diodes (c) power diodes (d) signal diodes	
	(7)	The transistor parameters are dependent.	
		(a) Temperature (b) Pressure (c) humidity (d) force	
	(8)	The transistors are usually specified by their parameters.	
		(a) control (b) regulating (c) hybrid (d) quiescent	
	(9)	When the biasing arrangements are such that the base emitter junction is	
		forward biased and the collector base junction is reverse biased the transistor	
		operates in region.	
		(a) runaway (b) Active (c) cutoff (d) saturation	
	(10)	The voltage gain of an amplifier is given by	
		(a) $A_v = V_o/V_i$ (b) $A_v = V_i/V_o$ (c) $A_v = V_o/I_o$ (d) $A_v = V_i/V_o$	
			[00]
Q-2		rer the following questions in brief. (Answer any Ten Questions)	[20]
		State and explain Coulomb's law for electric field.	
	1 1	Write a short note on flux due to an electric field.	
	(3)	Enlist properties of lines of force.	
	(4)	State the Lorentz Force Law for magnetic forces.	
	(5)	Define the surface current density.	
	(6)	Write the equation for the total force on a charge Q due to electric and magnetic	
	/ m \	fields.	(PTO)
	(7)	Discuss briefly the simplest biasing circuit.	Cr10/

(9) What is biasing? Why do we need to bias a transistor? (10) State the name of the four h parameters for a transistor in CE configuration. (11) Why do we require multi-stage amplifier? (12) Explain gain of multi-stage amplifier in dB. What is electric flux? Discuss about the divergence of electric field and obtain the [10] Ω -3 integral and differential forms of Gauss law. Also discuss applications of Gauss law. OR [5] (a) Write a note on Poisson's equation and Laplace's equation. Q-3[5] (b) Prove that the curl of electric field is always zero and it obeys the superposition principal. (a) Obtain the formula for the magnetic force produced by a line charge distribution. [5] Q-4 (b) Calculate the work required to be done in moving a charge in an electric field. [5] (a) Deduce the expression for the energy of a point charge distribution in terms of [5] Q-4 work done. (b) Calculate the magnetic force produced by a current carrying wire on the other [5] wire and hence prove that magnetic forces do no work. (a) What is Thermal Runaway? Using the necessary equations and diagram explain [5] Q-5 the need for bias stabilization in a transistor circuit. (b) Discuss the approximate analysis of voltage divider biasing circuit in detail. [5] (a) Discuss the emitter bias circuit in detail and derive the necessary equations [5] Q-5 (b) Draw the circuit diagram of the fixed bias circuit and derive the necessary [5] equations which govern it. (a) Derive the formula necessary to calculate the gain of a multi-state amplifier. [5] Q-6 Write a note on h-parameter equivalent circuit. [5] (a) Give reasons why decibel(dB) unit of measurement is used in the calculation of [5] Q-6 gain in multi-stage amplifiers. (b) Discuss the single-stage transistor amplifier in detail. Also explain the voltage [5]

(8) Draw the diagram showing the thermal runaway.



gain for this amplifier.