Ref.No: EX/PG/ETCE/T/127E/2017

M.E. (ETCE) 1st YEAR EXAMINATION, 2017
(2nd Semester)

MICTRSTRIP COMPONENTS AND CIRCUITS

Time: Three hours | Full Marks 100

No. of questions		Marks
	Answer *question no. 1* and any *four* from the rest.	
1.	For each of the following five types of transmission line, draw the cross-sectional view and plot the approximate configuration of electric and magnetic fields therin:	
(i)	Two wore line	
(ii)	Coaxial cable	
(iii)	Microstrip line	
(iv)	Trapped inverted microstrip (TIM)	
(v)	Coplanar waveguide (CPW)	
2.(a)	Justify the fact that micrpstrip cannot support pure TEM mode but stripline can.	
(b)	Discuss the concepts of effective dielectric constant and filling factor in relation to microstrips.	
(c)	What do you mean by 'mode of propagation'?	
(d)	What is the mode of propagation In coaxial cables, waveguides, microstrip and CPW?	
3.(a)	Among normal microstrip and inverted microstrip, which one can operate over higher frequencies and why?	
(b)	What assumptions were made by Schneider for calculation of dispersion in microstrips?	
(c)	With symbols having their usual meanings, prove the relation $Q = \beta/(2\alpha)$.	
(d)	Among plastic type and ceramic type of substrates, which one is more suited for antenna applications and which one for circuit applications? Justify your answer.	
4.(a)	Why is inset feed preferred for patch antennas?	
(b)	Name two models for approximate analysis of patch antennas.	
(c)	Determine the input impedance of an inset fed patch antenna by using one of the two.	
5.(a)	Discuss the utility of quarter wave transformer for impedance matching.	
(b)	A certain line of $R_0 = 400$ ohms is $(7/16)\lambda$ long and open at both ends. Find the impedance seen by a generator connected at a point $\lambda/4$ distant from one end.	
6.(a)	What do you mean by even and odd modes in a coupled line? Explain with appropriate diagrams.	
(b)	Prove that Z_0 is the geometric mean of Z_{oe} and Z_{oo} with the symbols having their usual meanings	
7.(a)	Explain how the finite difference technique is applied to compute the characteristic impedance of a microstrip line.	
(b)	Elaborate how the propagation constant is determined along a microstrip line using integral equation technique.	

8.(a) (b) (c)	Discuss the origin and propagation of surface waves along a dielectric coated metal plate. Prove that a finite number of modes will always exist therein. Prove that such a wave is slow wave.	