Total No. of Questions: 6 *Total No. of Printed Pages:2*

Enrolments No.....

Faculty of Engineering

End Sem (Even) Examination May-2019

EC3EC05/EI3EC05 Wireless and Mobile Communications

Programme: B.Tech. Branch/Specialisation: EC/EI

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. Spectral efficiency represents _____ **1**

(a) Traffic density/Hz/m^2 (b) Traffic density/m^2

(c) (Traffic density)^2 /Hz/m^2 (d) Traffic density /Hz^2/m^2

ii. Large scale fading can be measured on a scale of **1**

(a) Lesser than λ (b) Greater than λ

(c) Greater than 10 λ (d) Lesser than 10 λ

iii. Intersymbol interference occurs in _____ wireless channel. **1**

(a) Narrow band (b) Wide band

(c) Both (a) and (b) (d) None of these

iv. The maximum Doppler shift typically given by **1**

(a) – v / λ (b) – (v / λ) cos (γ)

(c) – v / f (d) – (v / f) cos (γ)

v. Time diversity uses _____ as a diversity element. **1**

(a) Correlation coefficient (b) Coherence time

(c) Coherence bandwidth (d) SNR

vi. For slow fading channel, the coherence time of the channel is greater than _____ of transmitted signal. **1**

(a) Doppler spread (b) Bandwidth

(c) Symbol period (d) Coherence bandwidth

vii. GSM uses _____ multiple access technique for creating 8 channels per carrier. **1**

(a) TDMA (b) FDMA (c) CDMA (d) None of these

viii. Soft handoff occurs in case of CDMA because of **1**

(a) No time change (b) Same frequency

(c) Doppler Effect (d) Delay dispersion.

P.T.O.

ix. 802.11a IEEE standard supports data rate up to **1**

(a) 11 Mbit/s (b) 1 Mbit/s (c) 54 Mbit/s (d) None of these

x. In wireless ad-hoc network **1**

(a) Access point is not required

(b) Access point is must

(c) Nodes are not required

(d) None of these

Q.2 i. Define term Service Quality for speech communication. **2**

ii. Explain mobility requirements of wireless communication system. **3**

iii. Explain characteristics of broadcasting service, paging service and cordless phone service of wireless communication systems. **5**

OR iv. Discuss multipath propagation challenges of wireless communication system. **5**

Q.3 i. Explain flat fading for wireless channel. **2**

ii. Describe statistical description of small scale fading without dominating components. **8**

OR iii. Derive Frii's law of received power in free space wireless channel. **8**

Q4 i. Define terms slow fading and fast fading channels. **3**

ii. Discuss selection diversity and maximal ratio combing diversity methods of space diversity technique. **7**

OR iii. Explain BER v/s SNR performance for Rayleigh fading wireless channel. **7**

Q.5 i. Discuss limitations of FDMA System. **4**

ii. Explain frequency planning in Cellular system with an example. **6**

OR iii. What is CDMA? Explains features of CDMA system. **6**

Q.6 Discuss standards and applications for any two of the following:

i. Wireless LANs **5**

ii. Wireless MANs **5**

iii. Short range Networks. **5**

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Marking Scheme

EC3EC05/EI3EC05 Wireless and Mobile Communications

Q.1	i.	Spectral efficiency represents _____ (a) Traffic density/Hz/m^2		**1**
	ii.	Large scale fading can be measured on a scale of (c) Greater than 10 λ		**1**
	iii.	Intersymbol interference occurs in _____ wireless channel. (b) Wide band		**1**
	iv.	The maximum Doppler shift typically given by (a) – v / λ		**1**
	v.	Time diversity uses _____ as a diversity element. (b) Coherence time		**1**
	vi.	For slow fading channel, the coherence time of the channel is greater than _____ of transmitted signal. (c) Symbol period		**1**
	vii.	GSM uses _____ multiple access technique for creating 8 channels per carrier. (a) TDMA		**1**
	viii.	Soft handoff occurs in case of CDMA because of (b) Same frequency		**1**
	ix.	802.11a IEEE standard supports data rate up to (c) 54 Mbit/s		**1**
	x.	In wireless ad-hoc network (a) Access point is not required		**1**
Q.2	i.	Definition of Mean Opinion Score Formula for service quality	1 mark 1 mark	**2**
	ii.	Mobility requirements of wireless communication system At least three mobility requirements 1 mark for each	 (1 mark * 3)	**3**
	iii.	Characteristics of broadcasting service Characteristics of paging service Characteristics of cordless phone service	1 mark 2 marks 2 marks	**5**
OR	iv.	Multipath propagation challenges Small scale fading Large scale fading Intersymbol interference	 2 marks 1 mark 2 marks	**5**
Q.3	i.	Flat fading for wireless channel.		**2**
	ii.	Statistical description of small scale fading without dominating components. Graphical explanation Mathematical explanation	 4 marks 4 marks	**8**
OR	iii.	Derivation of Frii's law of receiver power Theory of effect of frequency and distance parameter	6 marks 2 marks	**8**
Q4	i.	Definition slow fading Definition fast fading channels.	1.5 marks 1.5 marks	**3**
	ii.	Selection diversity Maximal ratio combing diversity	3.5 marks 3.5 marks	**7**
OR	iii.	BER v/s SNR performance for Rayleigh fading wireless channel Mathematical derivation of BER BER vs SNR graph	 5 marks 2 marks	**7**
Q.5	i.	Limitations of FDMA System. At least four limitations 1 mark for each	 (1 mark * 4)	**4**
	ii.	Frequency planning in Cellular system with an example. Theoretical explanation Mathematical explanation	 3 marks 3 marks	**6**
OR	iii.	Definition of CDMA Features of CDMA system. 1 mark for each (1 mark * 4)	2 marks 4 marks	**6**
Q.6		Discuss standards and applications for any two of the following:		
	i.	Wireless LANs Standards Applications	 2.5 marks 2.5 marks	**5**
	ii.	Wireless MANs Standards Applications	 2.5 marks 2.5 marks	**5**
	iii.	Short range Networks. Standards Applications	 2.5 marks 2.5 marks	**5**

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