

JHARKHAND UNIVERSITY OF TECHNOLOGY

Diploma 5th Semester Sample Paper (DIPLOMA WALLAH)

MOBILE WIRELESS COMMUNICATION

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Time: 3 Hours

Full Marks: 70

SET: 3

INSTRUCTIONS:

1. Question No. 1 is Compulsory.
2. Answer any **FOUR** questions from the remaining (Q.2 to Q.7).
3. **Note regarding Diagrams:** Where diagrams are required, please refer to standard textbooks or search on Google/YouTube for the specific topic (e.g., "LTE Architecture Diagram").

Q.1. Multiple Choice Questions

[2 × 7 = 14]

(i) Rapid fluctuations in signal strength over a short distance or time is known as:

(a) Path Loss	(b) Small-Scale Fading
(c) Large-Scale Fading	(d) Shadowing

(ii) LTE (Long Term Evolution) is generally referred to as:

(a) 2G	(b) 3G
(c) 4G	(d) 5G

(iii) A geostationary satellite orbits the earth at an approximate altitude of:

(a) 360 km	(b) 3,600 km
(c) 36,000 km	(d) 360,000 km

(iv) In Bluetooth, a network formed by one master and up to seven slaves is called a:

(a) Scatternet	(b) Piconet
(c) Ethernet	(d) Extranet

(v) Diversity techniques are used to mitigate the effects of:

(a) Modulation	(b) Multipath Fading
(c) Handoff	(d) Cell Splitting

(vi) IEEE 802.11 standard is popularly known as:

(a) Wi-Fi	(b) WiMAX
(c) Bluetooth	(d) Zigbee

(vii) The WAP model consists of a WAP Gateway that acts as a bridge between the Mobile network and:

(a) The PSTN	(b) The Internet
(c) The Satellite	(d) The Radio

SECTION B (Long Answer Type)

Q.2. (a) [Theory/Diagram] Explain the LTE (4G) Architecture. Describe the function of eNodeB, MME (Mobility Management Entity), and Serving Gateway.

[7]

[Important: Draw the LTE Evolved Packet Core (EPC) Architecture Diagram. Refer to Google.]

Q.2. (b) [Theory] Explain the **WAP (Wireless Application Protocol)** Architecture and its layers. How does it enable internet access on mobile phones? [7]

Q.3. (a) [Theory] What is **Multipath Propagation**? Explain the difference between **Small-Scale Fading** and **Large-Scale Fading**. [7]

Q.3. (b) [Theory] Explain **Diversity Techniques** used to overcome fading. Describe Space Diversity, Frequency Diversity, and Time Diversity. [7]

Q.4. (a) [Theory/Diagram] Describe the working of a **Satellite Communication System**. What are the Transponder, Uplink, and Downlink frequencies? [7]

[Important: Draw a basic Satellite Communication link diagram (Earth station -> Satellite -> Earth station). Refer to Google.]

Q.4. (b) [Theory] Differentiate between **Geostationary (GEO)**, **Low Earth Orbit (LEO)**, and **Medium Earth Orbit (MEO)** satellites. [7]

Q.5. (a) [Theory] Explain the architecture of **GPRS (General Packet Radio Service)**. How is it different from the standard GSM architecture? (Mention PCU and SGSN). [7]

[Important: Draw the GPRS Overlay Architecture Diagram. Refer to standard notes.]

Q.5. (b) [Theory] Explain **IEEE 802.11 (Wi-Fi)** Architecture. What are BSS (Basic Service Set) and ESS (Extended Service Set)? [7]

Q.6. [Detailed Long Answer] [14]

Explain the detailed operation of "Mobile Transmitters and Receivers".

Your answer must cover:

- Block diagram of a typical **Mobile Phone Unit (Handset)**.
- Function of the **Frequency Synthesizer** and **Local Oscillator**.
- Function of the **Logic Unit / Control Unit**.
- How the **Duplexer** allows simultaneous transmission and reception.
- The role of the **Modulator and Demodulator** circuits.

[Important: Draw the detailed Block Diagram of a Mobile Phone Unit (Transmitter/Receiver sections). Refer to Book/Google.]

- a. Doppler Shift / Doppler Effect
- b. VSAT (Very Small Aperture Terminal)
- c. WiMAX Technology
- d. IMT-2000 Standards (3G)
- e. Advantages of 5G over 4G

Diploma Wallah: Solution Key

MCQ: (i) b, (ii) c, (iii) c, (iv) b, (v) b, (vi) a, (vii) b.

Q4(b) Hint: GEO is stationary relative to earth (36,000km). LEO moves fast (500-1500km) and is used for mobile satellite phones (Iridium).

Q6 Hint: Focus on the interaction between the Microphone -> Audio Amp -> Modulator -> RF Amp -> Antenna.