

# JHARKHAND UNIVERSITY OF TECHNOLOGY

Diploma 5th Semester Sample Paper ( DIPLOMA WALLAH )

## MOBILE WIRELESS COMMUNICATION

More Model Sets & Study Materials available here [DiplomaWallah.in](https://DiplomaWallah.in)

**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.]*

**Q.7. Write Short Notes on (Any FOUR):**

**[3.5 × 4 = 14]**

- 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

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**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.

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