

लोक सेवा आयोग
नेपाल टेलिकम, प्राविधिक, टेलिकम, सार्तौं, टेलिकम इन्जिनियर (इलेक्ट्रोनिकस एण्ड कम्युनिकेशन)
पदको आन्तरिक तथा खुला प्रतियोगितात्मक लिखित परीक्षा
२०८२।०३।३०

पत्र : द्वितीय
समय : ३ घण्टा

पूर्णाङ्क : १००

विषय : Technical Subject

प्रत्येक Section को उत्तर छुट्टाछुट्टै उत्तरपुस्तिकामा लेख्नुपर्नेछ । अन्यथा उत्तरपुस्तिका रद्द हुनेछ ।

Section : "A"

50 Marks

1. Draw the circuit diagram of 2-bit counter and explain it. 5
2. Explain the sampling theorem and describe how A-law and μ -law companding improve signal quality in PCM. 5
3. How do you make JK flip-flop from SR flip-flop? Explain in detail. 10
4. Discuss the working principles and radiation characteristics of dipole antennas. Also, explain the concept of polarization and impedance matching in antenna systems. An electromagnetic wave with a frequency of 5MHz is propagating through a copper conductor with conductivity $\sigma = 5.8 \times 10^7$ S/m and relative permeability $\mu_r = 1$. Calculate the skin depth δ of the wave in the copper. Explain the significance of skin depth in high-frequency communication systems. 2+3+2+3=10
5. Compare open-loop and closed-loop control systems with suitable examples. Derive the transfer function of a simple closed-loop system and explain how the location of poles and zeros affect the system's stability and transient response. 3+3+4=10
6. Describe how synchronization is achieved in a DSC-SS system. Compare DS-SS with FH-SS in terms of performance and applications. Why is DSC-SS important? Clarify. 4+4+2=10

Section : "B"

50 Marks

7. How do you protect telecom equipments from electrical shock hazards and lightning? Discuss. 5
8. Explain the role of cache memory in a microcomputer system. How does it improve performance compared to main memory? Illustrate with an example. 5
9. Discuss the role of IP-based convergence in Next Generation Network (NGN). How does NGN support the convergence of voice, video and data? Analyze the challenges of achieving interoperability among different vendors and technologies in NGN. 3+3+4=10
10. Explain the working principle of optical fiber communication based on total internal reflection and Snell's law. Discuss different types of optical fibers and their properties. 5+5=10
11. Explain the single phase and three phase circuits with their benefits and applications. Write the formula for star-to-delta connection conversion and delta-to-star connection conversion formulas. 6+4=10
12. Explain the concept of cloud computing. List its types and explain one real-life application for each. A microprocessor reads an 8-bit binary value from port A and writes the complement of that value to port B. Write an algorithm and a flowchart to represent this logic. 2+4+4=10

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