विश्वजीवनामृतं ज्ञानम्

Atal Bihari Vajpayee Indian Institute of Information Technology & Management, Gwalior

IT404: Software Engineering

Major Examination (Session 2024–25)

Maximum Time: 3 Hours **Max Marks: 65**

Note: Answer all questions. Use diagrams, examples, or pseudo-code wherever appropriate.

1. (a) Distinguish between **functional** and **non-functional** requirements with two examples each. (5 Marks)
   (b) Prepare a sample SRS outline for a mobile ticket booking app. (5 Marks)

2. (a) Draw a **DFD (Level 1)** for an Online Food Ordering System. (6 Marks)
   (b) Prepare an ER diagram for the same system showing key entities and relationships. (6 Marks)

3. **Numerical:** A software project is estimated at 40 KLOC. Using basic COCOMO (organic):
   Effort = $2.4 \times (\text{KLOC})^{1.05}$ person-months.
   (a) Calculate effort. (4 Marks)
   (b) If the development time is approximated as $2.5 \times (\text{Effort})^{0.38}$ months, estimate project duration. (6 Marks)

4. (a) Explain Black-box vs White-box testing with examples. (5 Marks)
   (b) Discuss boundary value analysis with an example of a grading system (0–100 marks). (5 Marks)

5. **Case Study:** (15 Marks)
   A start-up wants to develop a healthcare appointment booking platform. They expect high reliability and must comply with data privacy regulations.
   Answer: (i) Which process model (Agile, Spiral, V-Model, Waterfall) would you recommend and why? (ii) Identify at least 4 possible risks and how you would mitigate them. (iii) Propose a test strategy covering functional, non-functional, and security testing. (iv) Suggest two metrics to track software quality post-deployment.

6. Write short notes on any **three** (5 Marks each — total 15 Marks):
   (i) Refactoring in software engineering
   (ii) Design patterns (Factory, Observer, Singleton — explain briefly)
   (iii) Continuous Integration/Continuous Deployment (CI/CD)
   (iv) Software maintainability and reliability measures