Exam.Code:0924
Sub. Code: 33566

2056

B.E. (Information Technology)

Sixth Semester

PEIT-602 (d): Software Project Management

Time allowed: 3 Hours Max. Marks: 50

NOTE: *Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Section.*

x-x-x

Q.1. Answer the following:-

(a) A software project has the following cash flows: Year 0 = –₹5,00,000 (investment), Year 1 = ₹1,50,000, Year 2 = ₹2,00,000, Year 3 = ₹2,50,000. Calculate the Net Present Value (NPV) at a discount rate of 10% and state whether the project is financially viable.

(b) Estimate the function points for a system with the following unadjusted counts: External Inputs = 5, External Outputs = 4, External Inquiries = 3, Internal Logical Files = 2, External Interface Files = 1. Use complexity weightings: EI=4, EO=5, EQ=4, ILF=10, EIF=7. Also assume Value Adjustment Factor (VAF) = 1.10.

(c) A project activity network has the following activities with durations (in days): A=3, B=5, C=4, D=6, E=2. Given that B and C depend on A, E depends on B, and D depends on C, determine the Critical Path and the minimum project duration.

(d) Using the Basic COCOMO model, estimate the development effort (in person-months) and development time for an organic-type software project of 40 KLOC. Use: Effort = 2.4 × (KLOC)^1.05 and Time = 2.5 × (Effort)^0.38.

(e) A project has a Budgeted Cost of Work Scheduled (BCWS) = ₹8,00,000, Budgeted Cost of Work Performed (BCWP) = ₹7,00,000, and Actual Cost of Work Performed (ACWP) = ₹7,50,000. Calculate: (i) Cost Variance (CV), (ii) Schedule Variance (SV), (iii) Cost Performance Index (CPI), and comment on project health. **(5x2)**

Section - A

Q.2.

(a) A software development company is evaluating two projects using the Payback Period and Return on Investment (ROI) methods. Project Alpha requires an investment of ₹10,00,000 and generates annual net cash inflows of ₹2,50,000. Project Beta requires ₹6,00,000 and yields ₹1,20,000 per year. (i) Calculate the Payback Period for both projects. (ii) If both projects have a life of 8 years, calculate ROI for each. (iii) Which project would you recommend and why?

(b) Explain with an example how Cash Flow Forecasting is done in programme management. Also describe the concept of Environmental Appraisal of a project and list any four factors that are considered in it. **(2x5)**

Q.3.

(a) For a software project, the following risks have been identified: R1 – Requirements change (Probability = 0.7, Impact = High, Loss = ₹2,00,000), R2 – Key developer leaves (Probability = 0.3, Impact = Medium, Loss = ₹80,000), R3 – Hardware failure (Probability = 0.1, Impact = Low, Loss = ₹20,000). (i) Calculate the Risk Exposure (RE) for each risk. (ii) Rank the risks by their exposure. (iii) Suggest one mitigation strategy for the highest-ranked risk.

(b) Differentiate between Net Present Value (NPV) and Internal Rate of Return (IRR) as cost-benefit evaluation techniques. A project has cash flows of –₹4,00,000 at Year 0, ₹1,50,000 at Year 1, ₹1,80,000 at Year 2, and ₹2,00,000 at Year 3. At a 12% discount rate, calculate the NPV. Is the project acceptable? **(2x5)**

P.T.O.

Q.4.

(a) An information system has the following components: 6 External Inputs (average complexity), 5 External Outputs (average complexity), 4 External Inquiries (simple), 3 Internal Logical Files (complex), and 2 External Interface Files (average). Standard complexity weights are: EI = 4/6, EO = 5/7, EQ = 3/4, ILF = 7/10/15, EIF = 5/7/10. (i) Compute the Unadjusted Function Point (UFP) count. (ii) If 14 General System Characteristics (GSC) each rated 4 on a scale of 0–5, calculate the Adjusted Function Point using the formula: AFP = UFP × (0.65 + 0.01 × ΣGSCi).

(b) State the problems with over-estimation and under-estimation in software projects. Also briefly describe how Expert Judgment is used as an estimation technique and list its advantages and disadvantages. **(6,4)**

Section- B

Q.5.

(a) A software project has the following activities with estimated durations and dependencies:

Activity	Duration (Days)	Depends On
A	4	–
B	3	A
C	6	A
D	5	B
E	4	C
F	2	D, E

(i) Draw the project network diagram. (ii) Perform Forward Pass and Backward Pass calculations. (iii) Identify the Critical Path. (iv) Calculate the Total Float for each non-critical activity.

(b) In a project, the three-point time estimates for activity X are: Optimistic (to) = 4 days, Most Likely (tm) = 7 days, Pessimistic (tp) = 12 days. Using PERT: (i) Calculate the Expected Duration (te). (ii) Calculate the Variance (σ^2) and Standard Deviation (σ). (iii) What is the probability that the activity will be completed in 10 days? (Use Z-table: $Z = (D - te)/\sigma$; for $Z = 1.5$, $P = 0.9332$). **(6,4)**

Q.6.

(a) A project manager is using Monte Carlo Simulation to assess project duration risk. The activity durations follow triangular distributions as below:

Activity	Min (days)	Most Likely (days)	Max (days)
A	3	5	9
B	2	4	7
C	4	6	10

Activities are sequential (A → B → C). (i) Using the triangular distribution formula:

Mean = (Min + Most Likely + Max)/3, calculate the expected total project duration.

(ii) Calculate the variance of total project duration using: Var = $(Max - Min)^2/18$ for each activity. (iii) What is the significance of Monte Carlo Simulation in risk management?

(b) For a project with the following CPM network data, compute the Critical Path and identify all activities on it. Also identify which activities have float and compute their Total Float:

Activity	ES	Duration	LS
1-2	0	3	0
1-3	0	5	2
2-4	3	4	3
3-4	5	2	5
4-5	7	3	7

(5,5)

Q.7.

(a) A project manager monitors the following data at the end of Week 6:

Task	BCWS (₹)	BCWP (₹)	ACWP (₹)
Design	1,20,000	1,10,000	1,25,000
Coding	2,50,000	2,00,000	2,10,000
Testing	80,000	60,000	70,000
Total	**4,50,000**	**3,70,000**	**4,05,000**

Calculate: (i) Cost Variance (CV) and Schedule Variance (SV) for each task and in total. (ii) Cost Performance Index (CPI) and Schedule Performance Index (SPI) for the total project. (iii) Estimate at Completion (EAC) if the total Budget at Completion (BAC) = ₹9,00,000. (iv) Comment on the overall project health and suggest corrective actions.

(b) A project team has three developers (Dev1, Dev2, Dev3) to be assigned to four tasks (T1, T2, T3, T4) with the following cost matrix (in ₹ hundreds). One task will be unassigned. Using the Assignment Problem (Hungarian Method or otherwise), find the optimal assignment and minimum cost:

	T1	T2	T3	T4
Dev1	9	2	7	8
Dev2	6	4	3	7
Dev3	5	8	1	8

(5,5)

x-x-x