

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI  
(END SEMESTER EXAMINATION)**

**CLASS: BTECH  
BRANCH: PIE**

**SEMESTER : IV  
SESSION : SP/2025**

**SUBJECT: PE219 PROJECT ENGINEERING**

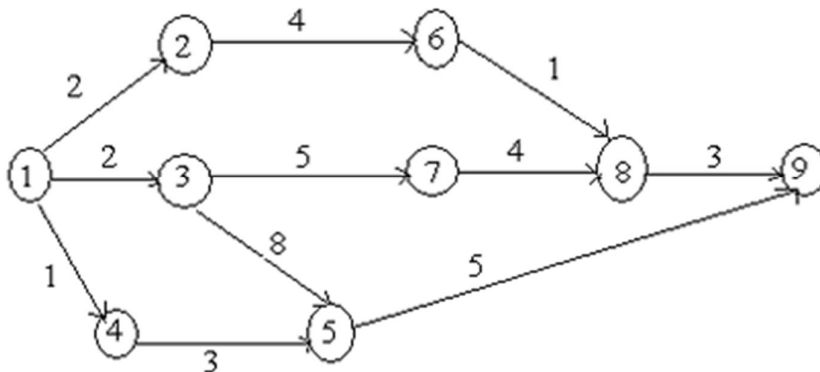
**TIME: 3 Hours**

**FULL MARKS: 50**

**INSTRUCTIONS:**

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
  2. Attempt all questions.
  3. The missing data, if any, may be assumed suitably.
  4. Before attempting the question paper, be sure that you have got the correct question paper.
  5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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|   |     | CO | BL |
|---|-----|----|----|
| Q.1(a) Explain the various phases of the Project Life Cycle and discuss the significance of each phase in ensuring project success.   | [5] | 1  | 2  |
| Q.1(b) Discuss how the balance between project constraints can impact the quality of the final deliverable. Can all constraints be optimized simultaneously? Justify your answer.   | [5] | 1  | 2  |
| Q.2(a) Explain the assumptions in Break-even analysis. A business has fixed costs of \$200,000 and sells a product at \$50 per unit. If the variable cost per unit is \$30, calculate the number of units sold to break even.   | [5] | 2  | 2  |
| Q.2(b) Discuss the primary factors considered in a make-or-buy decision? A company has to choose between two new projects. Project X has a 60% chance of generating \$150,000 and a 40% chance of generating \$50,000. Project Y has a 50% chance of generating \$120,000 and a 50% chance of generating \$80,000. Calculate the EMV for both projects and advise which one is better based on EMV. | [5] | 2  | 2  |
| Q.3(a) Discuss the key environmental considerations that should be considered during project evaluation? How can a project mitigate adverse environmental impacts?  | [5] | 3  | 2  |
| Q.3(b) Explain the concept of Social Cost-Benefit Analysis (SCBA). How does it differ from traditional financial cost-benefit analysis, and why is it important in project evaluation?  | [5] | 3  | 2  |
| Q.4(a) Define the critical path and critical activity in a project network. Explain with an example how you identify it using the time values from forward/backward passes.   | [5] | 4  | 1  |
| Q.4(b) Identify the critical path of the network. And find the total float, free float, and independent float for each node.  | [5] | 4  | 4  |



Q.5(a)

| Activity | Optimistic Time (O) | Most Likely Time (M) | Pessimistic Time (P) | Immediate Predecessor(s) |
|----------|---------------------|----------------------|----------------------|--------------------------|
| A        | 2                   | 4                    | 6                    | -                        |
| B        | 3                   | 6                    | 9                    | A                        |
| C        | 1                   | 3                    | 8                    | A                        |
| D        | 4                   | 6                    | 10                   | B                        |
| E        | 2                   | 5                    | 7                    | B, C                     |
| F        | 3                   | 4                    | 8                    | D, E                     |

[5] 5 4

1. Identify the critical path.
2. How likely is the project to be completed in 20 days?

Q.5(b)

A sandwich company assembles sandwiches in a production line. The following table lists the activities:

[5] 5 5

1. Draw the Precedence Diagram
2. Calculate the takt time if 320 sandwiches must be made in 8 hours
3. Determine the theoretical number of workstations
4. Assign tasks using Longest Task Time Rule
5. Calculate the line efficiency

| Task | Activity                 | Predecessors | Time (Minutes) |
|------|--------------------------|--------------|----------------|
| A    | Cut the bread            | None         | 1.5            |
| B    | Spread butter            | A            | 1              |
| C    | Add vegetables           | A            | 1.2            |
| D    | Add meat                 | B            | 0.8            |
| E    | Add cheese               | C            | 1              |
| F    | Assemble sandwich halves | D,E          | 1.5            |
| G    | Wrap the sandwich        | F            | 0.7            |

.....30/04/2025.....M

|          |             |             |             |             |             |             |             |             |             |             |
|----------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| -0.9     | 0.1841      | 0.1814      | 0.1788      | 0.1762      | 0.1736      | 0.1711      | 0.1685      | 0.1660      | 0.1635      | 0.1611      |
| -0.8     | 0.2119      | 0.2090      | 0.2061      | 0.2033      | 0.2005      | 0.1977      | 0.1949      | 0.1922      | 0.1894      | 0.1867      |
| -0.7     | 0.2420      | 0.2389      | 0.2358      | 0.2327      | 0.2296      | 0.2266      | 0.2236      | 0.2206      | 0.2177      | 0.2148      |
| -0.6     | 0.2743      | 0.2709      | 0.2676      | 0.2643      | 0.2611      | 0.2578      | 0.2546      | 0.2514      | 0.2483      | 0.2451      |
| -0.5     | 0.3085      | 0.3050      | 0.3015      | 0.2981      | 0.2946      | 0.2912      | 0.2877      | 0.2843      | 0.2810      | 0.2776      |
| -0.4     | 0.3446      | 0.3409      | 0.3372      | 0.3336      | 0.3300      | 0.3264      | 0.3228      | 0.3192      | 0.3156      | 0.3121      |
| -0.3     | 0.3821      | 0.3783      | 0.3745      | 0.3707      | 0.3669      | 0.3632      | 0.3594      | 0.3557      | 0.3520      | 0.3483      |
| -0.2     | 0.4207      | 0.4168      | 0.4129      | 0.4090      | 0.4052      | 0.4013      | 0.3974      | 0.3936      | 0.3897      | 0.3859      |
| -0.1     | 0.4602      | 0.4562      | 0.4522      | 0.4483      | 0.4443      | 0.4404      | 0.4364      | 0.4325      | 0.4286      | 0.4247      |
| -0.0     | 0.5000      | 0.4960      | 0.4920      | 0.4880      | 0.4840      | 0.4801      | 0.4761      | 0.4721      | 0.4681      | 0.4641      |
| <b>z</b> | <b>0.00</b> | <b>0.01</b> | <b>0.02</b> | <b>0.03</b> | <b>0.04</b> | <b>0.05</b> | <b>0.06</b> | <b>0.07</b> | <b>0.08</b> | <b>0.09</b> |