

| Exam.<br>Level | Back    |            |        |
|----------------|---------|------------|--------|
|                | BE      | Full Marks | 80     |
| Programme      | BCE     | Pass Marks | 32     |
| Year / Part    | IV / II | Time       | 3 hrs. |

**Subject: - Construction Management (CE 754)**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt **All** questions.
- ✓ The figures in the margin indicate **Full Marks**.
- ✓ Assume suitable data if necessary.

1. Explain construction project characteristics. Discuss the relation between contractor, client and consultant for proper execution of construction project. [5]

2. a) The details of a project are shown below. If the indirect cost per week is Rs.200. Determine the optimum duration of the project and the corresponding minimum cost. [6]

| Activity | Predecessor | Normal Duration | Normal Cost | Crash Duration | Crash Cost |
|----------|-------------|-----------------|-------------|----------------|------------|
| A        | -           | 5               | 2           | 500            | 620        |
| B        | A           | 4               | 3           | 600            | 700        |
| C        | A           | 3               | 2           | 500            | 650        |
| D        | A           | 6               | 4           | 400            | 440        |
| E        | B           | 5               | 3           | 1500           | 1800       |
| F        | D           | 4               | 2           | 300            | 480        |
| G        | C, E, F     | 6               | 3           | 800            | 1040       |

b) Calculate EOQ, maximum stock level, minimum stock level, average stock level and ROL/ROP, if annual cement required for a construction project is 25,000 bags, ordering cost is Rs. 10,500; carrying cost is 5%; cement rate per bag is Rs. 1,000; safety stock is 10 days; lead time is 5 days; also calculate total inventory cost. [6]

3. a) What are void and voidable contract? Explain basic element of a valid contract. [5]

b) List out different method of tunnel excavation. Explain drill & blast and TBM method of tunneling. [5]

4. a) Write purpose of bid security and performance security and prepare a sample bid invitation notice for a building construction project having total estimated cost of Rs.1,95,00,000. [3+4]

b) Prepare a typical job layout for earthwork in raft foundation. Explain what kind of equipment for such project. [3+3]

5. a) What are the vital record keeping documents for a public construction work? Explain site order book and measurement book. [2+2+2]

b) Explain equipment productivity. What are factor affecting equipment productivity. [1+3]

6. a) Explain types of maintenance in a road project after completion of project. [5]

b) List the minimum safety requirements required for construction project as per NBC 114. [5]

7. What is leadership? Which leadership style you prefer in supervising a construction site? Why motivation for worker is important in any construction project? [2+2+2]

8. A building having a cubic of 1500 m<sup>3</sup> was constructed 15 years ago on a free hold land measuring 1000 m<sup>2</sup>. The building fetched a rent of Rs.13500 per month. What amount will you recommend for advancing a loan on a property against the Mortgage, if the rate of land in that area is Rs. 1300 per sq meter? The building has following expenditure headings; [6]

- Insurance premium Rs. 7600 per annum, Repair and maintenance 7% of gross rent
- Municipal Taxes 29% of gross rent, Management collection charges 7% of gross rent. Assume that the future life to be 60 yrs. Rate of interest as 8% and redemption of capital 5% (rate of sinking fund)
- Bank provides loan only 50% of valuation amount.

9. What is specification and why is it necessary component of contract document? Write detail specification for M20 concrete. [2+6]

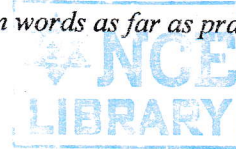
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TRIBHUVAN UNIVERSITY  
INSTITUTE OF ENGINEERING  
**Examination Control Division**  
2081 Chaitra

| Exam.       | Regular |            |            |    |
|-------------|---------|------------|------------|----|
|             | Level   | BE         | Full Marks | 80 |
| Programme   | BCE     | Pass Marks | 32         |    |
| Year / Part | IV/ II  | Time       | 3 hrs.     |    |

**Subject: - Construction Management (CE 754)**

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1. What are the roles of a consultant in construction projects concerning quality control and time management to complete the project on time, with approved quality standard and within allocated budget? [5]
2. a) The details of a project are shown below. If the indirect cost per week is Rs.200. Determine the optimum duration of the project and the corresponding minimum cost. [7]

| Activity | Predecessor | Normal Duration | Normal Cost | Crash Duration | Crash cost |
|----------|-------------|-----------------|-------------|----------------|------------|
| A        | -           | 5               | 2           | 500            | 620        |
| B        | A           | 4               | 3           | 600            | 700        |
| C        | A           | 3               | 2           | 500            | 650        |
| D        | A           | 6               | 4           | 400            | 440        |
| E        | B, C, F     | 5               | 3           | 1500           | 1800       |
| F        | D           | 4               | 2           | 300            | 480        |
| G        | C, F        | 6               | 3           | 800            | 1040       |

- b) By explaining time cost trade off, write how can we apply this concept for projects in Nepal which are behind the schedule to finish them on time. [5]
3. a) Explain the steps of procurement procedure for works in Government offices in Nepal as per prevailing Public Procurement Act and Regulation. [5]
- b) Explain the type and functioning of crane used in underground power house of a Hydropower project and explain factor affecting selection appropriate equipment in construction site. [5]
4. a) What is prequalification? Mention the various steps to be followed in prequalification and what are the differences between pre-qualification and post-qualification. [1+3+4]
- b) Prepare a typical job layout for a multi-story Hotel building project. Explain what are the precautions would you do for material handling of such project? [3+3]
5. a) What are the responsibilities of site engineer in construction site. [5]
- b) Discuss about the labor productivity and equipment productivity in construction industry. What are the causes of being low productivity and its remedial measures? [2+4]
6. a) Explain procedure to prepare interim payment certificates with format. [5]
- b) Define personnel management. Discuss briefly on any 7 principles, out of the Henry Fayol's 14 principles of administrative management. [1+4]

7. a) Discuss about the importance of construction safety management and current situation of safety management in Nepal. Also mention which NBC code refers to the construction safety in Nepal.

[5]

b) Write method of writing specifications and prepare detailed specification for earthwork in excavation in sandy soil for isolated footing of multi-storey building.

[2+5]

8. An office building having a plinth area of 5000 sq. ft. was constructed at the cost of Rs. 4,000.00 per sq. ft. The building is two storey RCC structure on a 6 aana plot. The Government rate of land is Rs. 10,00,000 per aana and commercial rate of land is 40,00,000 per aana. The office building is given on a monthly rental of Rs. 50,000. Life of the structure may be taken as 70 years. Calculate maximum loan that can be sanctioned from a bank which provides loan amount equivalent to 40% of valuated amount. The bank policy for land valuation is to take 70% of commercial rate and 30% of government rate. The annual expenses of the building are 30% of gross income, prevailing interest rate is 10% and rate of capital redemption is 5%.

[6]

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1. What is construction project life cycle? Explain its phases with suitable diagrams. Mention which phase of project life cycle in Mega projects is more problematic in Nepal. [1+4+1]
2. a) Define planning. Explain pre-tender stage or contract stage planning by contractor. [5]
- b) Find the optimum project duration, minimum project duration and their corresponding project completion cost based on following information. Consider all the rupees in Million NPR and durations in months. Time-dependent variable cost is Rs 210 per unit duration. [8]

| Activity | Predecessor | Normal Duration | Crash Duration | Normal Cost (RS) | Crash Cost (RS) |
|----------|-------------|-----------------|----------------|------------------|-----------------|
| A        | -           | 12              | 8              | 600              | 1080            |
| B        | -           | 11              | 9              | 1500             | 1580            |
| C        | A, B        | 12              | 9              | 1000             | 1030            |
| D        | A, B        | 14              | 10             | 500              | 900             |
| E        | A           | 9               | 9              | 1500             | 1500            |

3. a) What are the key benefits of ABC classification of materials? Explain its basis of ABC classification of materials. [2+2]
- b) If you are appointed as project manager for a building project in rural area. Now you are going to buy the materials for the project. Write down the steps which you will be following for procurement of the materials, based on material provisioning process? [4]
4. Explain the key characteristics of following construction equipment with the suitability based on their functions. [6]

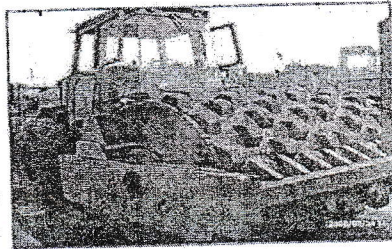


Figure (a)

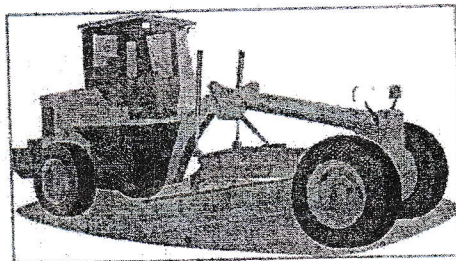


Figure (b)

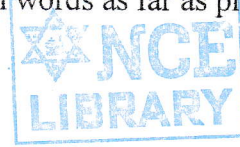
5. a) Explain Bid security, Performance security, EPC contract in brief. [3×2]
- b) Prepare bid invitation notice for following project. [4]  
Name of Project:- Construction of Municipal Building Ward no 4  
Office :- Dhaulagiri Municipality, Myagdi  
Estimated Amount:- Rs 1,80,00,000.00  
Method :- NCB, E-bidding  
Bid invitation date- Today
6. Define Job Layout plan with its example and figures. [3]
7. Define Labor Productivity Index. What are the factors affecting labor productivity? Explain in brief. [6]
8. Prepare the format of Site order Book and Interim Payment Certificates. [4]
9. Explain the benefits of decentralization in Project Control and Management. [4]
10. Why regulatory requirements are needed in any construction project? How building codes and bye laws of any country helps in effective urban planning? Explain it. [6]
11. Write detailed specification of First Class Brick work with (1:6) cement sand mortar. [2+6]
12. A freehold property consisting of RCC building having a total area of 500 m<sup>2</sup> constructed 10 years ago is proposed to be purchased by Mr. Thapa. The present market rate of construction for similar type of building is Rs. 45,000/m<sup>2</sup>. The total area of land is 500m<sup>2</sup>. The commercial market rate(CMR) of this land is Rs. 1,00,000/m<sup>2</sup>. The government registration rate (GRR) for this land is Rs. 30,000/ m<sup>2</sup>. Use 60:40 proportion for determining cost of land. Assume life of building to be 70 years and scrap value as 10%. Advise Mr. Thapa as to what cost he should purchase the property. Use Plinth area method of valuation and straight line method of depreciation. [6]

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1. List out various activities to be carried in the construction phase from the Employer's perspective. What is the time frame for pre-tender stage for the contractor? Describe the relationship between Client, Contractor and Consultants in three actors system. [2+1+3]
2. The details of project are shown below. If the indirect cost per week is Rs. 450, find the optimal crashed result of the project network. [8]

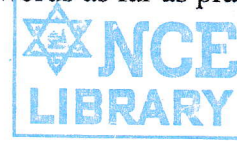
| Activity | Predecessor | Time (week) |       | Cost (Rs) |       |
|----------|-------------|-------------|-------|-----------|-------|
|          |             | Normal      | Crash | Normal    | Crash |
| A        | -           | 7           | 4     | 1800      | 2150  |
| B        | -           | 9           | 7     | 3500      | 3850  |
| C        | B           | 5           | 4     | 2500      | 2675  |
| D        | A           | 8           | 5     | 4000      | 4275  |
| E        | C           | 9           | 8     | 3000      | 3375  |
| F        | B           | 11          | 11    | 3000      | -     |

3. Explain importance of materials wastage standards. What are the different causes of materials wastage in construction project? Explain. [2+3]
4. Explain the method of selection of appropriate equipment. List the equipment used in compaction and explain any two of them with a neat sketch. Explain the function of concrete batching and mixing plant with neat sketches. [2+2+6]
5. List out different types of contract used in construction project. Differentiate between tender document and contract document. [6]
6. What is job layout plan? Explain with typical schematic diagram for a housing project. [5]
7. What is equipment productivity? What are the causes of being low productivity and its remedial measures? [1+4]
8. Prepare a muster roll and the format of IPCs in a construction project. [2.5+2.5]
9. Describe different types of maintenance in a project and explain the importance of maintenance in operating project. [5]
10. List out the 14 administrative management principles propound by Fayol and elaborate any six of them. [6]
11. Why insurance are required in a construction project? Explain with the headings that are insurable in a construction project. [2+4]
12. Explain the roles of specifications in any construction project. What are the principles of writing technical specification for construction works? [3+3]
13. A building having a cubic of  $1600 \text{ m}^3$  was constructed 14 years ago on a free hold land measuring  $900 \text{ m}^2$ . The building fetched a rent of Rs. 12300 per month. What amount will you recommend for advancing a loan on a property against the Mortgage, if the rate of land in that area is Rs. 800 per sq. meter? The building has following expenditure headings: [7]
  - Insurance premium Rs. 6700 per annum
  - Repair and maintenance 7% of gross rent taxes 27% of gross rent
  - Management collection charges 5% of gross rent

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1. Discuss the relationship between client, consultant and contractor for proper execution of a construction project. [5]
2. Consider the data of a project as shown in table below: [7]

| Activity | Immediate Predecessor | Normal Time (Week) | Normal Cost (Rs.) | Crash Duration (Week) | Crash Cost (Rs.) |
|----------|-----------------------|--------------------|-------------------|-----------------------|------------------|
| P        | -                     | 7                  | 2500              | 4                     | 2200             |
| Q        | -                     | 9                  | 4500              | 7                     | 4200             |
| R        | P                     | 5                  | 3500              | 4                     | 3000             |
| S        | P                     | 8                  | 5500              | 7                     | 5100             |
| T        | Q                     | 9                  | 3000              | 8                     | 2500             |
| U        | Q                     | 12                 | 5500              | 12                    | -                |
| V        | S, T                  | 4                  | 1500              | 2                     | 1800             |

If the indirect cost per week is Rs. 2500, find the optimal crashed project completion time and corresponding minimum cost.

3. Define EOQ. What do you mean by Value Engineering? Explain about the material provisioning process. [1+2+4]
4. Explain the steps to be followed in sequence while carrying out tunneling work by using conventional method. Introduce TBM and its advantage in tunnel construction. [7]
5. a) Explain different types of contract based on technical and administrative responsibility. [5]  
b) What are the major causes of Low labor productivity? Explain about the material productivity control. [3+3]
6. How does mobilization advance affect the cash flow of contractor? Explain the term Job Layout Plan. [2+3]
7. Write down the procedure of preparing bills. What is site order book and Muster Roll? [5]
8. Why maintenance is needed for a project? Explain about planned maintenance. [4]
9. What is leadership? What are the characteristics of a good leader? Why motivation for workers is important in any construction projects? [6]
10. Define specification and explain its types. Discuss on techniques of writing specification. [4+4]
11. a) Why valuation is done? Explain different parameters affecting the valuation of the property. [2+2]  
b) A building having estimated future life of 80 years, fetches a gross annual rent of Rs. 2500 per month. Work out its capitalized value on the basis of 8% net yield. The rate of above building measures 1200 m<sup>2</sup> and cost of land is taken at Rs. 100 per m<sup>2</sup>.  
The other outgoing are:  
-Repair and maintenance (1/12)<sup>th</sup> of gross income  
-Municipal axis and property tax – 25% of gross income  
-Management and miscellaneous charges – 8% of gross income  
The plinth area of a building is 600 m<sup>2</sup> and plinth area rate of the building is Rs. 200 per m<sup>2</sup>. [6]
12. Discuss various safety control devices used in construction site to ensure safety. [5]

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1. a) Define construction management. Why construction team needs knowledge about construction management? [1+4]
- b) State in details about planning activities carried out in implementation stage by the client of a project. [4]
2. a) How inventory of construction materials can be planned for the repeatedly used items? Explain with suitable diagram. Consider a construction site acquired different materials given below, based on the data classify the materials in A, B and C classes. What are the significances of this classification? [2+4+2]

| Materials    | Quantity | Unit | Rate per unit |
|--------------|----------|------|---------------|
| steel re-bar | 15       | ton  | 110000        |
| cement       | 600      | bag  | 750           |
| tiles        | 1500     | sqft | 350           |
| brick        | 9000     | no   | 12            |
| marbles      | 450      | sqft | 250           |
| aggregate    | 50       | cum  | 1400          |
| sand         | 25       | cum  | 1200          |

- b) How construction equipment is considered disadvantages in construction project? Explain. Enlist the construction equipment used in earthwork and explain any two of them with neat sketches. [2+2+4]
3. a) Sinoma company of China has planned to prepare a Subgrade for Koteswor to Kalanki road section of 8.7 km length of ring road to be accomplished within 1.5 years at a cost of 1.5 million per kilometer. The data were taken after 6 months of commencement of the work, the work found to be of 2.3 km completed by expending 4.6 million rupees. Perform EVA and draw your conclusion regarding the Chinese performance in Nepalese domain by calculating each component of EVA. [6]
- b) Describe Herzberg Dual factor theory of motivation. Write down the steps of personal selection in any organization. [1+3]
4. Prepare a typical job layout for a multi-story building construction project. Explain cash flow forecasting of a contractor depicting contract and contractor's margin with neat diagram. [3+3]
5. What are the various factors affecting the value of the property. Work out the valuation of a cinema hall with the following [2+6]
  - a) Cost of land = Rs. 15,00,000
  - b) Gross income = Rs. 90,00,000
  - c) Expenses undergone per year to run the Cinema including staff salary, electricity charges, municipal taxes, stationary and printing etc 30% of gross income

- d) Repair and maintenance of machinery, plant and equipment at 5% of their capital cost which is Rs. 55,00,000
- e) Sinking fund for machinery, plant and equipment whose life is estimated at 25 years at 5% after allowing 10% scrap value.
- f) Insurance premium is 60,000 per annum

Assume year's purchase for 60 years at 8% and redemption of capital at 4% and repair of hall at 2% of gross income.

- 6. a) Explain in detail, what is project scope control and how it can be achieved? [4]
- b) What are the roles and responsibilities of site engineer? Explain in detail. [4]
- 7. Define and differentiate between general and detailed specification. Write a detailed specification of cement plaster of 1:4 in brick wall. [2+4]
- 8. Differentiate between running bill and final bill. Prepare a typical muster roll used in construction project executed through user's committee. [2+2]
- 9. How do you see the importance of repair and maintenance to prolong the useful life of construction project? Explain. Define preventive and corrective maintenance. [2+2]
- 10. Write short notes on: (Any Three) [3×3]
  - a) Building Bye-Laws and its requirements
  - b) Barriers to Communication
  - c) Types of maintenance in Buildings
  - d) Unit price contract and its disadvantages

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2076 Bhadra

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1. Consider the data of a project as shown in the table below.

| Activity | Immediate Predecessor | Normal Duration (Week) | Normal Cost (Rs.) | Crash Duration (Week) | Crash Cost (Rs.) |
|----------|-----------------------|------------------------|-------------------|-----------------------|------------------|
| A        | ---                   | 8                      | 2000              | 5                     | 2300             |
| B        | ---                   | 10                     | 4000              | 8                     | 4300             |
| C        | A                     | 6                      | 3000              | 5                     | 3125             |
| D        | A                     | 9                      | 5000              | 6                     | 5225             |
| E        | B                     | 10                     | 2500              | 9                     | 2700             |
| F        | B                     | 13                     | 5000              | 13                    | ---              |
| G        | D,E                   | 5                      | 1000              | 3                     | 1700             |

If the indirect cost per week is Rs. 2000, find the optimal crashed project completion time and corresponding minimum cost. [16]

2. a) List the different types of cranes and discuss in brief with sketches. [5]  
b) Explain the EVM technique for the cost control and monitoring. Illustrate an EVA graph with your own values. [5]
3. a) Why valuation is done? Explain different parameters affecting the valuation of the property. [3+3]  
b) Define cost, value and obsolescence. Explain on qualification of valuer. [3+3]
4. An office building having a plinth area of 4000 sq. ft. was constructed at the cost of Rs. 4000.00 per sq. ft. The building is two storey RCC structure on a 4000 sq. ft. plot. The cost of land is Rs. 1000000.00. The office building is given on a monthly rental of Rs. 50000.00. Life of the structure may be taken as 70 years. For sinking fund 6% compound interest is prescribed. Work out the capitalized value of the property on the basis of net yield of 8%. Repairs and maintenance charges may be taken as one month rent and municipal and property tax 25% of annual rentable value. Insurance and other miscellaneous charges is 8% of annual rentable value. [10]
5. a) Differentiate between planned maintenance and unplanned maintenance with suitable examples. How a good maintenance plan can be formulated, explain in brief. [2+2]  
b) How personnel involved in any organization can be motivated? Explain at least two theories of motivation. [2+4]
6. a) Describe Contract, essential elements of contract and types of contract in detail. [1+2+4]  
b) Explain labor productivity and equipment productivity in construction industry. [5]
7. Write short notes on: **(Any Two)** [5×2]
  - a) TBM
  - b) Herzberg Dual factor theory of motivation.
  - c) Face shovel and Front end loader.

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**Subject: - Construction Management (CE754)**

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- ✓ The figures in the margin indicate **Full Marks**.
- ✓ Assume suitable data if necessary.

1. a) Discuss on scope of construction management. Explain about the relationship between client, consultant and contractor to perform the project effectively. [2+3]
- b) The details of a project are shown below. If the indirect cost per week is Rs.400, find the lowest cost schedule of the project. [7]

| Activity | Predecessor (s) | Time (weeks) |       | Cost (Rs) |       |
|----------|-----------------|--------------|-------|-----------|-------|
|          |                 | Normal       | Crash | Normal    | Crash |
| A        | -               | 8            | 5     | 2000      | 2200  |
| B        | -               | 10           | 8     | 3800      | 4000  |
| C        | B               | 6            | 5     | 2700      | 2600  |
| D        | A               | 9            | 6     | 4100      | 4300  |
| E        | C               | 10           | 9     | 3100      | 3350  |
| F        | B               | 12           | 12    | 3100      | 3100  |

2. a) What are the prominent advantages and disadvantages of using construction equipments? Explain in short. [3]
- b) Explain the equipments with the help of neat sketches: Concrete mixer and Backhoe. [3]
3. a) Write down the activities to be carried out before inviting tender. Explain about the different types of contract practicable in our context. [3+3]
- b) List down the various components for site preparation. Explain about the cash flow management in construction project. [3+3]
4. a) Discuss about the importance of safety requirements in the construction site. How building codes of any country helps in effective urban planning? [2+3]
- b) Why specification is important in construction contracts? Write down the major techniques that you follow for writing specification. [2+3]
5. a) Why it is necessary to do the material productivity control in the construction project? Define equipment productivity control. [3+3]
- b) What is muster roll and why it is important? Explain about the site order book. [3+3]
6. a) Name the types of Contract. Explain the item rate contract. [6]
- b) Calculate the value of a building built 20 years ago having plinth area 500 sqm, constructed in the land of 1000 sqm. Current market value of the land is Rs. 25000 per sqm and rate of building is Rs. 50,000 per sqm. Assume suitable data if necessary. [6]
7. a) Discuss the Use of Earned value analysis for Performance control in a project. [6]
- b) Prepare a typical job layout of a Building Project. [4]
8. Write short notes on: (Any two) [6]
  - a) Value engineering
  - b) Leadership Styles
  - c) Pre-qualification for the selection of contractors
  - d) Scrap Value and Salvage value

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**Subject: - Construction Management (CE754)**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt **All** questions.
- ✓ The figures in the margin indicate **Full Marks**.
- ✓ Assume suitable data if necessary.

1. a) Define client and discuss the role of a client during pre tender stage. [4]  
b) What is time-cost trade off? Explain the use of time cost trade off with example. [6]
2. a) What do you mean by ABC classification of materials? Discuss importance of material management. [5]  
b) Discuss with examples cash-flow management during construction of project. [5]
3. a) Write advantages and disadvantages of using equipment in construction work. [5]  
b) Write short notes on grader and dragline. [5]
4. a) Name types of contract and discuss the use of BOOT contracts the context of Nepal. [6]  
b) What is pre-qualification of contractor's and why it is necessary. [4]
5. a) Describe the types of maintenance in a project and explain the importance of maintenance of already built projects. [6]  
b) What is communication in a project? Discuss its importance. [4]
6. a) What are different types of specification you are aware of rite the importance of specification. [6]  
b) Discuss the use of earned value analysis's for performance control in a project. [4]
7. a) What is valuation? Write different methods of valuation. [6]  
b) What is material handling system and why is it useful in construction work. [4]

**OR**

Discuss most important two roles each of client, consultant and contractor. [4]

8. Write short notes on: (any two) [5×2]
  - i) National building code
  - ii) Advantage and disadvantage of centralization
  - iii) Labor productivity control

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| Exam.       | Back    |            |        |
|-------------|---------|------------|--------|
| Level       | BE      | Full Marks | 80     |
| Programme   | BCE     | Pass Marks | 32     |
| Year / Part | IV / II | Time       | 3 hrs. |

**Subject: - Construction Management (CE754)**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt any **Eight** questions.
- ✓ **All** questions carry equal marks.
- ✓ Assume suitable data if necessary.

1. a) Elaborate the scope of construction management. Explain different phases on construction project life cycle with characteristics of each phase.  
b) What is tender notice? Enlist the task for a contractor during submission of tender.
2. a) What is time-cost trade off? Explain its importance for fixing duration of a construction work.  
b) Explain the terms: inventory, inventory cost, EOQ, cycle time, lead time, re-order level, good in transit, safety stock.
3. a) What are the factors that govern the selection of particular equipment in construction project? Explain.  
b) Explain any two earth moving equipments in details with their suitable uses. Make sketches of them.
4. a) Make differences between contract and agreement. Discuss turnkey and BOOT contract briefly.  
b) What is tender document? Explain the pre-qualification and post-qualification of a contractor with their pros and cons.
5. a) Explain labor productivity and equipment productivity. How can they improve?  
b) Chino company of China has planned to prepare a Subgrade for Koteshower to Kalanki road of 8.7km length to be accomplished within 1.5 years at cost of Rs 1.5million per kilometer. The data were taken after 6 month of the commencement of the work, the work found to be of only 2.3km completed by expanding 4.6 million rupees. Perform EVA and draw your conclusion regarding the Chinese performance in Nepalese domain by calculating each component of EV.
6. a) What are the key responsibilities of a civil engineer in a hydropower project site? Explain the terms: record keeping, site order book, muster roll, measurement book.  
b) Enunciate different types of maintenance. Discuss "preventive maintenance is better than corrective maintenance".
7. a) "Effective and timely communication is like blood in any organization". elaborate on the ground of personnel management.  
b) Discuss the types of specification. What are the importance of specification and discuss different elements used in writing a detailed specification?

8. a) Explain importance of specification and valuation. What are the different methods of working out the valuation of property?
- b) A RCC framed structure building having estimated future life 80 years, fetches a gross annual rent of Rs 2220 per month. Work out its capitalized value on the basis of 6% net yield. The rate of compound interest for sinking fund may be taken 4%. The land Plot of above building measures 1400 sqm and cost of land may be taken to be Rs.120 per sqm. The other Outgoing are: (i) Repair and maintenance  $1/12^{\text{th}}$  of the gross income (ii) Municipal taxes and Property tax 25% of gross income (iii) Management and Miscellaneous charges 7% of gross income.

9. Write short notes on:

- i) ABC classification in material management
- ii) Cash flow management in a construction project

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| Exam.       | Regular |            |        |
|-------------|---------|------------|--------|
| Level       | BE      | Full Marks | 80     |
| Programme   | BCE     | Pass Marks | 32     |
| Year / Part | IV / II | Time       | 3 hrs. |

**Subject: - Construction Management (CE 754)**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt **All** questions.
- ✓ The figures in the margin indicate **Full Marks**.
- ✓ Assume suitable data if necessary.

1. a) Write down the function of construction project management in context of Nepal as Nepal needed more infrastructure planning and development. [4]
- b) The details of a project are shown below. If the indirect cost per week is Rs. 300, find the optimal crashed result of the project network. [6]

| Activity | immediate<br>Predecessor(s) | Time (Weeks) |       | Cost (Rs.) |       |
|----------|-----------------------------|--------------|-------|------------|-------|
|          |                             | Normal       | Crash | Normal     | Crash |
| A        | -                           | 7            | 4     | 1800       | 2100  |
| B        | -                           | 9            | 7     | 3500       | 3800  |
| C        | B                           | 5            | 4     | 2500       | 2625  |
| D        | A                           | 8            | 5     | 4000       | 4225  |
| E        | C                           | 9            | 8     | 3000       | 3325  |
| F        | B                           | 11           | 11    | 3000       | -     |

2. a) Explain about ABC classification of construction material graphically. How the value of a construction materials can be analysed on the basis of value engineering? Discuss it. [3+3]
- b) Write down the factors to be considered for deciding the extent of mechanisation of construction project. Write short notes on equipment used for highway and pavement construction. [4+4]
3. a) Name contract types and reimbursable contract. Write down the activities to be carried out as preparation before inviting tendering. [4+4]
- b) List down the various components for site preparation, and prepare a typical arrangement facilities of a building construction project in Urban area of Nepal. [4]
4. a) Define material productivity and write down the basic reasons for material productivity control in construction project. [4]
- b) Explain and differentiate between site order book and measurement book. What is muster roll and why it is important? [2+2]
5. a) Write down the objectives of the maintenance. Explain in details about planning and scheduling of maintenance in project maintenance. [2+3]
- b) Define personnel management. Write down the steps of personnel selection in any organisation. [2+4]

6. a) Why specification is important in construction contracts? Write down the specification for Stone masonry work in 1: 6 mortar. [2+4]
- b) Why regulatory requirements are needed in any construction project? How building codes of any country helps in effective urban planning, explain it. [4]

**OR**

Discuss about safety requirements in a construction site.

7. Define value of any property and what is to be satisfied by any property to have its value. A person desire to sale his property having details as: Gross rent = Rs 5000 per month, total outgoings = 25% of gross rent, estimated future life = 35yrs, area of land = 200 m<sup>2</sup>, estimated value of Land = Rs 2000 per square meter. Determine the fare value of property. Take rate of interest on capital as 10% and rate of redemption of capital as 5%. Assume suitable data, if required. [1+6]
8. Write short notes on: (Any two) [2×4]
- a) Pre-bid meeting
  - b) Methods of valuation of properties
  - c) Material handling system
  - d) BOOT

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| Exam.       | New Back (2066 & Later Batch) |            |        |
|-------------|-------------------------------|------------|--------|
| Level       | BE                            | Full Marks | 80     |
| Programme   | BCE                           | Pass Marks | 32     |
| Year / Part | IV / II                       | Time       | 3 hrs. |

**Subject:** - Construction Management (CE754)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. a) Discuss on scope of construction management and project life cycle and phases. [6]
- b) Explain ABC classification of Construction material. Discuss inventory planning process for repetitive material. [6]
2. a) Consider the data of a project as shown in table below: [6]

| Activity | Immediate Predecessor | Normal time (Week) | Normal Cost (Rs.) | Crash Duration (Week) | Crash Cost (Rs.) |
|----------|-----------------------|--------------------|-------------------|-----------------------|------------------|
| A        | -                     | 8                  | 2000              | 5                     | 2300             |
| B        | -                     | 10                 | 4000              | 8                     | 4300             |
| C        | A                     | 6                  | 3000              | 5                     | 3125             |
| D        | A                     | 9                  | 5000              | 6                     | 5225             |
| E        | B                     | 10                 | 2500              | 9                     | 2700             |
| F        | B                     | 13                 | 5000              | 13                    | -                |
| G        | D, E                  | 5                  | 1000              | 3                     | 1700             |

If the indirect cost per week is Rs. 3000, find the optimal crashed project completion time and corresponding minimum cost.

- b) Explain different types of leadership styles. [4]
3. a) Discuss the importance of specification in construction work. Write down detailed specification for cement sand mortar 1:6. [6]
- b) Name types of contract and explain the content of tender document. [6]
4. a) Differentiate between cost and value. Explain different factors affecting valuation of property. [6]
- b) A building having a cubic of  $1500 \text{ m}^3$  was constructed 15 years ago on a free hold land measuring  $1000 \text{ m}^2$ . The building fetched a rent of Rs.12000 per month. What amount will you recommend for advancing a loan on a property against the Mortgage, if the rate of land in that area is Rs. 700 per sq meter? The building has following expenditure headings:
  - Insurance premium Rs. 6000 per annum
  - Repair and maintenance 8% of gross rent
  - Taxes 25% of gross rent
  - Management collection charges 5% of gross rent
  - Redemption of capital is 5%

[6]

5. a) Explain the merits and demerits of using equipments. What are the points that should be consider while selecting appropriate equipment? [6]
- b) List the different type of equipments for concrete construction with their function. Explain briefly. [6]
6. a) Explain the importance of work scope control and material productivity control in construction project. [6]

**OR**

What is cash flow and how do you prepare it? Explain its importance.

- b) Explain project maintenance and its objective. Differentiate different types of project maintenance. [6]
7. Write short notes on: (any two) [2×5]
- a) Measurement book and Muster roll
- b) Use of Building code and Quality Control
- c) Importance of communication
- d) Pre-qualification of contractors

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| Exam.       | Regular |            |        |
|-------------|---------|------------|--------|
| Level       | BE      | Full Marks | 80     |
| Programme   | BCE     | Pass Marks | 32     |
| Year / Part | IV / II | Time       | 3 hrs. |

**Subject: - Construction Management (CE754)**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt **All** questions.
- ✓ **All** questions carry equal marks.
- ✓ Assume suitable data if necessary.

1. Write the various phases of project life cycle. Discuss the relation between Client, Consultant and Contractor in a construction project.
2. Explain the importances and steps of construction planning and scheduling. Write the application of value engineering in the procurement of construction materials.
3. Write the factors to be considered in the selection of appropriate construction equipment. Explain equipment for excavation and equipment for compaction.
4. a) Define Tender Notice and write the essential information that should be included in a Tender Notice.  
b) Explain the concept of time cost trade off in determining duration of contract.
5. Explain the points to be dealt in financial management and cash flow management by a manager in a construction project. Explain how a manager takes decision in controlling project with "earned value analysis"?
6. Write the responsibilities of 'site engineer' while supervising the work of a contractor. Justify the statement 'prevention maintenance is better than corrective maintenance'. Explain the importance of communication in construction project.
7. a) State the purpose of specification and write the techniques of specification writing.  
b) Write various methods of valuation of properties and elaborate concept of depreciations.
8. Write short notes on: (any two)
  - i) Material handling system
  - ii) Leadership styles
  - iii) Measurement book
  - iv) Material productivity control

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| Exam        | New Back (2066 & Later Batch) |            |        |
|-------------|-------------------------------|------------|--------|
| Level       | BE                            | Full Marks | 80     |
| Programme   | BCE                           | Pass Marks | 32     |
| Year / Part | IV / II                       | Time       | 3 hrs. |

**Subject: - Construction Management (CE754)**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt **All** questions.
- ✓ The figures in the margin indicate **Full Marks**.
- ✓ Assume suitable data if necessary.

1. a) Define construction project management. Explain what relation between construction team (client, consultant and contractor) should be in construction project in order to complete project within schedule time and cost. [1+4]
- b) Explain necessity of construction planning. Write in details about construction planning in a construction project to be carried out by a contractor in context of Nepalese Construction. [2+6]
2. a) Explain the concept of material handling. What is cash flow management? [3+3]
- b) What are the factors to be taken into consideration while selecting cranes for lifting of materials? Write short notes on (i) Grader (ii) Equipment in tunnel construction. [4+4+4]
3. a) Define bid security in contract and explain its use. Mention what are the essential informations to be provided for advertising tender notice in media. [4+4]
- b) Explain the necessity of site surveying and preparation in construction project. List out components of site preparation. [3]
4. a) Discuss how the performance control is carried out using earned value analysis explaining each terms used in earned value analysis. [4]
- b) Differentiate between running bills and final bills. What is site order book? [2+2]
5. a) Explain the term planning and scheduling of maintenance. Explain and differentiate between preventive and corrective maintenance giving suitable examples. [4]
- b) Define personal management. How an effective information system helps for quality decision making process, explain it. [4]
6. a) Write down the steps of personal selection in any organization. Discuss leadership styles. [3+3]
- b) Explain with examples why international standards are used in drafting of specification. Write down the specification paragraphs for first class brick works in cement mortar of 1:4. [2+4]
7. Discuss with examples about the factors affecting the value of the property. The annual sinking fund of concrete vibrating machine costing Rs.50,000 is Rs.150 and its salvage value is estimated to be Rs.5,000 only. Assuming interest rate as 4%. Determine the useful life of the machine. Assume suitable data if required. [2+4]
8. Write short notes on: (any two) [2×2]
  - a) ABC classification of construction materials
  - b) Product quality control
  - c) Time cost trade off
  - d) Building codes and quality control

| Exam.       | Regular / Back |            |            |
|-------------|----------------|------------|------------|
|             | Level          | BE         | Full Marks |
| Programme   | BCE            | Pass Marks | 32         |
| Year / Part | IV / II        | Time       | 3 hrs.     |

**Subject: - Construction Management (CE754)**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. What are the characteristics of Construction Project? Explain. [4]
2. Explain time cost trade off with example. [6]
3. What is material wastage standard? Describe the application of value engineering in procurement of material. [6]

**OR**

Define economic order quantity. Calculate EOQ and reorder point if rebar required is 1000 tonnes; Ordering Cost is Rs. 10,000; Carrying Cost is 15%, rebar rate is Rs. 90,000 per tonne; Safety Stock is 50 tonnes; lead time is 4 day and consumption per day is 50 tonnes.

4. a) Discuss the methods of tunnel excavation. [6]
- b) Discuss Batching and Mixing plant. [6]
5. Classify contract based on payment. Explain lump sum contract and cost plus contract. [2+2+4]
6. Prepare a typical job layout of a Building Project. [4]
7. Define work scope control. Discuss earned value analysis with example. [2+4]
8. Explain procedure to prepare Bills. [4]
9. Describe the types of maintenance in project. [4]
10. Define leadership. What are the characteristics of good leader? Which style is better? [1+3+2]
11. What are the causes of accidents in construction project? How it can be minimized? [2+2]
12. Explain the importance of specification. Write a detailed specification of brick work in cement sand mortar. [3+5]
13. Calculate the value of a building built 10 years ago having a plinth area of 450 sqm, constructed in the land of 1000 sqm. Current market value of land is Rs. 15,000 per sqm and rate of building is Rs. 30,000 per sqm. Assume suitable data if necessary. [8]

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| Exam.       | BE      | Regular    |        |
|-------------|---------|------------|--------|
| Level       | BE      | Full Marks | 80     |
| Programme   | BCE     | Pass Marks | 32     |
| Year / Part | IV / II | Time       | 3 hrs. |

**Subject: - Construction Management (CE754)**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. Write short notes on (Any Three only) [3×4]
  - (a) Tower Cranes
  - (b) Tunnel excavation by Blasting
  - (c) Concrete Batching Plants
  - (d) Road pavers
2. Write short notes on (Any Four only) [4×3]
  - (a) Responsibilities of Site Engineer
  - (b) Measurement Book
  - (c) Safety Requirements
  - (d) Building Codes
  - (e) Diagnostic Maintenance
  - (f) Importance of Maintenance
3. (a) Explain the importance of Specifications in Construction Works [4]  
(b) Write a note on the art and science of writing Specifications covering following aspects [6]
  - (i) Necessity of specification
  - (ii) Procedure of drafting
  - (iii) What to write and what to avoid in writing.
4. (a) Explain the situation where the following method of valuation will be used [3]
  - (i) Cost based method
  - (ii) Plinth area method
  - (iii) Development method  
(b) Work out the valuation of a Cinema hall with the following data [5]
  - (i) Cost of land = Rs. 15,00,000
  - (ii) Gross income = Rs. 90,00,000
  - (iii) Expenses undergone per year to run the Cinema including Staff salary, electricity charges, municipal taxes stationery and printing etc. 30 % of gross income.
  - (iv) Repair and maintenance of machinery, plant and equipment at 5 % of their capital cost which is Rs. 55,00,000
  - (v) Sinking fund for machinery, plant and equipment whose life is estimated as 25 years at 5 % after allowing 10 % Scrap value.
  - (vi) Insurance premium is Rs. 60,000 per annum.

Assume year's purchase for 60 years at 8 % and redemption of capital at 4 % and repair of hall at 2 % of gross income.
5. (a) Discuss on scope of construction management and Project life cycle phases. [5]  
(b) Discuss on Time cost Trade-off with examples and steps in planning. [5]
6. Write short notes on (Any Three only) [4×4]
  - (a) ABC Classification of materials.
  - (b) Material inventory.
  - (c) Types of contract
  - (d) Financial management
  - (e) Prequalification of contractor
7. Write short notes on (Any three only) [3×4]
  - (a) Performance control using EVA
  - (b) Labor productivity control
  - (c) Leadership styles
  - (d) Motivating and directing

| Exam.       | New Back (2066 & Later Batch) |            |        |
|-------------|-------------------------------|------------|--------|
| Level       | BE                            | Full Marks | 30     |
| Programme   | BCE                           | Pass Marks | 32     |
| Year / Part | IV / II                       | Time       | 3 hrs. |

**Subject: - Construction Management (CE754)**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. Define Consultant. Explain the role of Consultant in maintaining the quality of Construction works. [1+3]
2. Why do you prefer Bar Chart as planning tool? Explain pretender Stage Planning by contractor in Detail. [2+4]

OR

Calculate Minimum Cost and Minimum Duration Schedule using time cost Trade-off analysis of the project with following detail. Indirect cost is Rs. 1000 per day. [6]

| Activity | Predecessor | Normal Duration | Crash Duration | Normal Cost | Crash Cost |
|----------|-------------|-----------------|----------------|-------------|------------|
| A        | -           | 5               | 2              | 5000        | 6200       |
| B        | A           | 4               | 3              | 6000        | 7000       |
| C        | A           | 3               | 2              | 5000        | 6500       |
| D        | A           | 6               | 4              | 4000        | 4400       |
| E        | B           | 5               | 3              | 15000       | 18000      |
| F        | D           | 4               | 2              | 3000        | 4800       |
| G        | C,E, F      | 6               | 3              | 8000        | 10400      |

3. Define A, B and C category of materials. Calculate Economic Order Quantity of Cement with following details; Total Quantity = 12000 bags;  $C_i=15\%$ ,  $C_o=10000$ ;  $P = 750$  Rs. per bag. [3+3]
4. What are the disadvantages of using equipment in Construction sites? List out construction equipment used in hydropower and explain any two of them with sketches. [2+3+5]
5. What is BOOT Contract? Explain its importance in Developing Countries like Nepal [2+4]
6. Why cash flow management is necessary for a contractor. Draw a typical cash flow estimate of a contractor showing the most critical stage. [2+3]
7. What are the reasons of excessive material wastage during usage? Explain its preventive measures. [3+3]

or

Perform earned value analysis of a project with five activities as given below. Progress was evaluated at the end of 5th day. [6]

| Activity | Cost   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|----------|--------|---|---|---|---|---|---|---|---|
| A        | 6,000  | ■ | ■ | ■ | ■ | ■ |   |   |   |
| B        | 15,000 |   | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| C        | 10,000 |   |   | ■ | ■ | ■ | ■ | ■ | ■ |
| D        | 4,000  |   |   |   |   | ■ | ■ | ■ | ■ |

| At the end of 5 <sup>th</sup> day | % Complete | Actual Cost |
|-----------------------------------|------------|-------------|
| A                                 | 100%       | 7000        |
| B                                 | 55%        | 7500        |
| C                                 | 40%        | 3600        |
| D                                 | 0%         | ×           |

Also comment on the performances.

8. What are the responsibilities of site Engineer in construction site? Explain procedures to prepare bills. [3+3]
9. "Prevention is better than cure" Elaborate it with reference to preventive and corrective maintenance [4]
10. Explain various types of leadership and their suitability in construction projects in Nepal. [6]
11. Why insurance is necessary during construction? Explain. [4]
12. Differentiate between general and detailed specification. Write detailed specification for brick work in 1:4 cement sand mortar. [2+7]
13. Define valuation. What are the purposes of valuation? Explain the factors affecting value of the property [2+3+3]

Or

Workout the value of a Cinema hall from the following data. [8]

- i) Cost of Land = Rs 5 crore
- ii) Gross income = Rs. 2 crore
- iii) Operating Cost = 40% of Gross income
- iv) Repair and Maintenance of machineries = 5% of Capital Cost where capital cost is Rs. 40 lakh
- v) Repair of Hall = 5% of Gross income
- vi) Sinking fund for machineries whose life is estimated 25 years @ 4% after allowing 10% scrap value.
- vii) Insurance premium = Rs 50000 per year
- viii) Assume years purchase for 60 years at 8% and redemption of capital at 10%.

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| Exam.       | Regular / Back • |            |        |
|-------------|------------------|------------|--------|
| Level       | BE               | Full Marks | 80     |
| Programme   | BCE              | Pass Marks | 32     |
| Year / Part | IV / II          | Time       | 3 hrs. |

**Subject:** - Management of Construction and Maintenance (EG776CE)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt any **Five** questions.
- ✓ The figures in the margin indicate **Full Marks**.
- ✓ Assume suitable data if necessary.

1. a) Explain the importance of specification in construction work. Write down the main techniques that you follow for writing specification. [4+4]
- b) Write detailed specification of: [4+4]
  - i) RCC with M20 concrete in column
  - ii) Brick work in 1: 6 cement sand mortar
2. a) What are the responsibilities of site engineer in construction work? Explain the relationship between owner, contractor and consultants. [4+4]
- b) Explain about the process for evaluation of tender and selection of contractor. [8]
3. a) Discuss about the different equipments for tunnel construction. [8]
- b) Enlist the equipment for highway construction and explain any two of them with sketches. [2+6]
4. a) What is job layout? Discuss various factors to be considered in construction site planning. [2+6]
- b) "Preventive maintenance is better than the corrective maintenance". Do you agree with this statement? Explain with suitable example. [8]
5. a) For the activities lying on the critical path of a network, the normal duration and the crash duration along with their respective direct cost are given in the table. [8]

| Activity | Normal duration | Normal cost (Rs) | Crash duration | Crash costs (Rs) |
|----------|-----------------|------------------|----------------|------------------|
| 1-2      | 2 days          | 50               | 1 day          | 75               |
| 2-3      | 4 days          | 160              | 3 days         | 225              |
| 3-5      | 9 days          | 270              | 6 days         | 350              |
| 5-6      | 5 days          | 100              | 4 days         | 250              |

The overhead indirect cost is Rs.30/- per day. Crashing is possible for 1 day for each of the activities 1-2, 2-3, and 5-6 and 3 days for activity 3-5. Find the lowest cost schedule by crashing step by step assuming no fresh critical path is developed on crashing a project.

- b) Among CPM, PERT and bar chart which planning tool do you prefer for building construction? Explain. [8]
6. Write short notes on: (any four) [4×4]
  - a) Process of material procurement
  - b) Purchase or lease of equipment
  - c) Fayol's principles of management
  - d) Maslow's theory of motivation
  - e) Importance of record keeping
  - f) Balance sheet