Name : ....

Roll No. : ....

Invigilator's Signature : ....

CS/B.TECH(CHE)/SEM-7/CHE-703/2011-12

2011

PROJECT ENGINEERING

Time Allotted : 3 Hours   *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words

as far as practicable.

GROUP – A
### (Multiple Choice Type Questions)

1.   Choose the correct alternatives for any *ten* of the following :

$10 \times 1 = 10$

   i)   Book value of a property

   a)   is the worth of the property in the market

   b)   is the worth of the property as shown in the owner's accounting records

   c)   is independent of time

   d)   cannot be predicted without experimental determination.

   ii)   Interest on depreciation fund is taken into consideration in

   a)   D.B. method

   b)   sum-of-the-year-digit method

   c)   Sinking fund method.

iii) Meaning of capitalized cost of equipment is

    a) present worth value of the equipment

    b) highest market value of the equipment

    c) price of a completely installed equipment

    d) sum of the original cost and present value of renewable perpetuity.

iv) In a chemical process plant the raw materials lose substantial weight during processing. Such a plant should be located

    a) close to the market

    b) close to raw material source

    c) half-way between market & raw material source

    d) none of these.

v) Effect of interest on depreciation fund is considered by

    a) sinking fund method

    b) sum-of-the-year-digit method

    c) declining balance method

    d) straight line method.

vi) An equipment can no longer render the service for which it was designed. The profit obtainable from disposal of the equipment is called

    a) salvage value   b) scrap value

    c) book value   d) none of these.

vii) IRR may be considered as

    a) interest rate at which money is available from a bank

    b) maximum interest rate at which capital can be borrowed to finance a proposed project

    c) minimum interest rate at which capital can be borrowed to finance a proposed project

    d) none of these.
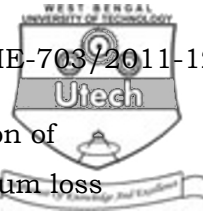
viii) Break-even point represents the condition of

    a)   maximum profit   b)   maximum loss

    c)   minimum loss   d)   no profit-no loss.

ix)   Optimistic time for an activity is

    a)   the shortest possible time in which the activity can be completed

    b)   the largest time required to complete the activity

    c)   average time required to complete the activity

    d)   none of these.

x)   The float for an activity on the critical path is

    a)   infinity   b)   always positive

    c)   zero   d)   none of these.

xi)   Capitalized cost of an equipment is

    a)   installed equipment cost

    b)   delivered equipment cost

    c)   total fund required to use the equipment for infinite time

    d)   none of these.

xii) Accounts receivable is a component of

    a)   fixed capital investment

    b)   working capital investment

    c)   raw material cost

    d)   none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following   3 × 5 = 15

2. Define depreciation. Classify the different depreciation calculation methods.

3. A piece of equipment originally costing $ 40,000 was put into use 12 years ago. At the time of equipment was put into use the service life was estimated to be 20 years and the salvage and the scrap value at the end of the service life were assumed to be zero. On the basis of a straight line depreciation fund was set up. The equipment can now be sold for $ 10,000 and a more advanced model can be installed for $ 55,000. Assuming the depreciation fund is available for use, how much new capital must be supplied to make the purchase ?

4. Derive the relation between amount of ordinary annuity and the periodic payments.

5. What are the advantages and disadvantages of Gantt chart ?

6. The total cost for a particular operation is given by the following equation :

   Total cost (C_T) = 2·33 x + 11900 / xy + 1·86 y + 10, where x and y are two variables. Determine the optimum cost for the operation.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. What are the different methods for determining depreciation ? Deduce the Matheson formulae for textbook declining method. Explain the Sinking fund method for depreciation calculation. 3 + 5 + 7

8. A plant is to be designed to produce 22500 kg of caustic soda per 24 hour day. The process requires concentration of a water-caustic soda liquor containing 5 per cent by weight of caustic soda to 40% by weight. A single effect or a multiple effect evaporator may be used, and a single effect evaporator of required capacity needs an initial investment of Rs. 18 lakh. The same investment is required for each additional effect. The service life is estimated to be 10 years and salvage value of each effect at the end of service life is estimated to be Rs. 6 lakhs. Annual fixed charges other than depreciation amount to 20 per cent of initial investment. Steam costs Rs. 60 per 1000 kg and administrative, labour and miscellaneous costs are Rs. 4,000 per day, no matter how many evaporator effects are used. 0·9 N kg of water is evaporated per kg of steam fed, where N is the number of evaporator effects. There are 300 operating days in a year. If the minimum acceptable return on any investment is 15%, how many effects should be used ?

9. a) Derive an expression for annual depreciation cost by sinking-fund method in terms of original cost, service life, salvage value at the end of service life and interest rate. Also find the book-value at the end of ath year.

b) The initial installed cost of a new equipment is Rs. 5·0 lakhs and its salvage value at the end of service life of 10 years is estimated to be Rs. 1·0 lakh. After the equipment has been in use for 4 years it is sold for Rs. 3·5 lakhs. The company which originally owned the equipment employs straight line method for determining depreciation costs. If the company had used an alternative method (declining balance method) for determining depreciation costs, the book value of the equipment at the end of 4 years would have been Rs. 2,62,000. The income tax rate for the company is 48 per cent of all gross earnings. Capital-gains taxes is 25 per cent of the gains. How much net savings after taxes would the company had achieved by using the alternative depreciation method instead of straight line depreciation method ? 7 + 8
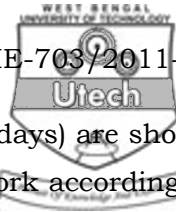
10. For the network the three time estimates (in days) are shown in the figure. Number the events in the network according to the Fulkerson's rule in the steps of 10. If the schedule completion time is 48 days, determine the slack time for each event and identify the critical path. Enter the values in a tabular form.
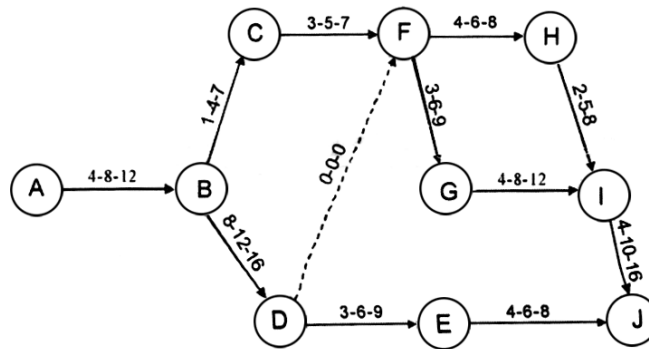
11. Write short notes on any *three* of the following :   3 × 5

    a) Hazop Study

    b) Chi-square method in statistical technique

    c) Replacement & Alternative Investment

    d) Least Square Method

    e) Capitalized cost.

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