

Operation Research

9:00am to 11:00am

Semester – II

June 13, 2010

SECTION A (ONE MARKS)

(1) .Which of the given point is not included in the guidelines to construct dual problem?

(a) the coefficients c_1, c_2, \dots, c_n in the objective function of the primal become b_1, b_2, \dots, b_m in the objective function of the dual

(b) the maximization problem in the primal becomes a minimization problem in the dual and vice versa

(c) Both a and b

(d) None of the above

Answer : C

(2) What is the importance of duality concept of LPP?

(a) if the primal contains a large number of constraints and a smaller number of variables, the labor of computation can be considerably reduced by converting it into the dual problem

(b) the interpretation of the dual variable from the lost proves extremely useful; in making future decisions in the activities being programmed.

(c) Both a and b

(d) None of the above

Answer : C

(3) What is the basic features of two phase method?

(a) formulate the new problem by eliminating the original objective function by the sum of the artificial variables for a minimization problem

(b) the resulting objective function is optimized by the simplex method with the constraints of the original problem

(c) Both a and b

(d) None of the above

Answer : C

(4) What is the key features of canonical form are?

(a) all decisions variables is non-negative

(b) all constraints is of $<$ type

(c) the objective function is of the maximization type

(d) all of the above

Answer : D

(5) In linear programming problems may have:

(a) no solutions

(b) a unique optimal solution

(c) an unbounded solution

(d) all of the above

Answer : A

(6) The output in the linear programming may be measured in the form of;

(a) profits

- (b) costs
(c) Both a and b
(d) None of the above

Answer : C

(7) Linear programming can be used for optimization problems if the following conditions are satisfied?

- (a) must be a well defined objective function
(b) must be alternative courses of action
(c) must be constraints on the amount
(d) all of the above

Answer : D

(8) The other name of the simplex method of operations research?

- (a) simplex technique
(b) simplex algorithm
(c) Both a and b
(d) None of the above

Answer : C

(9) What is the key advantages of LPP?

- (a) helps in attaining the optimum use of productive factors
(b) improves the quality of decisions
(c) can go a long way in improving the knowledge
(d) all of the above

Answer : D

(10) What is the advantages of the revised simplex method?

- (a) data can be recorded in lesser space
(b) there is less accumulation of round-off errors
(c) helpful in understanding the advanced topics in linear programming
(d) all of the above

Answer : D

(11) Which of the following is included in the operation research approach to problem solving?

- (a) validation of the model
(b) definition of the problem
(c) Both a and b
(d) None of the above

Answer : C

(12) The variables which have assigned value zero initially are called_____.

- (a) basic variables
(b) non-basic variables
(c) Both a and b
(d) None of the above

Answer : B

(13) .What is the various ways by which the nature of variables may be changed?

- (a) by treating a variable as constant
(b) by treating a discrete variable as continues

- (c) Both a and b
(d) None of the above

Answer : C

- (14) What is the key approximation of any given model in the operations research?
(a) aggregating certain variables
(b) omitting certain variables
(c) modifying constraints
(d) all of the above

Answer : D

- (15) They is one-time decisions models.
(a) static model
(b) dynamic models
(c) general models
(d) All of the above

Answer : A

- (16) The product of an environment of risk and uncertainty.
(a) deterministic model
(b) probalistic model
(c) general model
(d) specific model

Answer : B

- (17) Which of the following field is not included in the scope of operations research?
(a) agriculture sector
(b) defense operations
(c) industrial management
(d) None of the above

Answer : D

- (18) What is the various ways by which the classification of models is done?
(a) by structure
(b) by function
(c) by degree of abstraction
(d) all of the above

Answer : D

- (19) What is the key objective functions of operations research?
(a) maximization of overtime
(b) minimization of cost
(c) minimization of resource utilization
(d) minimization of contribution or profit

Answer : B

- (20) What is the various constituents of mathematical model?
(a) Decision variables
(b) Objective function
(c) Constraints
(d) all of the above

Answer : D

- (21) Which of the following is correct in context of programming?
- (a) Planning
 - (b) Refers to the process of decision -making regarding particular plan of action
 - (c) Both a and b
 - (d) None of the above

Answer : C

- (22) Which of the following is the key features of Operations Research?
- (a) Use of computer
 - (b) Human factors
 - (c) Both a and b
 - (d) None of the above

Answer : C

- (23) Which of the following is included in the activities performed by various defense departments in the operations?
- (a) administration
 - (b) intelligence
 - (c) training
 - (d) all of the above

Answer : D

- (24) What are the steps involved in the use of finite queuing tables?
- (a) compute the service factor
 - (b) find mean service time T and mean running time U
 - (c) select the table corresponding to the population N
 - (d) all of the above

Answer : D

- (25) In a game, the strategy of a player may be:
- (a) pure strategy
 - (b) mixed strategy
 - (c) Both a and b
 - (d) None of the above

Answer : C

- (26) What is the point to be considered in saddle point of the game?
- (a) maximum pay-off in each column is boxed
 - (b) the minimum pay-off in each row of the pay-off matrix is circled
 - (c) Both a and b
 - (d) none of the above

Answer : C

- (27) What are the ways if marketing different brands of a commodity ?
- (a) providing cash discounts to consumers
 - (b) offering larger sales commission to dealers
 - (c) advertising through electronic media
 - (d) all of the above

Answer : D

What is the features of competitive game?

- (a) the number of players if finite
- (b) each player has finite number of courses of action
- (c) the game is said to be played when each player adopts one of his course of action
- (d) all of the above

Answer : D

(29) What is the various ways of campaigning for locations?

- (a) door to door
- (b) public meetings
- (c) Both a and b
- (d) None of the above

Answer : C

(30) Which of the following is defined as a collection of inter-related activities that must be completed in a specified time according to a specified sequence?

- (a) bridge
- (b) highway
- (c) power plant
- (d) all of the above

Answer : D

(31) What is the key maintenance policies ?

- (a) replace a bearing only when it fails
- (b) replace Both the bearings if one fails
- (c) replace the bearing which fails plus the other one if its has been in use for more than it's
- (d) all of the above

Answer : D

(32) What is the steps involved in the analysis of a queuing process?

- (a) preliminary study
- (b) evaluation of alternatives
- (c) implementation
- (d) all of the above

Answer : D

(33) Queuing theory is based on:

- (a) probability concepts give an indication of the capability of a given system
- (b) all the constraints of the process is not taken into account in the formulation of Queuing model
- (c) Both a and b
- (d) None of the above

Answer : C

(34) What all is included in the service facility in queuing process ?

- (a) availability of service
- (b) duration of service
- (c) number of service centers
- (d) all of the above

Answer : D

- (35) What is the key features of standard form of LPP?
- (a) the right hand side element of each constraint equation is non-negative.
 - (b) all variables is non-negative
 - (c) the objective function is of maximization
 - (d) all of the above

Answer : D

- (36) Which of the following does reflect the customer behavior?
- (a) reneging
 - (b) collusion
 - (c) balking
 - (d) all of the above

Answer : D

- (37) A two person zero-sum game is a game in which:
- (a) two players participate
 - (b) the gain of one player is the loss of the other
 - (c) Both a and b
 - (d) None of the above

Answer : C

(38) IPP is a special case of LPP where all or some variables are constrained to assume:

- (a) non-negative integer values
- (b) negative integer values
- (c) Both a and b
- (d) None of the above

Answer : A

(39) Testing of integrality of the optimum solution includes:

- (a) of the optimum solution contains all integer values , an optimum basic feasible integer solution has been obtained
- (b) if the optimum solution does not include all integer values then proceed onto next step
- (c) Both a and b
- (d) none of the above

Answer : C

- (40) What is the constraints of the traveling salesman problem?
- (a) only one directed arc may assigned to a specific k
 - (b) only one other cost may be reached from a scientific city i
 - (c) Both a and b
 - (d) None of the above

Answer : C

() SECTION B

(41) While expressing in the standard form , such constraints a non negative variable to each of

- (a) subtract
- (b) multiply
- (c) divide
- (d) add

Answer : D

(42) If non zero artificial variables is present in the final basic , then the program has solution.

- (a) infinite
- (b) less than two
- (c) no
- (d) None of the above

Answer : C

(43) A linear inequality in two variables is known as_____.

- (a) half plane
- (b) feasible region
- (c) Both a and b
- (d) None of the above

Answer : A

(44) The_____ of function is mathematically equivalent to the_____ of the negative expression of this function.

- (a) maximization, minimization
- (b) minimization, maximization
- (c) minimization, minimization
- (d) maximization, maximization

Answer : B

(45) Linear programming with_____decision variables can be analysed graphically.

- (a) 2
- (b) 8
- (c) 1
- (d) 4

Answer : A

(46) _____deal with idle resources such as men, machines and materials.

- (a) statistical techniques
- (b) inventory models
- (c) routing models
- (d) decision theory

Answer : B

(47) The judgment phase consists of:

- (a) formulation of relevant hypothesis and models
- (b) determination of the operation
- (c) prediction and generalization of results
- (d) observations and data collection for better understanding of the problem.

Answer : B

(48) _____defined the Operations Research as the application of scientific methods, techniques and tools to operation of a system with optimum solutions to the problems.

- (a) Churchman
- (b) Ackoff

- (c) both a and b
(d) None of the above

Answer : D

(49) _____ models explain the various operations in non-mathematical language and try to define the functional relationships and interactions between various operations.

- (a) predictive
(b) language
(c) normative
(d) descriptive

Answer : D

(50) Which of the following is included in the financial scope of the operations research?

- (a) product selection
(b) determination of optimum replacement policies
(c) bidding and replacement policies
(d) recruitment policies

Answer : B

(51) _____ refers to reevaluating actual progress against the plan.

- (a) project planning
(b) scheduling
(c) project control
(d) None of the above

Answer : C

(52) Game theory gained prominence only after_____.

- (a) 1935
(b) 1944
(c) 1910
(d) 1957

Answer : B

(53) A game is said to be fair if its value is_____.

- (a) one
(b) infinite
(c) zero
(d) two

Answer : C

(54) A game in which n players participate is called_____.

- (a) 2 person game
(b) N person game
(c) Rectangular game
(d) None of the above

Answer : B

(55) _____ strategy of a play is his predecision to adopt a specified course of action.

- (a) pure

- (b) mixed
(c) Both a and b
(d) None of the above

Answer : A

- (56) The simplest method of LPP is also called as_
(a) Big M-Method
(b) Penalty cost method
(c) Both a and b
(d) None of the above

Answer : C

- (57) The non-negative variable that has to be subtracted from a constraint inequality of the form $>$ to change it to an equation called_____.
(a) surplus variable
(b) slack variable
(c) Both a and b
(d) all of the above

Answer : A

- (58) Which of the following statement is correct?
(a) a network may include more than one critical path
(b) a non-critical activity cannot have zero total float
(c) Both a and b
(d) None of the above

Answer : A

- (59) What is the first phase of critical path caution called?
(a) forward pass
(b) backward pass
(c) Both a and b
(d) None of the above

Answer : A

- (60) What is the basic rules for constructing arrow diagram?
(a) each activity is represented by one and only one arrow in the network
(b) no two activities can be identified by the same head and tail events
(c) Both a and b
(d) None of the above

Answer : C

(C) SECTION C

- (61) Find the maximum and minimum value of $Z=2x+3y$ Subject to $x+y < 30$
 $x-y > 0$ $y > 3$ $0 < x < 20$ $0 < y < 12$
(a) $x=3, y=3$
(b) $x=4, y=3$
(c) $x=3, y=4$
(d) $x=4, y=4$

Answer : A

- (62) A firm engaged in producing 2 models i.e. Model A and Model B only 3 operations painting, assembly and testing. The relevant data is as follows: Unit Sale Price

Hours required for each unit Model A Rs. 50 1.0 0.2 0.0 Model BRs. 80
1.5 0.2 0.1 Total number of hours available each week is as under assembly
600, painting 100, and testing 30. The firm wishes to determine the weekly product mix as
to maximize revenue.

- (a) $1.0x_1 + 1.5x_2 < 600$
- (b) $0.2x_1 + 0.2x_2 < 100$
- (c) $0.0x_1 + 0.1x_2 < 0$
- (d) all of the above

Answer : D

(63) Arrange the following steps in the order as they are in the simple's algorithm?
(i) the optimal solution is obtained by assigning to each variable in the first
column (ii) replace the x variable in the pivot row (iii) locate the most negative number in
the last

- (a) iii, ii, i
- (b) i, iii, ii
- (c) ii, i, iii
- (d) None of the above

Answer : A

(64) The simplex method to solve the following LPP Maximize $z = 7x_1 + 5x_2$
Subject to constraints $x_1 + 2x_2 < 6$, $4x_1 + 3x_2 < 12$, $x_1, x_2 > 0$,

- (a) $x_1 = 3$
- (b) $x_2 = 0$
- (c) maximize $z = 21$
- (d) all of the above

Answer : D

(65) Apply simplex procedure to solve the LPP maximize $z = 3x_1 + 4x_2$ subject to
 $5x_1 + 4x_2 < 200$, $3x_1 + 5x_2 < 150$, $5x_1 + 4x_2 > 100$, $8x_1 + 4x_2 > 80$, $x_1 > 0, x_2 > 0$

- (a) $x_1 = 400/14$, $x_2 = 150/13$, $x_5 = 100$, $x_6 = 2760/13$
- (b) $x_1 = 300/14$, $x_2 = 150/13$, $x_5 = 100$, $x_6 = 2760/13$
- (c) $x_1 = 400/13$, $x_2 = 150/13$, $x_5 = 100$, $x_6 = 2760/13$
- (d) all of the above

Answer : C

(66) Arrange the following steps in the order as they are in scientific approach of
operations research:

(i) Problem to be analyzed (ii) hypothesis is formulated (iii) test the hypothesis
(iv) observations is made under varying conditions

- (a) i, iv, ii, iii
- (b) i, ii, iii, iv
- (c) iv, iii, ii, i
- (d) iii, iv, ii, i

Answer : A

(67) Arrange the following steps in the order as they are in the Hungarian method
of algorithm: (i) determine the effectiveness matrix (ii) check for optimality (iii) assign the
zero (iv) draw minimum number of lines

- (a) iii, i, ii, iv
- (b) iv, i, ii, iii
- (c) i, iii, ii, iv

(d) i,iii,iv,ii

Answer : C

(68) The tool company's quality control department is manned by a single clerk, who takes an average of 5 minutes in checking parts of each of the machines coming for inspection. The machines arrive once in every 8 minutes on the average. One hour of machine is valued at Rs. 15 and a clerk's time is valued at Rs. 4 per hour. What are the average hourly queuing system costs associated with the Quality Control Department?

- (a) Rs. 30
- (b) Rs. 45
- (c) Rs. 78
- (d) Rs. 29

Answer : D

(69) If it is needed to be 95% certain of being correct in an experiment with marginal error of 1% of the true value, what should be the sample size?

- (a) 9700
- (b) 9600
- (c) 8976
- (d) None of the above

Answer : B

(70) Which of the following is false statement?

- (a) a critical activity must have its total and free floats equal to zero
- (b) a non-critical activity cannot have zero total float
- (c) in a project network, a sequence of activities may form a loop
- (d) all of the above

Answer : C

(71) What is the basic features of CPM?

- (a) developed in connection with construction project which consisted of routine tasks
- (b) suitable for establishing a trade-off for optimum balancing between schedule time and cost of the project
- (c) used for projects involving activities of repetitive nature
- (d) all of the above

Answer : D

(72) Students arrive at the university according to a Poisson input process with a mean rate of 40 per hour. The time required to serve a student has an exponential distribution with a mean of 50 per hour. Assume that the students are served by a single individual, find the average waiting time of a student.

- (a) 5 mins
- (b) 4.8 mins
- (c) 7 mins
- (d) 10.45 mins

Answer : B

(73) New Delhi Railway Station has a single ticket counter. During the rush hours, customers arrive at the rate of 10 per hour. The average number of customers that can be served is 12 per hour. Find out the following probability that the ticket counter is free.

- (a) 25/6

(b) 1/7

(c) 6/25

(d) none of the above

Answer : A

(74) Students arrive at the university according to a Poisson input process with a mean rate of 30 per day. The time required to serve a student has an exponential distribution with a mean of 36 minutes. Assume that the students are served by a single individual, and queue capacity is 9. On the basis of this information, find the average line length.

(a) 5

(b) 12

(c) 2

(d) 6

Answer : C

(75) Universal Bank has two tellers working on savings accounts. The first teller handles withdrawals only. The second teller handles deposits only. It has been found that the service times distributions for both deposits and withdrawals are exponential with mean service time 2 minutes per customer. Deposits & withdrawals are found to arrive in a Poisson fashion with mean arrival rate 20 per hour. What would be the effect on the average waiting time for depositors and withdrawers, if each teller could handle both withdrawers & depositors?

(a) $\frac{1}{4}$ mins

(b) $\frac{1}{2}$ mins

(c) $\frac{1}{4}$ mins

(d) $\frac{1}{10}$ mins

Answer : A