

DU MPhil Phd in Operational Research

Topic:- DU_J18_MPHIL_OR

1) A suburban specialty restaurant has developed a single drive-thru window. Customers order, pay, and pick up their food at the same window. Arrivals follow a Poisson distribution, while service times follow an exponential distribution. If the average number of arrivals is 6 per hour and the service rate is 2 every 15 minutes, then the average number of customers in the system is

[Question ID = 1816]

1. 3.00 [Option ID = 7264]
2. 2.25 [Option ID = 7263]
3. 4.00 [Option ID = 7262]
4. 0.5 [Option ID = 7261]

Correct Answer :-

- 3.00 [Option ID = 7264]

2) A blueprint of the research work is called

[Question ID = 1836]

1. research problem [Option ID = 7341]
2. research tools [Option ID = 7343]
3. research methods [Option ID = 7344]
4. synopsis [Option ID = 7342]

Correct Answer :-

- synopsis [Option ID = 7342]

3) Which of the following functions are convex?

[Question ID = 1796]

1. $f_1(x)-f_2(x)$, where f_1 and f_2 are convex functions [Option ID = 7183]
2. $\sin x$ [Option ID = 7181]
3. $|x|$ [Option ID = 7182]
4. all of these [Option ID = 7184]

Correct Answer :-

- $|x|$ [Option ID = 7182]

4) Which of the following is a degenerate basic feasible solution to the following system of linear equations and inequalities?

$$x_1 + 2x_2 + x_3 = 3, 2x_1 + 4x_2 - x_4 + x_5 = 6, x_j \geq 0, j = 1, 2, \dots, 5$$

[Question ID = 1799]

1. $x_1=0, x_2=0, x_3=3, x_4=0, x_5=6$ [Option ID = 7193]
2. $x_1=3, x_2=0, x_3=0, x_4=0, x_5=0$ [Option ID = 7194]
3. $x_1=0, x_2=0, x_3=3, x_4=2, x_5=8$ [Option ID = 7195]
4. $x_1=0, x_2=1, x_3=0, x_4=0, x_5=0$ [Option ID = 7196]

Correct Answer :-

- $x_1=3, x_2=0, x_3=0, x_4=0, x_5=0$ [Option ID = 7194]

5) Qualitative research methods can be thought of as

[Question ID = 1842]

1. parallel with the physical sciences [Option ID = 7367]
2. a preliminary stage in the research which can contribute to the development of adequate quantification [Option ID = 7365]
3. methods used to search for the nature of reality [Option ID = 7366]
4. a stark alternative to quantitative research [Option ID = 7368]

Correct Answer :-

- a preliminary stage in the research which can contribute to the development of adequate quantification [Option ID = 7365]

6) When a hypothesis is stated negatively it is called

[Question ID = 1837]

1. null hypothesis [Option ID = 7347]
2. casual hypothesis [Option ID = 7348]
3. relational hypothesis [Option ID = 7345]
4. situational hypothesis [Option ID = 7346]

Correct Answer :-

- null hypothesis [Option ID = 7347]

7) In a recent survey, 80% of the community favored building a police substation in their neighborhood. If 15 citizens are chosen, then the standard deviation of the number favoring the substation is

[Question ID = 1829]

1. 0.55 [Option ID = 7314]
2. 0.98 [Option ID = 7316]
3. 2.4 [Option ID = 7315]
4. 1.55 [Option ID = 7313]

Correct Answer :-

- 1.55 [Option ID = 7313]

8) In an assignment problem, if there are n workers and n jobs, then there can be

[Question ID = 1797]

1. $(n!)^n$ assignments [Option ID = 7187]
2. $n!$ assignments [Option ID = 7185]
3. $(n - 1)!$ assignments [Option ID = 7186]
4. n assignments [Option ID = 7188]

Correct Answer :-

- $n!$ assignments [Option ID = 7185]

9) In a transportation problem, while improving an existing solution a loop may be defined as an ordered set of at least

[Question ID = 1807]

1. 3 cells [Option ID = 7222]
2. 8 cells [Option ID = 7226]
3. 6 cells [Option ID = 7228]
4. 4 cells [Option ID = 7224]

Correct Answer :-

- 4 cells [Option ID = 7224]

10) In a transportation cost matrix, if a row has four cost entries given as p,q,r, and s ($p \leq q \leq r \leq s$), then the penalty for such a row is

[Question ID = 1801]

1. $r - q$, if $p = q$ [Option ID = 7202]
2. $s - r$ [Option ID = 7204]
3. $s - p$ [Option ID = 7203]
4. 0, if $p = q$ [Option ID = 7201]

Correct Answer :-

- 0, if $p = q$ [Option ID = 7201]

11) In a balanced transportation problem with m origins and n destinations, the number of linearly independent constraints is

[Question ID = 1798]

1. $m \cdot n$ [Option ID = 7191]
2. $m + n$ [Option ID = 7189]
3. $m + n - 1$ [Option ID = 7192]
4. $m + n + 1$ [Option ID = 7190]

Correct Answer :-

- $m + n - 1$ [Option ID = 7192]

12) Sum of absolute deviations about median is

[Question ID = 1822]

1. maximum [Option ID = 7286]
2. zero [Option ID = 7285]
3. one [Option ID = 7288]
4. minimum [Option ID = 7287]

Correct Answer :-

- minimum [Option ID = 7287]

13) If $P(A)=1/3$, $P(B)=1/4$, $P(A|B)=1/6$, then probability $P(B|A)$ is equal to

[Question ID = 1823]

1. $1/8$ [Option ID = 7291]
2. $1/4$ [Option ID = 7289]
3. none of these [Option ID = 7292]
4. $3/4$ [Option ID = 7290]

Correct Answer :-

- $1/8$ [Option ID = 7291]

14) Scale in which the respondent directly compares two or more objects and makes choices among them is known as

[Question ID = 1840]

1. ranking scale [Option ID = 7357]
2. rating scale [Option ID = 7358]
3. none of these [Option ID = 7360]
4. graphic scale [Option ID = 7359]

Correct Answer :-

- ranking scale [Option ID = 7357]

15) UGC Stands for

[Question ID = 1844]

1. University Governance Council [Option ID = 7375]
2. University Grants Commission [Option ID = 7373]
3. Union Government Commission [Option ID = 7374]
4. Union Government Council [Option ID = 7376]

Correct Answer :-

- University Grants Commission [Option ID = 7373]

16) "Empirically verifiable observation" is termed as

[Question ID = 1841]

1. value [Option ID = 7362]
2. statement [Option ID = 7364]
3. fact [Option ID = 7363]
4. theory [Option ID = 7361]

Correct Answer :-

- fact [Option ID = 7363]

17) If a set of data has one mode and its value is less than mean, then the distribution is called

[Question ID = 1827]

1. normal [Option ID = 7308]
2. symmetrical [Option ID = 7307]
3. negatively skewed [Option ID = 7306]
4. positively skewed [Option ID = 7305]

Correct Answer :-

- positively skewed [Option ID = 7305]

18) A manufacturer produces switches and experiences that 2% switches are defective. The probability that in a box of 50 switches, there are at most two defectives is

[Question ID = 1825]

1. $2e^{-1}$ [Option ID = 7299]
2. $2.5e^{-1}$ [Option ID = 7297]
3. e^{-1} [Option ID = 7298]
4. e^2 [Option ID = 7300]

Correct Answer :-

- $2.5e^{-1}$ [Option ID = 7297]

19) If in a normal distribution $Q_1 = 54.52$ and $Q_3 = 78.86$, then median of distribution is

[Question ID = 1824]

1. 39.43 [Option ID = 7294]
2. 12.17 [Option ID = 7293]
3. none of these [Option ID = 7296]
4. 66.69 [Option ID = 7295]

Correct Answer :-

- 66.69 [Option ID = 7295]

20) To study the relationship of family size with income, a researcher classifies his population into different income slabs and then takes a random sample from each slab. Which sampling technique does he adopt? [Question ID = 1832]

1. stratified random sampling [Option ID = 7326]
2. systematic sampling [Option ID = 7328]
3. random sampling [Option ID = 7325]
4. cluster sampling [Option ID = 7327]

Correct Answer :-

- stratified random sampling [Option ID = 7326]

21) In APA style of citation, APA means

[Question ID = 1838]

1. American Publishing Association [Option ID = 7350]
2. American Publishing Authority [Option ID = 7352]
3. American Printing Association [Option ID = 7349]
4. American Psychological Association [Option ID = 7351]

Correct Answer :-

- American Psychological Association [Option ID = 7351]

22) Assuming that reliability of a mechanical device is defined by $R(t) = e^{-\lambda t}$, where $\lambda = 0.0004$ failures per hour, the Mean Time to Failure is

[Question ID = 1819]

1. 1100 hours [Option ID = 7275]
2. 2100 hours [Option ID = 7274]
3. none of these [Option ID = 7276]
4. 2500 hours [Option ID = 7273]

Correct Answer :-

- 2500 hours [Option ID = 7273]

23) Assume that the constant failure rates of tires 1, 2, 3, and 4 of a car are $\lambda_1 = 0.00001$ failures per hour, $\lambda_2 = 0.00002$ failures per hour, $\lambda_3 = 0.00003$ failures per hour, and $\lambda_4 = 0.00004$ failures per hour, respectively. For practical purposes, the car cannot be driven when any one of the tires punctures. The system Mean Time to Failure of the car with respect to tires is

[Question ID = 1820]

1. 10050 hours [Option ID = 7278]
2. 9999 hours [Option ID = 7279]
3. none of these [Option ID = 7280]
4. 10000 hours [Option ID = 7277]

Correct Answer :-

- 10000 hours [Option ID = 7277]

24) If the i-th slack variable of the primal linear programming problem is not zero, then

[Question ID = 1794]

1. the j-th dual constraint is satisfied as an equality [Option ID = 7175]
2. the j-th dual variable is zero [Option ID = 7173]
3. the j-th dual variable may be zero [Option ID = 7174]
4. none of these [Option ID = 7176]

Correct Answer :-

- none of these [Option ID = 7176]

25) If the first phase of the two-phase Simplex method terminates with a non-zero objective function value, then

[Question ID = 1793]

1. the given linear programming problem may have optimal solution [Option ID = 7171]
2. the given linear programming problem is unbounded [Option ID = 7169]
3. the given linear programming problem is feasible [Option ID = 7170]
4. dual of the given linear programming problem is either unbounded or infeasible [Option ID = 7172]

Correct Answer :-

- dual of the given linear programming problem is either unbounded or infeasible [Option ID = 7172]

26) If there is a tie in the "minimum ratio test" of the Simplex method, then the solution in the next tableau

[Question ID = 1795]

1. will be non-basic [Option ID = 7177]
2. will have an inferior objective value [Option ID = 7179]
3. will be degenerate [Option ID = 7180]
4. will not be feasible [Option ID = 7178]

Correct Answer :-

- will be degenerate [Option ID = 7180]

27) If total usage of the given item is 36000 units per year, the cost per order is Rs. 36, the costs of carrying inventory is 25% of the investment in the inventories, and the unit cost is Rs. 10, then the optimal order cycle time is

[Question ID = 1814]

1. 1 year [Option ID = 7254]
2. 0.978 year [Option ID = 7255]
3. 0.894 year [Option ID = 7253]
4. 2 years [Option ID = 7256]

Correct Answer :-

- 0.894 year [Option ID = 7253]

28) Quantitative research is a measure of

[Question ID = 1839]

1. feelings and numbers [Option ID = 7353]
2. numbers and opinions [Option ID = 7354]
3. numbers and figures [Option ID = 7355]
4. all of these [Option ID = 7356]

Correct Answer :-

- numbers and figures [Option ID = 7355]

29) When using the ABC classification for stock categorization, which of the following describes class C items? [Question ID = 1813]

1. high value, low risk [Option ID = 7250]
2. high value, high risk [Option ID = 7249]
3. low value, high risk [Option ID = 7251]
4. low value, low risk [Option ID = 7252]

Correct Answer :-

- low value, low risk [Option ID = 7252]

30) Usually confidence intervals are set at

[Question ID = 1843]

1. 95% [Option ID = 7371]
2. 55% [Option ID = 7372]
3. 100% [Option ID = 7370]
4. 5% [Option ID = 7369]

Correct Answer :-

- 95% [Option ID = 7371]

31) An alternate name for a Likert scale is

[Question ID = 1833]

1. Event sampling [Option ID = 7332]
2. Ranking [Option ID = 7330]
3. Rating scale [Option ID = 7331]
4. Interview protocol [Option ID = 7329]

Correct Answer :-

- Rating scale [Option ID = 7331]

32) Given that λ_1 is the unit 1 failure rate and λ_2 is the unit 2 failure rate, the Mean Time to Failure of a parallel system is

[Question ID = 53374]

1. $\frac{1}{\lambda_1} - \frac{1}{\lambda_2} + \frac{1}{\lambda_1 + \lambda_2}$ [Option ID = 93484]
2. $\frac{1}{\lambda_1} + \frac{1}{\lambda_2} - \frac{1}{\lambda_1 + \lambda_2}$ [Option ID = 93482]
3. $\frac{1}{\lambda_1 \lambda_2} - \frac{1}{\lambda_1 + \lambda_2}$ [Option ID = 93483]
4. $\frac{1}{\lambda_1} + \frac{1}{\lambda_2(\lambda_1 + \lambda_2)}$ [Option ID = 93485]

Correct Answer :-

- $\frac{1}{\lambda_1} + \frac{1}{\lambda_2} - \frac{1}{\lambda_1 + \lambda_2}$ [Option ID = 93482]

33) A constraint in a linear programming problem restricts

[Question ID = 1792]

1. value of the objective function [Option ID = 7165]
2. value of the decision variables [Option ID = 7166]
3. all of these [Option ID = 7168]
4. use of the available resources [Option ID = 7167]

Correct Answer :-

- all of these [Option ID = 7168]

34) The local maximum of the function $f(x_1, x_2, x_3) = x_1 + x_1x_2 + 2x_2 + 3x_3 - x_1^2 - 2x_2^2 - x_3^2$ occurs at

[Question ID = 1957]

1. (-6/7, 5/6, -3/2) [Option ID = 7826]
2. (6/7, 5/6, 3/2) [Option ID = 7825]
3. (-4/7, 4/6, -2/3) [Option ID = 7828]
4. (4/7, 4/6, 2/3) [Option ID = 7827]

Correct Answer :-

- (6/7, 5/6, 3/2) [Option ID = 7825]

35) Which of the following is not true regarding the normal distribution? [Question ID = 1828]

1. it is symmetrical [Option ID = 7311]
2. it has a single peak [Option ID = 7310]
3. the points of the curve meet the X-axis at $z = -3$ and $z = 3$ [Option ID = 7312]
4. mean, median and mode are all equal [Option ID = 7309]

Correct Answer :-

- the points of the curve meet the X-axis at $z = -3$ and $z = 3$ [Option ID = 7312]

36) Which of the following is not a source of data appropriate for qualitative study? [Question ID = 1845]

1. Historical records [Option ID = 7378]
2. Biographies [Option ID = 7377]
3. Participant observations [Option ID = 7379]
4. Experiments [Option ID = 7380]

Correct Answer :-

- Experiments [Option ID = 7380]

37) Which of the following is a measure of internal consistency of a scale or measure? [Question ID = 1846]

1. None of these [Option ID = 7384]
2. Cronbach's α [Option ID = 7383]
3. Test reliability [Option ID = 7382]
4. Correlation coefficient [Option ID = 7381]

Correct Answer :-

- Cronbach's α [Option ID = 7383]

38) Which of the following statement hold true for safety stock? [Question ID = 1812]

1. the lower the opportunity cost of the funds invested in inventory, the smaller the safety stock needed [Option ID = 7246]
2. the greater the risk of running out of stock, the larger the safety stock needed [Option ID = 7245]
3. the greater the uncertainty associated with forecasted demand, the lower the level of safety stock needed [Option ID = 7247]
4. the higher the profit margin per unit, the lower the safety stock necessary [Option ID = 7248]

Correct Answer :-

- the greater the risk of running out of stock, the larger the safety stock needed [Option ID = 7245]

39) Let the total usage of the given item be 9,000 units per year, the cost per order is Rs. 15, and the unit cost is Rs. 20. If the carrying charges are 15% of the average inventory per year, then the economic order quantity is

[Question ID = 1811]

1. 556 units [Option ID = 7242]
2. 443 units [Option ID = 7239]

3. 300 units [Option ID = 7237]
4. 310 units [Option ID = 7244]

Correct Answer :-

- 300 units [Option ID = 7237]

40) If $\rho_{XY} = -1$, then relation between X and Y satisfies

[Question ID = 1826]

1. when Y increases, X also increases [Option ID = 7301]
2. when Y increases, X proportionately decreases [Option ID = 7304]
3. when Y decreases, X also decreases [Option ID = 7302]
4. X is equal to -Y [Option ID = 7303]

Correct Answer :-

- when Y increases, X proportionately decreases [Option ID = 7304]

41) Customers enter the waiting line to pay for food as they leave a cafeteria on a first-come, first served basis. The arrival rate follows a Poisson distribution, while service times follow an exponential distribution. If the average number of arrivals is 4 per minute and the average service rate of a single server is 7 per minute, then the proportion of the time the server is busy is

[Question ID = 1817]

1. 0.57 [Option ID = 7266]
2. 0.43 [Option ID = 7265]
3. 0.10 [Option ID = 7267]
4. none of these [Option ID = 7268]

Correct Answer :-

- 0.57 [Option ID = 7266]

42) The pattern Arrival \rightarrow Service \rightarrow Service \rightarrow Service \rightarrow Out represents

[Question ID = 1815]

1. single channel multi-phase system [Option ID = 7259]
2. single channel single-phase system [Option ID = 7257]
3. multi channel single-phase system [Option ID = 7258]
4. multi channel multi-phase system [Option ID = 7260]

Correct Answer :-

- single channel multi-phase system [Option ID = 7259]

43) The main advantage of a research paper is

[Question ID = 1831]

1. to put the research work for wider criticism or approval [Option ID = 7322]
2. all of these [Option ID = 7324]
3. to communicate the research work carried out by the researcher [Option ID = 7321]
4. to modify the research process if there is any discrepancy in it [Option ID = 7323]

Correct Answer :-

- all of these [Option ID = 7324]

44) The linear programming problem $\max z = 10x_1 + 6x_2$ subject to $5x_1 + 3x_2 \leq 30$, $x_1 + 2x_2 \leq 18$, $x_1 \geq 0$, $x_2 \geq 0$ has

[Question ID = 1800]

1. an unbounded solution [Option ID = 7197]
2. a unique optimal solution [Option ID = 7198]
3. no feasible solution [Option ID = 7200]
4. multiple optimal solutions [Option ID = 7199]

Correct Answer :-

- multiple optimal solutions [Option ID = 7199]

45) The reliability of an item can be obtained as

[Question ID = 1958]

1. all of these [Option ID = 7832]
2. $R(t) = e^{-\int_0^t \lambda(t)dt}$ [Option ID = 7831]
3. $R(t) = 1 - \int_0^t f(t)dt$ [Option ID = 7829]
4. $R(t) = \int_t^\infty f(t)dt$ [Option ID = 7830]

Correct Answer :-

- all of these [Option ID = 7832]

46) The mean of a Poisson variate is

[Question ID = 1830]

1. equal to its variance [Option ID = 7319]
2. none of these [Option ID = 7320]
3. less than its variance [Option ID = 7318]
4. greater than its variance [Option ID = 7317]

Correct Answer :-

- equal to its variance [Option ID = 7319]

47) The objectivity of the research can be enhanced

[Question ID = 1835]

1. all of these [Option ID = 7340]
2. through its impartiality [Option ID = 7337]
3. through its validity [Option ID = 7339]
4. through its reliability [Option ID = 7338]

Correct Answer :-

- all of these [Option ID = 7340]

48) The process of writing a research paper is

[Question ID = 1834]

1. unscientific [Option ID = 7334]
2. scientific [Option ID = 7333]
3. original [Option ID = 7335]
4. all of these [Option ID = 7336]

Correct Answer :-

- scientific [Option ID = 7333]

49) The area where the tasks accumulate, waiting to be serviced, is called the

[Question ID = 1809]

1. (D) both (A) and (B) [Option ID = 7236]
2. (A) Queue [Option ID = 7230]
3. (B) Waiting line [Option ID = 7232]
4. (C) DIMM [Option ID = 7234]

Correct Answer :-

- (D) both (A) and (B) [Option ID = 7236]

50) A real valued function is convex if

[Question ID = 1802]

1. the Hessian matrix of the function is negative semi definite [Option ID = 7211]
2. the Hessian matrix of the function is negative definite [Option ID = 7209]
3. the Hessian matrix of the function is positive definite [Option ID = 7206]
4. the Hessian matrix of the function is positive semi definite [Option ID = 7208]

Correct Answer :-

- the Hessian matrix of the function is positive semi definite [Option ID = 7208]