

150/2024

Maximum : 100 marks

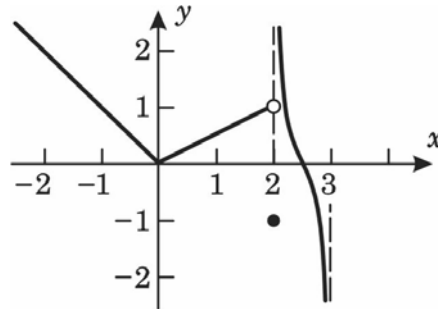
Time : 1 hour and 30 minutes

1. $\begin{bmatrix} 0 & h & -g \\ -h & 0 & f \\ g & -f & 0 \end{bmatrix}$ is a _____ matrix.
- (A) Symmetric (B) Skew-Symmetric
(C) Scalar (D) Diagonal
2. If A is a 5×3 matrix and B is a 3×2 matrix, then what is the order of the product AB ?
- (A) 5×2 (B) 3×3
(C) 2×5 (D) AB is not defined
3. If A' denotes the transpose of A , then $(AB)'$ = :
- (A) $A' + B'$ (B) $A' - B'$
(C) $B'A'$ (D) $A'B'$
4. The condition for a system of homogeneous linear equations in n variables to have $n - r$ linearly independent solutions, where r is the rank of the coefficient matrix, is :
- (A) $r = n$
(B) $r > n$
(C) $r < n$
(D) it will not have linearly independent solutions
5. The sum of the eigen values of $\begin{bmatrix} 5 & 4 & 1 \\ 1 & 2 & 2 \\ 3 & 2 & 0 \end{bmatrix}$ is :
- (A) 10 (B) 7
(C) 4 (D) 5
6. The number of independent eigen vectors for a matrix with n distinct eigen values is :
- (A) n (B) $n - 1$
(C) 0 (D) $n + 1$
7. If every minor of order greater than or equal to r of a matrix A is zero, then rank of A is :
- (A) greater than r (B) equal to r
(C) 0 (D) less than r

8. The product of the eigen values of $\begin{bmatrix} 2 & 3 \\ 7 & 8 \end{bmatrix}$ is :

- (A) 16 (B) 5
(C) -5 (D) 21

9. Find $\lim_{x \rightarrow 2^+} f(x)$ for the function graphed in the following figure :



- (A) 2 (B) -1
(C) 2.5 (D) ∞

10. For what values of x , if any, is the function $f(x) = \frac{x^2 - 4}{x^2 - 5x + 6}$ discontinuous?

- (A) $x = 2$ only (B) $x = 3$ only
(C) $x = 2$ and $x = 3$ (D) No discontinuities

11. If the line $3x - 2y = 7$ is tangent to the graph of $y = f(x)$ at $x = 1$, then what is the value of $f'(1)$?

- (A) $-\frac{2}{3}$ (B) 7
(C) -2 (D) $\frac{3}{2}$

12. Find the value of $c \in (-4, 6)$, appearing in the Mean Value Theorem if $f(x) = 2x^2 - 3x$:

- (A) -1 (B) 1
(C) -2 (D) 2

13. The derivative of an increasing function is :

- (A) not defined (B) zero
(C) negative (D) positive

14. At a point of inflexion of a function, its third derivative is :

- (A) negative (B) zero
(C) not equal to zero (D) positive

15. Evaluate $\int_0^{\pi/2} \frac{\sqrt{\cos x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$:
- (A) $\frac{\pi}{4}$ (B) $\frac{\pi}{2}$
 (C) zero (D) π
16. Evaluate the area of the tangent cut off from the parabola $x^2 = 8y$ by the line $x - 2y + 8 = 0$:
- (A) $\frac{123}{6}$ sq. units (B) $\frac{125}{6}$ sq. units
 (C) zero sq. units (D) $\frac{128}{6}$ sq. units
17. Evaluate $\lim_{(x,y) \rightarrow (2,1)} [8x^2y^3 - 10]$:
- (A) 22 (B) 1
 (C) -42 (D) 52
18. If $D = 2\sqrt{x^3 + y^2}$ is the length of the diagonal of a rectangle whose sides are x and y , that are allowed to vary, what is the rate of change of D with respect of x at the point $(1, 2)$:
- (A) $\frac{3}{\sqrt{5}}$ (B) $\frac{2}{\sqrt{5}}$
 (C) $\frac{-3}{5}$ (D) $\frac{-2}{5}$
19. Evaluate $\int_0^2 \int_0^y (3x^2 - y) dx dy$:
- (A) $\frac{-4}{3}$ (B) $\frac{3}{4}$
 (C) $\frac{-3}{4}$ (D) $\frac{4}{3}$
20. Evaluate $\int_{-10}^2 \int_0^1 \int_0^2 10xy^2 z^3 dz dy dx$:
- (A) 20 (B) -20
 (C) $\frac{-20}{3}$ (D) $\frac{20}{3}$

21. Solution of the differential equation $ydx + xdy = 0$ is :

(A) $xy = k$

(B) $\frac{x^2}{2} + \frac{y^2}{2} = c$

(C) $\frac{x}{y} = c$

(D) $x = cy$

22. Solution of the differential equation $\frac{d^2y}{dx^2} + 4y = 0$ is :

(A) $y = c_1 \cos 2x + c_2 \sin 2x$

(B) $y = c_1 e^{2x} + c_2 e^{-2x}$

(C) $y = (c_1 + c_2 x) e^{2x}$

(D) $y = (c_1 + c_2 \ln x) e^{2x}$

23. Solution of the differential equation $x^2 y'' + xy' + y = 0$ is

(A) $y = c_1 \cos x + c_2 \sin x$

(B) $y = c_1 x^{-1} c_2 x$

(C) $y = c_1 \cos(\ln x) + c_2 \sin(\ln x)$

(D) $y = (c_1 + c_2 \ln x) x^2$

24. $\frac{dy}{dx} + y \tan x = \sec x$ has the solution :

(A) $y \sec x = x + c$

(B) $y = \tan x + c$

(C) $y \sec x = \tan x + c$

(D) $y = x + c$

25. Find the mean of 20, 22, 28, 24 :

(A) 22

(B) 25

(C) 23.5

(D) 28

26. If a random variable follows Poisson distribution and $P(1) = P(0)$, then mean of the distribution is :

(A) 1

(B) 0

(C) ∞

(D) e^{-1}

27. Variance of the Uniform distribution with probability density function $f(x) = \frac{1}{3}, 3 < x < 6$ is :

(A) $\frac{3}{4}$

(B) 4.5

(C) 3

(D) $\frac{1}{3}$

28. If $E(X) = 5$ then $E(X + 2)$ is :

(A) 7

(B) 5

(C) 0

(D) 10

29. If mean and variance of a binomial distribution are 4 and 2 respectively then probability of failure is :
- (A) $\frac{1}{2}$ (B) $\frac{1}{3}$
(C) 2 (D) $\frac{2}{3}$
30. Find the probability of getting 2 red balls from 4 red balls and 3 white balls :
- (A) $\frac{2}{7}$ (B) $\frac{4}{7}$
(C) $\frac{6}{7}$ (D) $\frac{2}{3}$
31. If X follows normal distribution with mean 10 and variance 4, then $P(X < 10)$ equals :
- (A) 1 (B) 0.5
(C) ∞ (D) -1
32. Value of correlation co-efficient ranges between :
- (A) -1 and 1 (B) 0 and 1
(C) ∞ and ∞ (D) -2 and 2
33. The probability of getting a ticket, with number a multiple of 5 in a random draw from a bag containing tickets of even numbers from 1 to 100 is :
- (A) $\frac{1}{5}$ (B) $\frac{1}{20}$
(C) $\frac{1}{2}$ (D) $\frac{2}{5}$
34. If the joint probability density function of a two dimensional random variable (X, Y) is $f(x, y) = 2, 0 < x < 1, 0 < y < x$ then the marginal density function of Y is :
- (A) $2y, 0 < y < 1$ (B) $2(1 - y), 0 < y < 1$
(C) $2, 0 < y < 1$ (D) $2x, 0 < x < 1$
35. If $X_1, X_2, X_3, \dots, X_n$ are independently and identically distributed random variables with variance σ^2 , then $V\left(\frac{X_1 + X_2 + X_3 + \dots + X_n}{n}\right)$ equals :
- (A) $n\sigma^2$ (B) $\frac{\sigma^2}{n}$
(C) $n^2\sigma^2$ (D) σ^2

36. If A and B are two independent events then:

- (A) $P(A/B) = P(A)$ (B) $P(A/B) = P(B)$
 (C) $P(A/B) = \phi$ (D) $P(A/B) = P(A)P(B)$

37. The first iterative solution of $x^3 + x^2 - 3x - 3 = 0$ which lies between 1 and 2 given by Regula-Falsi method is :

- (A) 1.571 (B) -4
 (C) 3 (D) 2.32

38. Newton-Raphson method gives first iterative solution of $\sqrt[3]{2}$ as :

- (A) 1.33 (B) 1
 (C) 1.414 (D) $\frac{2}{3}$

39. First and second forward differences of 2 from the below table are :

| | | | |
|-----|---|---|---|
| x : | 2 | 3 | 4 |
| y : | 5 | 7 | 8 |

- (A) 2, -1 (B) 1, -1
 (C) 2, 1 (D) -1, 0

40. Lagrange's interpolating polynomial which fits the data (1, 0), (2, 3), (3, 8) is :

- (A) $x - 1$ (B) $x^2 - 1$
 (C) $x^2 - x$ (D) $x^2 - x + 1$

41. The ratio between the Einstein's coefficients for spontaneous and stimulated emissions is :

- (A) $\frac{2\pi^2 h \nu^3}{c^3}$ (B) $\frac{8\pi h \nu^3}{c^3}$
 (C) $\frac{8\pi^2 h^2 \nu^3}{c^3}$ (D) $\frac{8\pi^2 h \nu^3}{c^3}$

42. A ruby laser pulse is contributed by $3 \times 10^{20} Cr^{3+}$ ions. Calculate the energy of the pulse if the wavelength is 6630 Å :

- (A) $10^{-29} J$ (B) 90 J
 (C) 9 J (D) $10^{-15} J$

43. What is the expression for the acceptance angle of an optical fibre whose cladding and core have refractive indices μ_1 and μ_2 respectively?

(A) $\sqrt{\mu_1^2 - \mu_2^2}$

(B) $\sqrt{\mu_2^2 - \mu_1^2}$

(C) $\sin^{-1} \sqrt{\mu_1^2 - \mu_2^2}$

(D) $\sin^{-1} \sqrt{\mu_2^2 - \mu_1^2}$

44. The sensing medium in an intrinsic optical fibre sensor is :

(A) Fibre

(B) Photodiode

(C) LDR

(D) Laser light

45. Which material is commonly used in the production of blue LEDs?

(A) Silicon

(B) Gallium Arsenide

(C) Gallium Nitride

(D) Silicon Carbide

46. The Fermi level in an n -type semiconductor lies :

(A) Closer to the valence band

(B) At the centre of the band gap

(C) Closer to the conduction band

(D) Outside the conduction band

47. For a silicon semiconductor at 300 K, the intrinsic carrier concentration is $1.5 \times 10^{10} \text{ cm}^{-3}$. If the donor concentration is $1 \times 10^{15} \text{ cm}^{-3}$. What is the hole concentration?

(A) $5 \times 10^5 \text{ cm}^{-3}$

(B) $6.7 \times 10^{19} \text{ cm}^{-3}$

(C) $2.25 \times 10^{-10} \text{ cm}^{-3}$

(D) $2.25 \times 10^5 \text{ cm}^{-3}$

48. In BCS theory, Cooper pairs are composed of which of the following particles?

(A) Two electrons with opposite spins and momentum

(B) Two electrons with the same spin and opposite momentum

(C) Two electrons with the opposite spin and same momentum

(D) Two electrons with the same spin and momentum

49. The London penetration depth of a superconductor is :

(A) $\lambda = \left(\frac{n}{m\mu_0 e^2} \right)^{1/2}$

(B) $\lambda = \left(\frac{m}{n\mu_0 e^2} \right)^{1/2}$

(C) $\lambda = \left(\frac{m}{n\mu_0^2 e} \right)^{1/2}$

(D) $\lambda = \left(\frac{m\mu_0 e^2}{n} \right)^{1/2}$

50. What is the critical field for lead at 3.59 K if the critical field at 0K is 6.5×10^4 A/m. The critical temperature for lead is 7.18K?
- (A) 1.625×10^4 A/m (B) 3.25×10^4 A/m
(C) 3.66×10^4 A/m (D) 4.875×10^4 A/m
51. In which of the following applications are infrasonic waves most commonly used?
- (A) Sonar detection (B) Earthquake monitoring
(C) Ultrasonic cleaning (D) Medical imaging
52. What does an acoustic absorption coefficient (α) value of 1.0 indicate?
- (A) The material reflects all sound
(B) The material absorbs all sound energy
(C) The material transmits all sound
(D) The material reflects and absorbs sound equally
53. A change in the intensity level of 1 dB alters the intensity of sound by :
- (A) 1% (B) 10%
(C) 26% (D) 2%
54. The property of sound closely related to its pitch is :
- (A) Frequency (B) Loudness
(C) Intensity (D) Amplitude
55. What is the primary purpose of using a coupling gel in medical ultrasound imaging?
- (A) To protect the patient's skin
(B) To reduce tissue heating
(C) To eliminate air between the transducer and the skin
(D) To enhance image contrast
56. The monomers of Kevlar are :
- (A) Hexamethylene diamine and Adipic acid
(B) Ethylene glycol and Terephthalic acid
(C) Metaphenylene diamine and Isophthalic acid
(D) Paraphenylene diamine and Terephthalic acid
57. What is the purpose of developing chamber in TLC?
- (A) To hold the stationary phase
(B) To separate the components of the mixture
(C) To visualize the components of the mixture
(D) To mix the mobile phase

58. Which of the following is a p-type dopant for polyaniline (PANI)?
(A) Lithium chloride
(B) Hydrazine
(C) Alkali metals like sodium or potassium
(D) Iodine
59. The low thermal expansion of borosilicate glass is primarily due to the presence of :
(A) Aluminium oxide
(B) Boron trioxide
(C) Silicon dioxide
(D) Zirconium oxide
60. Which of the following ingredient in Portland cement regulates the setting time of cement?
(A) Silica
(B) Iron oxide
(C) Gypsum
(D) Alumina
61. TGA can be used for :
(A) Determining the melting point of a material
(B) Measuring the specific heat capacity of a material
(C) Studying the phase transitions of a material
(D) Analysing the thermal stability of polymers
62. What of the following statements are correct for carbon dioxide molecule?
I. All molecular vibrations of carbon dioxide are not IR active
II. Four molecular vibrations are possible for carbon dioxide
III. Only two absorption bands are observed in the IR spectrum of carbon dioxide
(A) I and II
(B) I and III
(C) I, II and III
(D) II only
63. Which is the most common fissionable nuclei used in Pressurised Water Reactors?
(A) Uranium -235
(B) Uranium -238
(C) Thorium -228
(D) Plutonium -242
64. What is the purpose of the Scanning coil in Scanning Electron Microscope?
(A) To detect secondary electrons
(B) To focus the electron beam
(C) To produce a beam of electrons
(D) To deflect the electron beam
65. The absorbance of 0.002 M solution of a dye shows an absorbance of 0.1750 at 720 nm; while a test solution of the same dye shows absorbance of 0.2625 under the same conditions. Find the concentration of the test solution :
(A) 0.001 M
(B) 0.003 M
(C) 0.004 M
(D) 0.005 M

66. International day for the preservation of the ozone layer is observed on :
- (A) January 26 (B) June 15
(C) September 16 (D) September 22
67. Both top-down approaches and bottom-up approaches are used to synthesis nanomaterials. Which of the following is a top-down method to synthesise nanomaterials?
- (A) Laser ablation (B) Sol-gel method
(C) Chemical reduction (D) Laser pyrolysis
68. Which of the following water treatment helps to remove dissolved gases?
- (A) Sedimentation (B) Disinfection
(C) Aeration (D) Reverse osmosis
69. Which of the following polymer membrane is used in PEM fuel cells?
- (A) PET (B) Nafion
(C) PPE (D) Teflon
70. Blue baby syndrome or methemoglobinemia is caused by excess concentration of _____ in drinking water :
- (A) Nitrate ions (B) Fluoride ions
(C) Lead ions (D) Phosphate ions
71. Which management concept suggests that low-importance decisions be handled by subordinates, so that managers can focus on high-importance decisions?
- (A) Management By Exception (B) Exclusionary Management
(C) Inclusionary Management (D) Management By Objective
72. A process in which a group of individuals generate and state ideas, but in which the rules prohibit questioning, evaluating, or rejecting any ideas, even if they seem ridiculous is called?
- (A) Delphi technique (B) Brain storming
(C) Nominal group technique (D) Bounded rationality
73. What kind of organizational structure combines a vertical chain of command with horizontal reporting requirements?
- (A) Line Authority (B) Matrix
(C) Functional (D) Quality Circle

74. In an organization if the manager once determines policy, program's and limitations for action and the entire process is entrusting to the subordinates for execution, then the leadership style is called?
- (A) Participative leadership (B) Benevolent autocrat
(C) Laissez faire (D) Dominant leadership
75. Functional managers are responsible :
- (A) For A Single Area Of Activity
(B) To The Upper Level Of Management And Staff
(C) For Complex Organizational Sub-Units
(D) For Obtaining Copyrights And Patents For Newly Developed Processes And Equipment
76. Find Breakeven point in units as per the following details:
Sales @ Rs.30 per unit, Variable cost @ Rs.15 per unit and Fixed cost Rs.45,000, produced 2500 units.
- (A) 1000 (B) 2000
(C) 3000 (D) 3200
77. That the authority rests solely with the management with no right to anyone to challenge it is the basis of the :
- (A) Pluralist approach (B) System approach
(C) Unitary approach (D) Social action approach
78. During the selection process while the candidate is being evaluated, the candidate too tries to evaluate the company and its culture, apart from the job, and comes to a decision about suitability of the organization, this means that
- (A) Only qualified candidate will make it to the next stage of the employment process
(B) During the selection process, the candidate should not be allowed to have contact with the existing employees of the organization
(C) The selection process also involves selling the organization to the candidate
(D) Suitable candidates are often rejected
79. Which component of performance management refers to communicating a firm's higher-level goals throughout the organization and then translating them into departmental and individual goals?
- (A) Role clarification (B) Goal alignment
(C) Performance monitoring (D) Direction sharing

80. A process theory of motivation is most likely to focus on :
- (A) Frustration-regression
 - (B) Expectancies regarding work outcomes
 - (C) Lower-order needs
 - (D) Higher-order needs
81. Liquidity risk :
- (A) Increases whenever interest rates increase
 - (B) Risk associated with secondary market transactions
 - (C) Is lower for small OTCEI stocks than for large NSE stocks
 - (D) Is the risk that investment bankers normally face
82. The method that calculates the expected monetary gain or loss from a project by discounting all expected future cash inflows and outflows to the present point in time, using the required rate of return is :
- (A) Net present value
 - (B) Internal rate of return
 - (C) Payback
 - (D) Accounting rate of return
83. According to the capital-asset pricing model (CAPM), a security's expected (required) return is equal to the risk-free rate plus a premium :
- (A) based on the systematic risk of the security
 - (B) based on the unsystematic risk of the security
 - (C) based on the total risk of the security
 - (D) based on the beta risk of the security
84. The return on capital employed shows the combined effect of :
- (A) Net Profit Ratio And Inventory Turnover Ratio
 - (B) Operating Ratio And Net Profit Ratio
 - (C) Net Profit Ratio and Capital Turnover Ratio
 - (D) Gross Profit Ratio and Capital Turnover Ratio
85. ————— model states that the value of a company's shares is sustained by the expectation of future dividends:
- (A) The dividend valuation model
 - (B) The Gordon growth model
 - (C) MM Theory
 - (D) Modified MM Theory

86. Debt Financing is a cheaper source of finance because of :
- (A) Time Value of Money
 - (B) Rate of Interest
 - (C) Tax-deductibility of Interest
 - (D) Dividends not Payable to lenders
87. Which of the following statements are correct?
- 1. Staff manager is authorized to direct the work of a subordinate and is responsible for accomplishing the organizations task
 - 2. Staff authority gives a manager right to advice other managers or employees
 - 3. Controlling labor cost is one of the primary responsibilities of Line manager
- (A) Only 1 is correct
 - (B) Only 2 is correct
 - (C) 1 and 2 are correct
 - (D) 2 and 3 are correct
88. A machine operator is injured while working with heavy machinery, leading to a temporary disability that prevents them from working for five days. According to the Workmen's Compensation Act, 1923, which of the following most accurately outlines the employer's liability in this case ?
- (A) The employer is liable to pay compensation as the operator miss more than three days of work due to injury.
 - (B) The employer is not liable to pay compensation as the injury did not result in permanent disablement
 - (C) The employer is not liable to pay compensation as the operator did not miss more than seven days of work due to injury
 - (D) The employer is not liable to pay compensation because the injury was temporary and did not cause long-term damage.
89. Which of the following criticism is incorrect related to Forced distribution method?
- 1. It damages moral of employees by placing them in lower rating categories, as they may feel demotivated and disengaged.
 - 2. It does not produce relative rating for pay rise
 - 3. Force ranking measure use subjective assessment to grade the employee, which makes it challenging to meaningfully differentiate employees.
- (A) Only 1 is incorrect
 - (B) Both 1 and 3 are incorrect
 - (C) Only 2 is incorrect
 - (D) All are correct

90. According to the Industrial Disputes Act, 1947, regarding the representation of parties in a dispute, which of the following accurately outlines the entitlements of a workman who is a party to an industrial dispute?

1. A workman can be represented by any member of the executive or other office bearer of a registered trade union of which he is a member.
2. If the workman is not a member of any trade union, he can be represented by any workman employed in the same industry, authorized in the prescribed manner
3. A workman can be represented by a member of the executive or other office bearer of a federation of trade unions, regardless of whether his trade union is affiliated to it.

(A) Only 1 and 2

(B) Only 1 and 3

(C) Only 2 and 3

(D) 1, 2 and 3

91. Philip Kotler defines various demand states. Consider the following examples of product demand in India :

1. Spotify users subscribe to the premium service to avoid listening to ads, which they find intrusive and disruptive during their music experience.
2. A state government offers highly subsidized green materials to build sustainable homes, but most consumers are unaware of the program or its benefits.
3. State transport buses are consistently overcrowded, with more passengers than available seats.
4. Restaurants serving traditional foods experience a decline in demand as younger consumers shift their preferences toward Western cuisines.

Which of the following options correctly identifies the demand state for each example?

(A) 1 : Negative Demand, 2 : Non-existent Demand, 3 : Full Demand, 4 : Irregular Demand

(B) 1 : Latent Demand, 2 : Irregular Demand, 3 : Overfull Demand, 4 : Declining Demand

(C) 1 : Negative Demand, 2 : Non-existent Demand, 3 : Overfull Demand, 4 : Declining Demand

(D) 1 : Full Demand, 2 : Unwholesome Demand, 3 : Overfull Demand, 4 : Latent Demand

92. Which of the following statements are true related to market research?

1. Ethnographic research is one of the best methods for gathering all necessary insights in a short period of time.
2. Experimental Research is designed to eliminate competitive explanation of the findings.
3. Focus group research requires researcher to gather marketing insight by observing unobtrusively as customers shop or consume product.

(A) Only 2 is true

(B) 1 and 2 are true

(C) Only 1 is true

(D) 2 and 3 are true

- 93.** According to Alan R. Andreasen to be labelled social marketing, a program :
1. Must not apply commercial marketing technology.
 2. Have as its bottom line the influencing of voluntary behavior.
 3. Primarily seek to benefit individuals/families or the broader society and not the marketing organization itself.
- Which of the above statement is incorrect?
- (A) Only 1 is incorrect (B) Only 2 is incorrect
(C) 1 and 2 are incorrect (D) None is incorrect
- 94.** Which of the following examples best illustrates the representativeness heuristic in consumer decision-making?
1. A consumer buys a product solely because it was featured in a celebrity's social media post, associating the celebrity's popularity with the product's value.
 2. Consumers tend to view brands with similar packaging in the same product category as having similar quality and meeting the typical standards of that category.
 3. Consumers viewing recent product failure to inflate the likelihood of future product failure and buys a product warranty.
 4. A customer sees a pizza worth 1500/- on the menu and as a result, perceives a pizza worth 750/- as a good deal, even though it's still relatively expensive.
- (A) 1 (B) 2
(C) 3 (D) 4
- 95.** Which of the following statements about Cultural Branding are true?
1. The concept of Cultural Branding is primarily attributed to Douglas B. Holt.
 2. Cultural Branding defines a brand as a performer of and container for an identity myth.
 3. The most appropriate application of cultural branding is for new fashion and new technology.
- (A) All statements are true (B) Statement 2 and 3 are true
(C) Statement 1 and 3 are true (D) Statement 1 and 2 are true
- 96.** Which of the following strategic actions are most appropriate during the decline stage?
1. Reducing marketing expenditures and shifting resources toward R and D for new product innovations while gradually phasing out underperforming product lines.
 2. Adopting a market penetration strategy by lowering prices to attract price-sensitive customers, thus extending the life of the product in saturated markets.
 3. Utilizing rebranding and repositioning to revive consumer interest, targeting new demographics and exploring alternative uses for the existing product.
- (A) Only 1 and 2 (B) Only 1 and 3
(C) Only 2 and 3 (D) 1, 2 and 3

97. Arrange the following steps for benchmarking in correct order :

1. Plan
2. Decide what to benchmark
3. Study others
4. Understand the current performance
5. Use the findings
6. Learn from data

(A) 4, 2, 1, 3, 6, 5 (B) 2, 1, 4, 6, 3, 5
(C) 1, 2, 3, 4, 5, 6 (D) 2, 4, 1, 3, 6, 5

98. In the DMAIC process, which of the following combinations of technique and stage is *incorrectly* matched?

1. Design of Experiments (DOE) – Improve
2. Value Stream Map – Define
3. Pareto Chart – Control
4. Failure Mode and Effects Analysis (FMEA) – Analyze

(A) Only 1 (B) Only 3
(C) 1 and 3 (D) 2 and 4

99. A production process has a fixed cost of Rs. 1,10,000 per year and a variable cost of Rs. 2 per unit. If the selling price of the product is Rs. 14 per unit, what is the annual break-even quantity for the process?

(A) 7,500 units (B) 7,857 units
(C) 8,500 units (D) 9,167 units

100. A firm is trying to determine the setup cost for a manufacturing operation to accommodate an Economic Order Quantity (EOQ) of 20 units for a part. The following data is available :

- Annual demand (D) = 20,000 units
- Holding cost per unit per year (H) = Rs. 15/-
- Production rate (P) = 80 units per day
- Daily demand rate (d) = 20 units per day
- EOQ = 20 units
- Setup cost (S) = unknown

What is the setup cost (S) for this process?

(A) Rs. 0.10 per setup (B) Rs. 0.15 per setup
(C) Rs. 0.25 per setup (D) Rs. 1.50 per setup

SPACE FOR ROUGH WORK

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