MAHARASHTRA BOARD · CLASS 12 · MATHEMATICS AND STATISTICS (COMMERCE)

Maharashtra Board Class 12 Mathematics and Statistics (Commerce) Guess Paper 2027

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Section I

Section I: Q objectives (MCQ + VSA) and short/long answer problems

Q1. integral from 2 to 7 of sqrt(x)/(sqrt(x) + sqrt(9 - x)) dx = (a) 7/2 (b) 5/2 (c) 7 (d) 2 — 1 mark

Q2. The difference between face value and present worth is called _____. (a) Banker's discount (b) True discount (c) Banker's gain (d) Cash value — 1 mark

Q3. integral x^2 (3)^(x^3) dx = _____ (a) (3)^(x^3)/(3 log 3) + c (b) (3)^(x^3) + c (c) (log 3)(3)^(x^3) + c (d) x^2 (3)^(x^3) + c — 1 mark

Q4. The order and degree of $(d^2y/dx^2)^2 + (dy/dx)^2 = a^x$ are respectively ___ (a) 1, 1 (b) 1, 2 (c) 2, 1 (d) 2, 2 — 1 mark

Q5. Fill in the blank: The integrating factor of the differential equation dy/dx - y = x is _____. — 1 mark

Q6. In regression analysis b_{yx} . b_{xy} = _____. (a) V(x) (b) $sigma_x$ (c) $(sigma_y)^2$ (d) r^2 — 1 mark

Q7. Fill in the blank: If P01(L) = 225, P01(P) = 144 then P01(F) = _____. — 1 mark

Q8. Area of the region bounded by the curve $y = x^2$, the X-axis and the lines x = 1 and x = 3 is _____. (a) 3/26 sq. units (b) 3 sq. units (c) 26 sq. units (d) 26/3 sq. units — 1 mark

Q9. Fill in the blank: integral e^x (1/x - $1/x^2$) dx = _____. — 1 mark

Q10. Fill in the blank: If the average revenue is 45 and elasticity of demand is 3 then marginal revenue is ____. — 1 mark

Q11. Fill in the blank: The dual of (p ^ ~q) v t is _____. — 1 mark

Q12. If 0 < eta < 1, then the demand is (a) elastic (b) unitary elastic (c) relatively elastic (d) relatively inelastic — 1 mark

Q13. Attempt any TWO (3 marks each): Solve the following L.P.P. by graphical method. Maximize: z = 4x + 6y Subject to: 3x + 2y <= 12, x + y >= 4, x, y >= 0 — 3 marks

Q14. Attempt any TWO (3 marks each): Obtain the 4-yearly centered moving averages for the following data: Years 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982; Production 1 0 1 2 3 2 3 6 5 1 4 10 — 3 marks

Q15. Attempt any TWO (3 marks each): Determine whether the following statement pattern is tautology, contradiction or contingency. [p ^ (~p v q)] — 3 marks

Q16. Attempt any TWO (3 marks each): Find the inverse of matrix [1 2 3; 1 1 5; 2 4 7] by adjoint method. — 3 marks

Q17. Attempt any ONE (4 marks each): Find the area of the region bounded by the curve $x^2 = 16y$ and the line $y = 4$. — 4 marks

Q18. Attempt any TWO (4 marks each): A random variable X has the following probability distribution: x 1 2 3 4 5 6 7; P[X = x] k 2k 2k 3k k^2 $2k^2$ $7k^{2+}$k. Determine (a) k (b) P(X < 3) (c) P(X > 6) (d) P(0 < X < 1) — 4 marks

Q19. Attempt any TWO (4 marks each): Following table shows the all India Infant Mortality Rates (per 000) for years 1980 to 1986: Years 1980 1981 1982 1983 1984 1985 1986; IMR 10 6 5 3 3 1 0. Fit a trend line to the above data by the method of least squares. — 4 marks

Q20. Attempt any ONE (4 marks each): For the following bivariate data obtain the equation of regression line of Y on X. X 1 2 3 4 5; Y 5 7 9 11 13 — 4 marks

Section II

Section II: Q objectives (MCQ + VSA) and short/long answer problems

Q21. integral (1 - x)^(-3) dx = _____. (a) (1/2)(1 - x)^(-2) + c (b) (1/2)(1 + x)^(-2) + c (c) (1/2)(1 - x)^(-2) + x/2 + c (d) (1/2)(1 - x)^(-2) - x/2 + c — 1 mark

Q22. Price Index Number by Simple Aggregate Method is given by (a) sum(p1/p0) x 100 (b) sum(p0/p1) x 100 (c) (sum p1/sum p0) x 100 (d) (sum p0/sum p1) x 100 — 1 mark

Q23. If $x = 2at^2$, $y = 4at$ then dy/dx = ____. (a) $-1/(2at^2)$ (b) $1/(2at^3)$ (c) 1/t (d) $1/(4at^3)$ — 1 mark

Q24. Paasche's Price Index Number is given by ____. (a) (sum p0 q0/sum p1 q0) x 100 (b) (sum p0 q1/sum p1 q1) x 100 (c) (sum p1 q0/sum p0 q0) x 100 (d) (sum p1 q1/sum p0 q1) x 100 — 1 mark

Q25. integral from 0 to 2 of e^x dx = _____. (a) e - 1 (b) 1 - e (c) $e^2 - 1$ (d) $1 - e^2$ — 1 mark

Q26. If y = e^(log x) then dy/dx is (a) e^(log x)/x (b) 1/2 (c) 1 (d) both (a) and (c) — 1 mark

Q27. State whether true or false: Order and degree of a differential equation are always positive integers. — 1 mark

Q28. State whether true or false: The integrating factor (I.F.) of dy/dx + y = e^(-x) is e^x — 1 mark

Q29. State whether true or false: integral 1/(2x + 3) dx = log|2x + 3| + c — 1 mark

Q30. Fill in the blank: Graphical solution set of the inequations x >= 0, y >= 0 lies in _____ quadrant. — 1 mark

Q31. State whether true or false: The optimum value of the objective function of L.P.P. occurs at the centre of the feasible region. — 1 mark

Q32. State whether true or false: To convert an assignment problem into a minimization problem, the smallest element in the matrix is deducted from all other elements. — 1 mark

Q33. Attempt any TWO (3 marks each): Write the converse, inverse and contrapositive of the following statement. 'If a man is rich, then he is happy.' — 3 marks

Q34. Attempt any TWO (3 marks each): A pair of dice is thrown 3 times. If getting a doublet is considered a success, find the probability of two successes. — 3 marks

Q35. Attempt any TWO (3 marks each): Given the following information about the production (X) and demand (Y) of a commodity, obtain the regression line of X on Y. Production (X): Mean 85, S.D. 5; Demand (Y): Mean 90, S.D. 6. Coefficient of correlation between X and Y is 0.6. Also estimate the production when demand is 100. — 3 marks

Q36. Attempt any TWO (3 marks each): Find the sequence that minimizes the total elapsed time to complete the following jobs. Each job is processed in order AB. Also find the idle time for machine B. Jobs (processing times in minutes) I II III IV V VI VII; Machine A 12 6 5 11 5 7 6; Machine B 7 8 9 4 7 8 3 — 3 marks

Q37. Attempt any ONE (4 marks each): Solve the following equation by method of reduction: x - y + z = 4, 2x + y - 3z = 0, x + y + z = 2 — 4 marks

Q38. Attempt any ONE (4 marks each): A die is thrown 4 times. If 'getting an odd number' is a success, find the probability of (a) 2 successes (b) at least 3 successes (c) at the most 2 successes. — 4 marks

Q39. Attempt any TWO (4 marks each): Find MPC, MPS, APC and APS, if the expenditure Ec of a person with income I is given as $Ec = (0.0003)\ I^2 + (0.075)\ I$ when I = 1000. — 4 marks

Q40. Attempt any TWO (4 marks each): Solve the following equations by the method of inversion: 2x - y + z = 1, x + 2y + 3z = 8, 3x + y - 4z = 1 — 4 marks

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