Class XII

APPLIED MATHEMATICS-840

SAMPLE QUESTION PAPER

Time: 3 Hrs **Maximum marks: 70**

General instructions:

a) All the questions are compulsory
b) The question paper consists of 34 questions divided in 4 sections A , B, C and D
c) Section A comprises of 20 questions of 1 mark each. Section B comprises of 5 questions of 2 marks each. Section C comprises of 5 questions of 4 marks each. Section D comprises of 4 questions of 5 marks each.
d) There is no overall choice. However, an internal choice has been provided in three questions of 1 mark each , two questions of 2 marks each , two questions of 4 mark each , and two questions of 5 marks each. You have to attempt only one of the alternatives in all such questions.
e) Use of calculator is not permitted.

	SECTION A	
	Q1-Q10 are multiple choice type questions. Select the correct option	
1.	If matrix $A = [a_{ij}]_{2\times 2}$, where $a_{ij} = \begin{cases} 1, & if\ i \neq j \\ 0, & if\ i = j \end{cases}$ .Then A^2 is equal to a) Identity matrix b) A c) null matrix d) none of these	1
2.	$\lim_{x\to 0} \frac{\sqrt{1+x}-1}{x}$ is equal to a) $\frac{1}{2}$ b) 2 c) 0 d) 1	1
3.	If ROAST is coded as PQYUR in a certain language , then SLOPPY will be coded in that language as a) MRNAQN b) NRMNQA c) QNMRNA d) RANNMQ	1
4.	Index numbers are expressed in a) Ratios b) squares c) percentages d) combinations	1
5.	If A and B are events such that $P(A) = \frac{1}{2}$, $P(B) = \frac{7}{12}$ and $P(A' \cup B') = \frac{1}{4}$, then A and B are a) Independent b) mutually exclusive c) both 'a' and 'b' d) none of these	1
6.	The equation of line passing through the point (3, - 4) and parallel to the x-axis is a) $x - 4 = 0$ b) $x + 4 = 0$ c) $y + 4 = 0$ d) $y - 4 = 0$	1
7.	The conditions $x \geq 0, y \geq 0$ are called a)Restrictions only b) non-negative restrictions c)negative restrictions d) none of these	1
8.	An unbiased die is tossed twice. What is the probability of getting a 4, 5 or 6 on the	1

	first toss and a 1, 2, 3 or 4 on the second toss? a) $\frac{2}{3}$ b) $\frac{3}{4}$ c) $\frac{5}{6}$ d) $\frac{1}{3}$	
9.	Choose the number which is different from the other in the group a) 131 b) 151 c) 171 d) 161	1
10.	The angle made by the line $x - \sqrt{3}y - 6 = 0$ with the positive direction of the x-axis is a) 45° b) 30° c) 60° d) 90°	1
	(Q11-Q15) Fill in the blanks	
11.	Differentiation of e^{ax+b} is _____	1
12.	The moving average value for different years are called _____	1
13.	The formula to calculate compound annual growth rate is _____	1
14.	Pointing towards a person in the photograph Anjali said, "He is the only son of the father of my sister's brother. The person is related to Anjali as her _____ **OR** Showing the man receiving the prize, Saroj said," He is the brother of my uncle's daughter." Who is the man to Saroj?	1
15.	If $\begin{bmatrix}1 & 0\\ y & 5\end{bmatrix} + 2\begin{bmatrix}x & 0\\ 1 & -2\end{bmatrix} = I$, where I is a 2×2 unit matrix then the value of $x + y$ is_____ **OR** If $\begin{vmatrix}x & 2\\ 18 & x\end{vmatrix} = \begin{vmatrix}6 & 2\\ 18 & 6\end{vmatrix}$ then x is equal to _____	1
	(Q16-Q20) Answer the following questions	
16.	Find the missing term in the following series 4, 6, 12, 14, 28, 30, ?	1
17.	If $\begin{bmatrix}x+y\\ x-y\end{bmatrix} = \begin{bmatrix}2 & 1\\ 4 & 3\end{bmatrix}\begin{bmatrix}1\\ -2\end{bmatrix}$ then what is the value of (x, y)	1
18.	Find $\int \frac{x^3 - x^2 + x - 1}{x-1} dx$ OR Find $\int \frac{2^x + 3^x}{5^x} dx$	1
19.	If $P(A) = 0.4$, $P(B) = 0.8$ and $P(B/A) = 0.6$, then find $P(A \cup B)$.	1
20.	What type of index number can help the government to formulate its price policies and to take appropriate economic measure to control price?	1
	SECTION B	
21.	The total revenue received from the sale of $x$units of a product is given by $R(x) = 3x^2 + 40x + 10$. Find the marginal revenue when $x = 5$ OR The total cost $C(x)$ of producing x items in a firm is given $C(x) = 0.005x^3 - 0.02x^2 + 30x + 6000$.Find the marginal cost when 4 units are produced	2

22. If $X_{m\times 3}Y_{p\times 4} = z_{2\times b}$, for three matrices X, Y and Z,then find the value of m, p and b — 2

23. In a radio manufacturing factory, average number of defective is 1 in 10 radios. Find the probability of getting exactly 2 defective radios in a random sample of 10 radios using Poisson distribution. — 2

24. Find the equation of a line that has y-intercept 4 and is perpendicular to the line joining $(2,-3)$ and $(4,2)$ — 2

25 — 2

Show that $\begin{vmatrix} 1 & bc & a(b+c) \\ 1 & ca & b(c+a) \\ 1 & ab & c(a+b) \end{vmatrix}$=0

OR

Show that $\begin{vmatrix} a & b & c \\ a+2x & b+2y & c+2z \\ x & y & z \end{vmatrix}$=0

SECTION C

26. Convert the decimal number 27.1875 to its binary equivalent — 4

27. Find the intervals in which the function $f(x) = -2x^3 - 9x^2 - 12x + 1$ is — 4

a) Strictly increasing b) strictly decreasing

OR

Find the intervals on which the function $f(x) = \frac{x}{(x^2+1)}$ is

a) Increasing b) decreasing

28. A man bought 360 ten-rupee shares paying 12% per annum. He sold them when the price rose to Rs.21 and invested the proceeds in five-rupee shares paying $4\frac{1}{2}\%$ per annum at Rs3.5 per share. Find the annual change in his income — 4

OR

A man sold some Rs.100 shares paying 10% dividend at a discount of 25% and invested the proceeds in Rs.100 shares paying 16% dividend quoted at Rs.80 and thus increased his income by Rs.2000. Find the number of shares sold by him.

29. Compute the index number using Aggregate Expenditure method for the year 2016 with 2011 as the base year, from the data given below: — 4

Commodity	***Quantity (in units)2011***	***Price(₹) 2011***	***Price(₹) 2016***
A	100	8	12
B	25	6	7.50
C	10	5	5.25
D	20	48	52
E	25	15	16.50
F	30	9	27

30. Solve the following problem graphically. — 4

Maximize $Z = 3x + 9y$, subject to the constraints $x + 3y \leq 60$, $x + y \geq 10$, $x \leq y$, $x \geq 0$ and $y \geq 0$

SECTION D

31. An urn contains 5 white, 7 red and 8 black balls. If four balls are drawn one by one with replacement, what is the probability that

a) All are white b) only 3 are white c) none is white d) at least 3 are white — 5

32. Prove that the area of right-angled triangle of given hypotenuse is maximum when the triangle is isosceles. — 5

OR

Show that of all the rectangles of a given area, the square has the smallest perimeter

33. An aeroplane can carry maximum of 200 passengers. A profit of ₹400 is made on each first class ticket and a profit of ₹600 is made on each economy class ticket. The airlines reserves at least 20 seats of first class. However, at least 4 times as many passengers prefer to travel by economy class to the first class. Determine how many each type of tickets must be sold in order to maximise the profit for the airline. What is the maximum profit? — 5

34. Find the amount of bill for the following intrastate transaction of goods/services — 5

MRP (in Rs)	12,000	15,000	9,500	18,000
Discount %	30	20	30	40
CGST%	6	9	14	2.5

OR

A dealer buys an article at a discount of 30% from the wholesaler, the marked price being ₹6000. The dealer sells it to the customer at the discount of 10% on the marked price. If the sales are intra –state and the rate of GST is 5%, find

i) The amount paid by the consumer for the article
ii) The tax(under GST) paid by the dealer to the state government
iii) The amount of tax (under GST) received by the central government.