

Techior Solutions Pvt. Ltd.

HSC Maths II Sample Paper 1

Total Time: 3 Hr

Total Marks: 80.0

		Section A	
MC) Single C	orrect	
	C 8		
1)	The surf volume i	ace area of a sphere increases at the rate of $0.6 \text{ cm}^2/\text{sec}$. The rate at which its s increasing, when its radius is 10 cm, is	1.0
	A)	2 cc/sec	X
	B)	3 cc/ sec	
	C)	4 cc/ sec	
	D)	5 cc/ sec	
2)	Two tow and 50 st as possib	rns A and B are 60 km apart. A school is to be built to serve 150 students in town sudents in town B. If the total distance travelled by all 200 students is to be as smole, hen the school should be built at:	n A 1.0 nall
	A)	Town B	
	B)	45 km from town A	
	C)	Town A	
	D)	45 km from town B	
B)	Function	$f(x) = x^2 - 3x + 4$ has minimum value at $x =$	1.0
	A)	0	
	B)	$\frac{-3}{2}$	
	C)		
	D)	$\frac{3}{2}$	
4)	The equa	ation of the tangent to the curve $y = 3x^2 - x + 1$ at the point (1, 3) is	1.0
	A)	y = 5x + 2	
	B)	$\mathbf{y} = 5\mathbf{x} - 2$	
		1 2	
	C)	y = -x + 2	

A) $\frac{4}{13}$ B) $\frac{5}{13}$ C) $\frac{9}{13}$ D) $\frac{6}{13}$

6) If y is a function of x and $\log (x + y) = 2xy$, then the value of $y'(0) = \dots$

- **A**) 2
- **B**) 0
- **C**) -1
- **D**) 1
- 7) The differential equation of all circles having their centres on the line y = 5 and touching the X-axis 1.0 is

$$\mathbf{A}) \qquad y^2 \left(1 + \frac{dy}{dx} \right) = 25$$

B)
$$(y-5)^2 \left[1 + \left(\frac{dy}{dx}\right)^2\right] = 25$$

C)
$$(y-5)^2 + \left[1 + \left(\frac{dy}{dx}\right)^2\right] = 25$$

D) $(y-5)^2 \left[1 - \left(\frac{dy}{dx}\right)^2\right] = 25$

- 8) The coordinates of the point on the curve $y = x \log x$ at which the normal is parallel to the 1.0 line 2x 2y = 3 are
 - A)(0, 0)B)(e, e)C) $(e^2, 2e^2)$ D) $(e^{-2}, -2e^{-2})$

9)

Given $X \sim B(n, P)$ if n = 10 and p = 0.4, find E(x) and Var(X). **1.0**

10) Identify the random variable as either discrete or continuous in each of the following. Write down 1.0 the range of it.

20 white rats are available for an experiment. Twelve rats are male. Scientist randomly selects 5 rats number of female rats selected on a specific day.

1.0

- **11**) Integrate the following w.r.t. $x : x^3 + x^2 x + 1$
- **12**) Find order and degree of the following differential equations.

$$\frac{dy}{dx} + \frac{3xy}{\frac{dy}{dx}} = \cos x$$

Section B

Shor	t Description	
13)	The radius of a soap bubble is increasing at the rate of 0.2 cm/sec. If its radius is 5 cm. find the rate of increase of its volume.	2.0
14)	Verify which of the following is p.d.f . of r.v. X:	2.0
	$f(x) = x$, for $0 \le x \le 1$ and $-2 -x$ for $1 < x < 2$	
15)	Differentiate the following w.r.t.x: tan[cos (sinx)]	2.0
16)	Differentiate the following w.r.t.x: $(1 + 4x)^5 (3 + x - x2)^8$	2.0
17)	If each sides of length 3 cm of an equilateral triangle increases at the rate of $\sqrt{2}$ cm/sec, find the rate of increase of its area.	2.0
18)	Let X ~ B(10, 0.2). Find P(X ≤ 8)	2.0
19)	Differentiate the following w.r.t.x: $cos(x^2 + a^2)$	2.0
20)	Differentiate the following w.r.t.x: $(x^3 - 2x - 1)^5$	2.0
21)	If V denotes the volume and S is the surface area of a sphere, then find the rate of change of V w.r.t S, when the radius of sphere is 2 cm.	2.0
22)	A spherical snow ball is melting so that its volume is decreasing at the rate of 8 cm/sec. Find the rate at which its radius is decreasing when it is 2 cm.	2.0
23)	State if the following is not the probability mass function of a random variable. Give reasons for your answer.	2.0
	X 0 -1 -2 P(X)0.30.40.3	
24)	Verify which of the following is p.d.f. of r.v. X:	2.0

f(x) = 2, for $0 \le x \le 1$.

1.0

Med	Iedium Description		
25)	A computer installation has 10 terminals. Independently, the probability that any one terminal will require attention during a week is 0.1. Find the probabilities that 3 or more, terminals will require attention during the next week.	3.0	
26)	The probability that a machine develops a fault within the first 3 years of use is 0.003. If 40 machines are selected at random, calculate the probability that 38 or more will develop any faults within the first 3 years of use.		
27)	Differentiate the following w.r.t.x: log (sec 3x+ tan 3x)	3.0	
28)	Find the derivative of the function $y = f(x)$ using the derivative of the inverse function $x = f^{-1}(y)$ in the following: $y = 2x + 3$		
29)	Evaluate the following : $\int x^2 \log x dx$	3.0	
30)	Evaluate the following : $\int \sec^3 x dx$	3.0	
31)	Integrate the following functions w.r.t. x : cosec (log x)[1 - cot (log x)]	3.0	
32)	Obtain the differential equation by eliminating the arbitrary constants from the following equation:	3.0	
	$x^3 + y^3 = 4ax$		
33)	Obtain the differential equation by eliminating the arbitrary constants from the following equation:	3.0	
	$Ax^2 + By^2 = 1$		
34)	Find expected value and variance of X, where X is number obtained on uppermost face when a fair die is thrown.	3.0	
35)	Find the mean number of heads in three tosses of a fair coin.	3.0	
36)	Two dice are thrown simultaneously. If X denotes the number of sixes, find the expectation of X.	3.0	

Section D

 \checkmark

Long Description

37) Solve the following differential equation:

(9x + 5y) dy + (15x + 11y)dx = 0

38) Integrate the following w.r.t. x :

$$rac{12x+3}{6x^2+13x-63}$$
. dx

39) The volume of a spherical balloon being inflated changes at a constant rate. If initially its radius is 3 **4.0** units and after 3 seconds it is 6 units. Find the radius of the balloon after t seconds.

4.0

4.0

40) Differentiate the following w.r.t. x :
$$\tan^{-1}\left[\sqrt{\frac{\sqrt{1+x^2}+x}{\sqrt{1+x^2}-x}}\right]$$
 4.0

41) Find the n^{th} derivative of the following : log (2x + 3)

42) Differentiate
$$\sin^{-1}\left(\frac{2x}{1+x^2}\right)$$
 w.r.t. $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ 4.0

43) If x = a sin t - b cos t, y = a cos t + b sin t, show that
$$\frac{d^2y}{dx^2} = -\frac{x^3 + y^2}{y^3}$$
.

44) Integrate the following w.r.t. x :
$$\frac{x^2+2}{(x-1)(x+2)(x+3)}$$

4.0

4.0

4.0