	The Times Secondary School						
	The Times mile Dillibazar, Kathmandu						
	INTERCEPTION First Terminal Examination – 2080						
	Grade: - XII Set A Full Marks:-75						
	Stream: Science		Pass Marks:-30				
	Subject: - Mathematics		Time : 3hrs				
6	· · · · · · · · · ·						
Ca fio	ndidates are required to give their ans ures in the margin indicate the full mar	wers in their own words ks	as far as practicable. The				
J*8	Gree Gree Gree Gree Gree Gree Gree Gree	$oup - A [11 \times 1 = 11]$					
Re	write the correct option in your answe	er sheet.					
	1. How many odd numbers of three dif	fferent digits can be form	ed from the integers 1, 2, 3,				
	a) 12 b) 36	c) 60	d) 120				
	2. The middle term in the expansion of	$f(x-\frac{1}{2})^{20}$ is	,				
	a) $C(20, 10)$ b) - $C(20, 10)$	$(x_{x}) = C(20, 10)x$	d) $C(20, 10)x^{10}$				
	3. Sum of the first n natural numbers i	is	u) C(20, 10)x				
	a) $n^2$ b) $\frac{n(n+1)(2n+1)}{2}$	$\frac{1}{2}$ c) $\frac{n(n+1)}{2}$	d) $\left(\frac{n(n+1)}{2}\right)^2$				
	4. The radius of the circle $x^2 + y^2 + 4x$	x - 6y + 4 = 0 is					
	a) 2 b) 3	c) 4	d) 9				
	5. For what value of p , do the system infinite solutions?	of equations $2x + 3y = 1$	, $4x + 6y = p$ have				
	a) 0 b) 1	c) 2	d) 4				
	6. $\lim_{x \to \frac{\pi}{2}} \frac{tan5x}{tanx}$ equals						
	a) $\frac{1}{r}$ b) $-\frac{1}{r}$	c) $\frac{5}{7}$	d) $-\frac{1}{7}$				
	7. The derivative of Arc tan sinh x is	,	7				
	a) cosh x b) sinh x	c) tanh x	d) sech x				
	8. The integral value of $\int \frac{dx}{a^2 - x^2}$ is						
	a) $\frac{1}{2a} \ln\left(\frac{a+x}{a-x}\right) + c$	b) $\frac{1}{a} tan^{-1} \frac{x}{a} + c$					
	c) $\log(x + \sqrt{a^2 - x^2}) + c$	d) $\sin^{-1}\frac{x}{a} + c$					
	9. If the regression coefficients are $b_{xy} = -\frac{1}{2}$ and $b_{yx} = -\frac{3}{4}$ , the correlation coefficient						
	between two vriables x and y is						
	a) 0.25 b)0.25	c) $0.50$	d) - 0.50				
	10. If $\alpha$ and $\beta$ be two complex roots of $\alpha$ a) 1 b) 0	i unity then $\alpha$ equals	d) B				
	11. For two dependent events A and B	P(A/B) equals	α) <i>p</i>				
	a) $\frac{P(A \cap B)}{P(A)}$ b) $P(A)P(B)$	) $c)\frac{\hat{P}(A\cap B)}{P(B)}$	d) $\frac{P(A)}{P(A \cap P)}$				
	Group 'B' [5 >	$\times 8 = 40$ ]	$P(A \cap B)$				
12.	(a) In how many ways can the letters of	the word 'INTERVAL' b	be arranged so that the				
vowels may occupy only the odd positions? [2] b) A candidate has to pass in each of the five subjects. In how many ways can he be fail?							
13	[3] 13 If $(1 + x)^n - C + C x + C x^2 + \dots + C x^n$						
19.	a) Write the value of $(1 + 1)^{-2} = (0 + 1)^{-2} + (1 + 1)^{-2}$						
	i) $C_0+C_1+C_2+C_3++C_n$		[1]				

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b) Prove	$C_2+3C_3+$	$\dots + nC_n$ $C_1 + 7C_2 + 10$	$C_{2}++(2)$	3n+1)C = C	$3n+2)2^{n-1}$		[1] [3]
14. Solve the system of equations : $x - y + 2z = 0$ , $x - 2y + 3z = -1$ , $2x - 2y + z = -3$ by							
Row-equ	ivalent mat	rix method	or Cramar's	s Rule.		·	•
15. Find the re	egression eq	uation of x	on y from	the following	ng data fro	m the following da	ata
X 5 9 13 17 21							
Y	3	8	13	18	23		
Estimate	th value of	x when y =	= 18.			1	
16. Solve the	following L	P Problem,	using simp	lex method	l		
Maximiz	z = 7x + 3	5y subject t	$o x + 2y \leq$	56, 4x + 3	$y \leq 12, x$ ,	$y \ge 0.$	
17.i) Define L	'Hospital's I	Rule and us	se it to evalu	uate $\lim_{x\to \theta}$	$\frac{x s i n \theta - \theta s i n}{\theta - \theta s i n}$	<u>nx</u>	[1 + 1]
ii) Find th	e derivative	of tanhx <sup>s</sup>	echx		$x - \theta$		[3]
18. a) Write	the equation	n of tangent	t to the curv	v = f(x) a	t piont $(x_1,$	$y_1$ ) in differential	form.
,	1	U			1 (1)	517	[1]
b) Define	e the angle o	of intersecti	ons betwee	n two curve	es.		[1]
b) Find	the point or	n the curve	$y = 2x^2 + 3$	3x + 5, the t	angent at v	which is perpendic	ular to
the lin	e x - 5y +10	0 = 0.					[3]
19. Two concentric circles are expanding in such a way that the radius of inner circle is increasing at a rate of 4cm/sec and that of the outer circle at a rate of 1.5cm/sec. Is the area between the circles increasing or decreasing when the inner and outer circles are 5 cm and 8 cm. And how fort?							
increasin between 8 cm Ar	entric circle g at a rate o the circles i d how fast?	s are expan f 4cm/sec a ncreasing c	ding in suc and that of t or decreasin	h a way tha he outer cin g when the	t the radius ccle at a rat inner and o	s of inner circle is e of 1.5cm/sec. Is puter circles are 5	the area cm and
increasin between 8 cm. An	entric circle g at a rate o the circles i id how fast?	s are expan of 4cm/sec a ncreasing c Group	ding in suc and that of t or decreasin o 'C'[8 × 3	h a way that the outer circle g when the $a = 24$	t the radius cele at a rat inner and o	s of inner circle is e of 1.5cm/sec. Is puter circles are 5	the area cm and
increasin between 8 cm. Ar	entric circle g at a rate o the circles i id how fast?	s are expan of 4cm/sec a ncreasing of Group	ding in suc and that of t or decreasin $0$ 'C'[ $8 \times 3$	h a way that the outer ching when the a = 24]	t the radius cle at a rat inner and o	s of inner circle is e of 1.5cm/sec. Is puter circles are 5	the area cm and
increasin between 8 cm. An 20. (a) Prove	entric circle g at a rate o the circles i id how fast?	s are expan of 4cm/sec a ncreasing c Group $\frac{1}{5} + \frac{1}{57} + \dots$	ding in suc and that of t or decreasin $\mathbf{O}^{*}\mathbf{C}^{*}[8 \times 3]$ 	h a way that the outer cing when the a = 24] $\log_{e} 2$	t the radius cele at a rat inner and o	s of inner circle is e of 1.5cm/sec. Is puter circles are 5	the area cm and [2]
increasin between 8 cm. An 20. (a) Prove b) Usins	entric circle g at a rate o the circles i d how fast? e that $\frac{1}{2.3} + \frac{3}{4}$	s are expan of 4cm/sec a ncreasing c Group $\frac{1}{.5} + \frac{1}{6.7} + \dots$ n's theorem	ding in suc and that of t or decreasin $0$ 'C'[ $8 \times 3$ = 1 - 1 find the va	h a way that he outer cing when the a = 24] $\log_{e} 2$ lue of (1-i	t the radius rele at a rat inner and $(\sqrt{3})^6$ .	s of inner circle is e of 1.5cm/sec. Is outer circles are 5	the area cm and [2]
<ul> <li>20. (a) Prove</li> <li>b) Using</li> <li>c) Using</li> </ul>	entric circle g at a rate o the circles i d how fast? that $\frac{1}{2.3} + \frac{2}{4}$ g De Morgan mathematic	s are expan of 4cm/sec a ncreasing c Group $\frac{1}{1.5} + \frac{1}{6.7} + \dots$ n's theorem cal inductio	ding in suc und that of t or decreasin $\mathbf{O} \cdot \mathbf{C} \cdot [8 \times 3$ 	h a way that he outer cing when the a = 24] $\log_e 2$ lue of $(1-i)$ at $1+3+5$	t the radius rcle at a rat inner and $(\sqrt{3})^6$ . ++ (2n	s of inner circle is e of 1.5cm/sec. Is puter circles are 5 -1) = n <sup>2</sup>	the area cm and [2] [3] [3]
<ul> <li>20. (a) Prove</li> <li>b) Using</li> <li>c) Using</li> <li>21. a) Find the</li> </ul>	entric circle g at a rate o the circles i d how fast? e that $\frac{1}{2.3} + \frac{2}{4}$ g De Morgan mathematic he equation	s are expan of 4cm/sec a ncreasing c Group $\frac{1}{1.5} + \frac{1}{6.7} + \dots$ n's theorem cal inductio of tangent	ding in suc und that of t or decreasin $\mathbf{O} \cdot \mathbf{C} \cdot [8 \times 3$ 	h a way that he outer cing when the = 24] $\log_e 2$ lue of $(1-i)$ at $1+3+5$ $2 x^2 + y^2 - 6$	t the radius rele at a rational and a transformed for the radius $(\sqrt{3})^6$ . $+ \dots + (2n + 8y - 4)$	s of inner circle is e of 1.5cm/sec. Is puter circles are 5 $(-1) = n^2$ = 0 at (8, 6).	the area cm and [2] [3] [3]
<ul> <li>20. (a) Prove</li> <li>b) Using</li> <li>c) Using</li> <li>21. a) Find th</li> </ul>	entric circle g at a rate o the circles i d how fast? e that $\frac{1}{2.3} + \frac{2}{4}$ g De Morgan mathematic he equation the conditio	s are expan of 4cm/sec a ncreasing c Group $\frac{1}{.5} + \frac{1}{6.7} + \dots$ n's theorem cal inductio of tangent in n that the li	ding in suc und that of t or decreasin $0 \cdot \mathbf{C}^{2}[8 \times 3]$ = 1 - 1 find the va n, prove that to the circle ne $lx + my$	h a way that he outer cing when the = 24] log <sub>e</sub> 2 lue of (1-i at 1 + 3 + 5 $\ge x^2 + y^2 - 6$ + n = 0 is	t the radius rcle at a rat inner and a $(\sqrt{3})^6$ . ++ (2n x + 8y - 4 = tangent to t	s of inner circle is e of 1.5cm/sec. Is puter circles are 5 $-1) = n^2$ = 0 at (8, 6). he circle $x^2 + y^2 + y^2$	the area cm and [2] [3] [3] 2gx +
<ul> <li>20. (a) Prove</li> <li>b) Using</li> <li>c) Using</li> <li>21. a) Find the b) Find the set of the set</li></ul>	entric circle g at a rate o the circles i d how fast? e that $\frac{1}{2.3} + \frac{7}{4}$ g De Morgan mathematic he equation the conditio + c = 0.	s are expan of 4cm/sec a ncreasing c Group $\frac{1}{.5} + \frac{1}{6.7} + \dots$ n's theorem cal inductio of tangent in n that the li	ding in suc und that of t or decreasin $\mathbf{O} \cdot \mathbf{C}^{2}[8 \times 3$ 	h a way that he outer cing when the = 24] log <sub>e</sub> 2 lue of (1-i at 1 + 3 + 5 $\Rightarrow x^2 + y^2 - 6$ + n = 0 is the	the radius rele at a rational radius $(\sqrt{3})^{6}$ . $+ \dots + (2n + 8y - 4)$ tangent to t	s of inner circle is e of 1.5cm/sec. Is puter circles are 5 $-1) = n^2$ = 0 at (8, 6). he circle $x^2 + y^2 + y^2$	the area cm and [2] [3] [3] • 2gx +
<ul> <li>20. (a) Prove</li> <li>b) Using</li> <li>c) Using</li> <li>21. a) Find th</li> <li>b) Find th</li> <li>2fy</li> <li>c) Find th</li> </ul>	entric circle g at a rate o the circles i d how fast? that $\frac{1}{2.3} + \frac{7}{4}$ g De Morgan mathematic he equation the conditio + c = 0.	s are expan f 4cm/sec a ncreasing c Group $\frac{1}{.5} + \frac{1}{6.7} +$ n's theorem cal induction of tangent to n that the line of parabol	ding in suc and that of t or decreasin $\mathbf{p} \cdot \mathbf{C'} [8 \times 3]$ = 1 - 1 find the va n, prove that to the circle ne $lx + my$ a whose ver	h a way that the outer cir g when the = $24$ ] log <sub>e</sub> 2 lue of (1- i at 1 + 3 + 5 $2x^2 + y^2 - 6$ + $n = 0$ is the retex is at (3)	t the radius rcle at a rat inner and a $(\sqrt{3})^6$ . $+ \dots + (2n)^4$ tangent to t $(2)^2$ and the	s of inner circle is e of 1.5cm/sec. Is puter circles are 5 $(-1) = n^2$ = 0 at (8, 6). he circle $x^2 + y^2 +$ focus is at (5, 2).	the area cm and [2] [3] [3] · 2gx +
<ul> <li>increasin between 8 cm. An</li> <li>20. (a) Prove b) Using c) Using 21. a) Find th b) Find th 2fy c) Find th 22. a)Define i</li> </ul>	entric circle g at a rate o the circles i d how fast? e that $\frac{1}{2.3} + \frac{3}{4}$ g De Morgan mathematic he equation the conditio + c = 0. he equation	s are expan f 4cm/sec a ncreasing c Group $\frac{1}{.5} + \frac{1}{6.7} +$ n's theorem al inductio of tangent i n that the li of parabol ne function	ding in suc and that of t or decreasin $\mathbf{p} \cdot \mathbf{C}^{*}[8 \times 3]$ = 1 - 1 find the va n, prove that to the circle ne $lx + my$ a whose veri f(x) w. r. t.	h a way that the outer cir g when the = 24] $\log_e 2$ $\ln e \text{ of } (1-i)$ $\tan 1 + 3 + 5$ $e x^2 + y^2 - 6$ + n = 0 is the retex is at (3) x	t the radius rcle at a rat inner and $(\sqrt{3})^6$ . ++ (2n x + 8y - 4 = tangent to t ,2) and the	s of inner circle is e of 1.5cm/sec. Is puter circles are 5 $(-1) = n^2$ = 0 at (8, 6). he circle $x^2 + y^2 + y^2$ focus is at (5, 2).	the area cm and [2] [3] [3] · 2gx + [1]
<ul> <li>20. (a) Prove</li> <li>b) Using</li> <li>c) Using</li> <li>c) Using</li> <li>21. a) Find th</li> <li>b) Find th</li> <li>2fy</li> <li>c) Find th</li> <li>2fy</li> <li>c) Find th</li> <li>2fy</li> <li>c) Find th</li> <li>2fy</li> <li>c) Find th</li> </ul>	entric circle g at a rate o the circles i d how fast? e that $\frac{1}{2.3} + \frac{2}{4}$ g De Morgan mathematic he equation the conditio + c = 0. he equation the integral of the integral	s are expan of 4cm/sec a ncreasing of <b>Group</b> $\frac{1}{1.5} + \frac{1}{6.7} + \dots$ n's theorem al inductio of tangent t in that the li of parabol ne function of $\int e^{ax} siz$	ding in suc und that of t or decreasin $\mathbf{O} \cdot \mathbf{C} \cdot [8 \times 3$ 	h a way that he outer cir g when the f = 24] $\log_e 2$ lue of $(1-i)$ at $1 + 3 + 5$ $e^{x^2} + y^2 - 6$ + n = 0 is represented by the second seco	t the radius rcle at a rat inner and o $(\sqrt{3})^6$ . ++ (2n x + 8y - 4 = tangent to t ,2) and the	s of inner circle is e of 1.5cm/sec. Is puter circles are 5 $(-1) = n^2$ = 0 at (8, 6). he circle $x^2 + y^2 + y^2$ focus is at (5, 2).	the area cm and [2] [3] [3] • 2gx + [1] [1]
<ul> <li>20. (a) Prove</li> <li>b) Using</li> <li>c) Using</li> <li>c) Using</li> <li>21. a) Find ti</li> <li>b) Find ti</li> <li>2fy</li> <li>c) Find ti</li> <li>2fy</li> <li>c) Find ti</li> <li>d) Define i</li> <li>b) Write</li> <li>c) Integration</li> </ul>	entric circle g at a rate o the circles i d how fast? e that $\frac{1}{2.3} + \frac{2}{4}$ g De Morgan mathematic he equation the conditio + c = 0. he equation ntegral of th the integral ate the follo dx	s are expan of 4cm/sec a ncreasing of <b>Group</b> $\frac{1}{1.5} + \frac{1}{6.7} + \dots$ n's theorem cal inductio of tangent to n that the lip of parabol ne function of $\int e^{\alpha x} sit$ wing	ding in suc und that of t or decreasin $\mathbf{O}^{\mathbf{C}}[8 \times 3]$ 	h a way that he outer cir g when the f = 24] $\log_e 2$ lue of (1-i at 1 + 3 + 5 $e x^2 + y^2 - 6$ + n = 0 is the retex is at (3)	t the radius rcle at a rat inner and $(\sqrt{3})^6$ . ++ (2n x + 8y - 4 = tangent to t ,2) and the	s of inner circle is e of 1.5cm/sec. Is puter circles are 5 $(-1) = n^2$ = 0 at (8, 6). he circle $x^2 + y^2 +$ focus is at (5, 2).	the area cm and [2] [3] (3) (2gx + 1) [1] [1]

## \*\*\*THE END\*\*\*

The Times Secondary School						
The Times antiso	Dillibazar, Kathman	du				
IN PLOOLERGIAN COLLEGE First Terminal Examination – 2080						
Grade: - XII	Set B	Full Marks:-75				
Stream: Science		Pass Marks:-30				
Subject: - Mathematics	8	Time : 3hrs				

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate the full marks.

### Attempt all the questions.

$Group - A [11 \times 1 = 11]$							
Rewrite the correct option in your answer sheet.							
1. Of the numbers formed by using all the figures 1, 2, 3, 4, 5 only once, how many are							
even ?	even ?						
a) 24	b) 36	c) 48	d) 96				
2. The sum of the binomi	al coefficients in the	e expansion of $(1 + x)^n$ is					
a) 2n	b) 2 <sup>n</sup>	c) n!	d) $n^2$				
3. Sum of the squares	ne first n natural nui	nbers is					
a) n <sup>2</sup>	b) $\frac{n(n+1)(2n+1)}{6}$	c) $\frac{n(n+1)}{2}$	$d\left(\frac{n(n+1)}{2}\right)^2$				
4. The center of the circle	$x^2 + y^2 + 4x - 6y + 4x$	4 = 0 is	· - /				
a) (-2, -3)	b) (2, -3)	c) (-2, 3)	d) (2, 3)				
5. The system of equation	is $x - 2y = 5$ and $kx$	+ 6y = 9 have no solutions	s when k equals				
a) -2	b) 2	c) -3	d) 3				
6. $\lim_{x \to \frac{\pi}{2}} \frac{\sec 7x}{\sec 5x}$ equals							
a) $\frac{7}{5}$	b) $-\frac{7}{5}$	c) $\frac{5}{7}$	d) $-\frac{5}{7}$				
7. The derivative of log(tan	7. The derivative of log(tanhx) is						
a) cosh 2x	b) sinh2 x	c) 2cosech2 x	d) sech <sup>2</sup> x				
8. The integral of $\int \frac{dx}{\sqrt{x^2+a}}$	$\frac{1}{2}$ is						
a) $\log(x + \sqrt{x^2 - a^2})$	+ <i>c</i> t	$\log(x - \sqrt{x^2 - a^2}) + c$					
c) $\log(x + \sqrt{x^2 + a^2})$	+ <i>c d</i>	$\sin^{-1}\frac{x}{a} + c$					
9. The correlation coefficinet 'r' between two variables lies between							
a) $-\infty \le r \le \infty$ b	$)-1 \le r \le 1$	c) $0 \le r \le 1$	d) $0 \le r \le \infty$				
10. If $\alpha$ and $\beta$ be two com	plex roots of unity t	then $\alpha^{-1}$ equals					
a) 1	0 (0	c) α	d ) β				
11. For two dependent ev	ents A and B, P(B/A	A) equals					
a) $\frac{P(A \cap B)}{P(A)}$	b). $P(A)P(B)$	c). $\frac{P(A \cap B)}{P(B)}$	d) $\frac{P(A)}{P(A \cap B)}$				

# Group 'B' $[5 \times 8 = 40]$

- 12. (a) In how many ways can the letters of the word "CALCULUS" be arranged so that two C's do not come together. [3]
- b) How many committees of 3 men and 2 women can be formed from 12 men and 8 women? [2]
- 13. a) Define Eulers number. [1] b) Show that  $1 + \frac{1+2}{2!} + \frac{1+2+3}{3!} + \frac{1+2+3+4}{4!} + \dots \dots$  to  $\infty = \frac{3e}{2}$ . [4]

- 14. Solve the system of equatiions : x y + z = -3, x + y + z = 1, 3x 4y z = 1 by Row-equivalent matrix method or Cramars Rule.
- 15. Find the coefficient of correlation by Karl Pearson's method.

	Х	6	2	10	4	8	
	Y	9	11	6	8	7	
16.	16. Solve the following LP Problem, using simplex method						
Maximize Z = 5x -3y subject to $3x + 2y \le 6$ , $x - 3y \le 4$ , $x, y \ge 0$							
17. a)Define L'Hospital's Rule and use it to evaluate $\lim_{x\to\theta} \frac{tanbx}{tancx}$ [1+1]							[1+1]
b) Find the derivative of $sinhx^{coshx}$ [3]							[3]
18. a) Write the equation of normal to the curve $y = f(x)$ at piont $(x_1, y_1)$ in differential form.						l form.	
							[1]
b) Define the angle of intersections between two curves.						[1]	
	c) Find the point on the curve $2y = 3 - x^2$ , the tangent at which is parallel to the line						line
	$\mathbf{x} + \mathbf{y} = 0.$						[3]

19. An inverted cone has depth of 40cm and a base of radius 5cm. Water is poured into it at a rate of 1.5 cubic centimeters per second. Find the rate at which the level of water in the cone is rising when the depth is 4 cm.

## Group 'C' $[8 \times 3 = 24]$

20. (a) If the coefficient of x in the expansion of $\left(x^2 + \frac{k}{x}\right)^5$ is 270 find k.	[2]
(b) Using De Morgan's theorem find the value of $(1 + i)^{20}$ .	[3]
c) Using mathematical induction, prove that $2 + 4 + 6 + + 2n = n (n + 1)$	[3]
21. a) Find the equation of tangents to the circle $x^2 + y^2 - 2x - 4y + 3 = 0$ at (2, 3).	[2]
b) Prove that the straight line $y = x + a\sqrt{2}x$ touches the circle $x^2 + y^2 = a^2$ . Also, find	d the
point of contact.	[3]
c) Find the equation of parabola whose vertex is at $(5, 3)$ and the focus is at $(5, 6)$ .	
22. a)Define integral of the function $f(x)$ w. r. t. x	[1]
b) Write the integral of $\int \sqrt{x^2 + a^2} dx$	[1]
c) Integrate the following	
i) $\int \frac{dx}{sinx+cosx}$ ii) $\int \frac{x-1}{(x-2)(x+1)} dx$	[3+3]

#### \*\*\*THE END\*\*\*