ZIAUDDIN UNIVERSITY
EXAMINATION BOARD

RESOURCES FOR

"HSC-II MATHEMATICS"

ZUEB EXAMINATIONS 2021

PREFACE:

The ZUEB examination board acknowledges the serious problems encountered by the schools and colleges in smooth execution of the teaching and learning processes due to sudden and prolonged school closures during the covid-19 spread. The board also recognizes the health, psychological and financial issues encountered by students due to the spread of covid-19.

Considering all these problems and issues the ZUEB Board has developed these resources based on the condensed syllabus 2021 to facilitate students in learning the content through quality resource materials.

The schools and students could download these materials from www.zueb.pk to prepare their students for the high quality and standardized ZUEB examinations 2021.

The materials consist of examination syllabus with specific students learning outcomes per topic, Multiple Choice Questions (MCQs) to assess different thinking levels, Constructed Response Questions (CRQs) with possible answers, Extended Response Questions (ERQs) with possible answers and learning materials.

ACADEMIC UNIT ZUEB:

2. Constructed Response Questions (CRQs)

HOW TO ATTEMPT CRQs:

- Write the answer to each Constructed Response Question/ERQs in the space given below it.
- Use black pen/pencil to write the responses. Do not use glue or pin on the paper.

SECTION B (SHORT ANSWER QUESTIONS)

Define each of the following:

i. $A \cup \emptyset$ **ii.** $A \cap A$ **iii.** $A \cap \emptyset$ **iv.** $A \cup A$ **v.** $\emptyset \cap \emptyset$ **vi.** $(A')' =$ **vii.** $A \cap A'$

S.#	CRQ	ANSWER	CL	DL
	EXERCISE 1.1			
1.	**Evaluate:** **a.** $\lim_{x\to 2} \frac{x^2-5x+6}{x^2-7x+10}$ **b.** $\lim_{x\to 0} \frac{sin2x}{sin3x}$	a. $\frac{1}{3}$ b. $\frac{2}{3}$	**K/A**	**E**

S.#	CRQ	ANSWER	CL	DL
	EXERCISE 1.7			
2.	**Find** $\lim_{x\to a} f(x), where$ $f(x) = \frac{3e^x-e^x-2}{x}$**, a=0**	4	**K/A**	**M**

S.#	CRQ	ANSWER	CL	DL
	EXERCISE 2.1			
3.	**Show that (-5, 3), (3, 2) and (-1,-4) are the vertices of an isosceles triangle.**	PROOF	**K/A**	**E**

4.	**The vertices A, B, C of a triangle are (2, 1), (5, 2) and (3, 4) respectively. Find the coordinates of the circum-center and also the radius of the circum-circle of the triangle.**	$\left(\frac{13}{4}, \frac{9}{4}\right), \frac{5\sqrt{2}}{4}$ units	**K/A**	**M**

S.#	**CRQ**	**ANSWER**	**CL**	**DL**
	EXERCISE 2.2			
5.	**Find the ratio in which the point M (0, -1) divides the join of L (1, 2) and N (2, 5).**	1: -2	**K/A**	**E**

S.#	**CRQ**	**ANSWER**	**CL**	**DL**
	EXERCISE 2.4			
6.	**The line through (6, -4) and (-3, 2) is parallel to the line through (2, 1) and (0, y). find y.**	$y = \frac{7}{3}$	**K/A**	**M**
7.	**Using slopes, find the fourth vertex of a parallelogram if (7, -1), (-3, 1) and (-5, 5) are its three consecutive vertices.**	(5, 3)	**K/A**	**M**

S#	**CRQ**	**ANSWER**	**CL**	**DL**
	EXERCISE 2.5			
8.	**The angle from the line through (2, 7) and (-6, 5) to a line through (1, -4) is 135º. Find the equation of the second line.**	3x+5y+17=0	**K/A**	**E**

S#	**CRQ**	**ANSWER**	**CL**	**DL**
	EXERCISE 3.1			
9.	**Find the equation of each of the following straight lines:** **i. Passing through (-1, 2) and parallel to the line joining the points (-1, 7) and (6, -5)**	12x+7y-2=0	**K/A**	**M**

S#	**CRQ**	**ANSWER**	**CL**	**DL**
	EXERCISE 3.2			
10.	**Find the value of k when the vertices of the triangle are the points:** **i. (2, 6), (6, 3) and (4, k) and area is 14 square units.** **ii. (-5, 3), (-1, -1) and (k, 5) and area is 16 square units.**	i. K=11.5 ii. K=1	**K/A**	**M**
11.	**Show that the line through the origin making an angle of measure ∅ with the line y=mx+b.** $\frac{y}{x} = \frac{m + tan\emptyset}{1 - m\, tan\emptyset}$	PROOF	**K/A**	**M**

S#	CRQ	ANSWER	CL	DL
	EXERCISE 4.2			
12.	**Find the differentiate coefficient of *f* at a given point t in the proper domain D(*f*) of *f*, where:** $f(t) = \frac{1}{2}tan^2t + ln\ cos\ t$	$\tan^3 t$	**K/A**	**M**

S#	CRQ	ANSWER	CL	DL
	EXERCISE 4.3			
13.	**If *f* is a function with y=*f(x)* given implicitly. Find $\frac{dy}{dx}$, where it exists in the following cases: (where a, b are constants)** $\sqrt{x^2+y^2} = ln\ (x^2-y^2)$	$\frac{x}{y}\left[\frac{2\sqrt{x^2+y^2}-x^2+y^2}{2\sqrt{x^2+y^2}+x^2-y^2}\right]$	**K/A**	**D**

S#	CRQ	ANSWER	CL	DL
	EXERCISE 4.4			
14.	**Find $\frac{dy}{dx}$ when x=*ln t* +sin *t*, y=e^t +cos t where it exists.**	$\frac{e1-sint}{\frac{1}{t}+cost}(wherecost \neq -\frac{1}{t})$	**K/A**	**E**

S#	CRQ	ANSWER	CL	DL
	EXERCISE 5.3			
15.	**Find the maximum and minimum values, if any, of the function $f: \mathbb{R} \to \mathbb{R}$ in the following cases:** $f(x) = x^3 - 9x^2 + 15x + 3$	Relative minimum at x=5 is -22 Related maximum at x=1 is 10	**K/A**	**E**

S#	CRQ	ANSWER	CL	DL
	EXERCISE 6.1			
16.	**Evaluate the following indefinite integrals.** **(i)** $\int (x-1)(x-2)(x-3)dx$	$\frac{1}{4}x^4 - 2x^3 + \frac{11}{2}x^2 - 6x + c$	**K/A**	**M**

S#	CRQ	ANSWER	CL	DL
	EXERCISE 6.2			
17.	**Evaluate the following integrals** **(i)** $\int \frac{dx}{\sqrt{25-16x^2}}$	$\frac{1}{4}sin^{-1}\left(\frac{4x}{5}\right) + C$	**K/A**	**M**

S#	CRQ	ANSWER	CL	DL
	EXERCISE 6.3			
18.	**Find:** **i.** $\int \frac{dx}{x\sqrt{x^4-1}}$	$\frac{1}{2}sec^{-1}(x^2) + C$	**K/A**	**M**

S#	CRQ	ANSWER	CL	DL
	EXERCISE 6.5			
19.	**Evaluate the following definite integrals** $\int \frac{dy}{y^2\sqrt{y^2-a^2}}$	$\frac{1}{a^2}\frac{\sqrt{y^2-a^2}}{y}+C$	**K/A**	**E**

S#	CRQ	ANSWER	CL	DL
	EXERCISE 6.7			
20.	**Find the following indefinite integrals:** $\int x\tan^{-1}x\,dx$	$\frac{x^2}{2}tan^{-1}x-\frac{x}{2}+\frac{1}{2}tan^{-1}x+C$	**K/A**	**M**
21.	**Calculate the following:** $\int e^x(\sin x+\cos x)\,dx$	$e^x sinx+C$	**K/A**	**D**

S#	CRQ	ANSWER	CL	DL
	EXERCISE 7.1			
22.	**Find the equation of the circle which touches x-axis and passes through the points (1, -2) and (3, -4)**	$x^2+y^2+10x+20y+25=0$, and $x^2+y^2-6x+4y+9=0$	**K/A**	**M**

S#	CRQ	ANSWER	CL	DL
	EXERCISE 8.4			
23.	**Find the value of c for which the line y-x=c will be tangent to the parabola $y^2=4ax$**	c=a	**K/A**	**E**

S#	CRQ	ANSWER	CL	DL
	EXERCISE 9.5			
24.	**Find sin(a, b) for the vector a, b of question 1**		**K/A**	**E**
25.	**Find a vector perpendicular to the plane through the points P_1, P_2, P_3 for each of the following sets of points:** **I. P_1 : (1, 3, 5), P_2 : (2, -1, 3), P_3 : (-3, 2, -6)** **II. P_1 : (2, 4, 6), P_2 : (-3, 1, 5), P_3 : (2, -6, 1)** **III. P_1 : (1, 0, 0), P_2 : (-2, 1, 3), P_3 : (-1, 1, 1)** **IV. P_1 : (2, -1, 2), P_2 : (0, 0, 0), P_3 : (-4, 1, -1)**	i. 42i – 19j -17k ii. 5i – 25j +50k iii. -2i -3j –k iv. i+6j +2k	**K/A**	**M**

S#	CRQ	ANSWER	CL	DL
	EXERCISE 9.6			
26.	**Simplify:** **i. [a . 2b -3c . -2a+b+c]** **ii. [-a-b-c . 2b +3c . -4a +c]**		**K/A**	**E**