ZIAUDDIN UNIVERSITY
EXAMINATION BOARD

RESOURCES FOR

"HSC-II MATHEMATICS"

<u>ZUEB EXAMINATIONS 2021</u>

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:

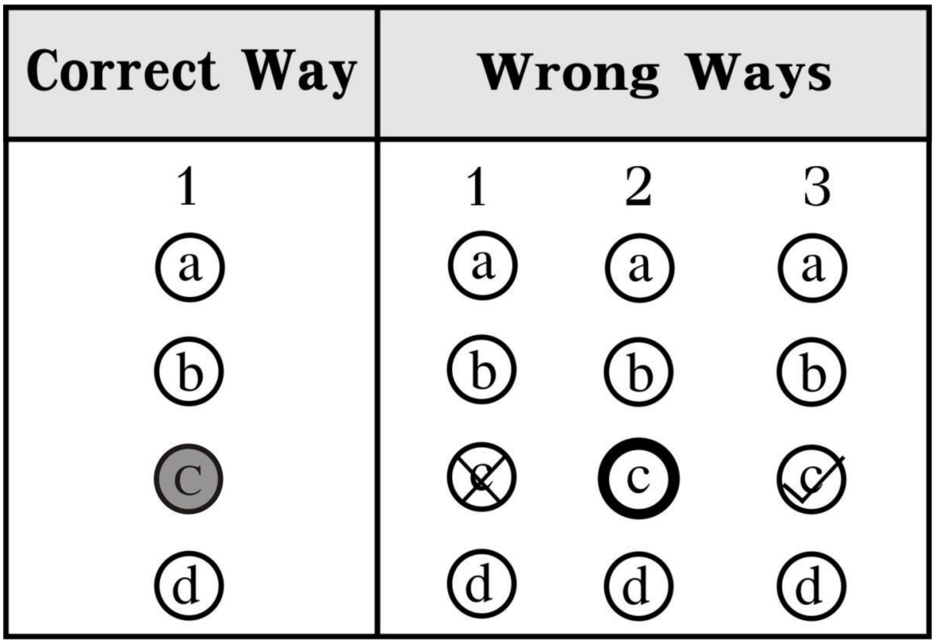
1: Multiple Choice Questions:

The Multiple-Choice Questions with a stem, correct answer and 3 distractors or plausible wrong answers format is designed to assess the content and thinking of students from; R (Remembering); U(Understanding) and A (Applying, Analyzing, Evaluating, Creating). The questions are also classified into three difficulty levels accordingly; D (DIFFICULT), M (MODERATE), E (EASY)

HOW TO ATTEMPT AN MCQ:

MCQ:

- **EACH MCQ HAS FOUR OPTIONS, A, B, C AND D. SELECT ONE OPTION AS THE BEST ANSWER AND FILL IN THE CIRCLE OF THAT OPTION, FOLLOWING THE INSTRUCTIONS GIVEN BY THE INVIGILATOR.**
- **USE BLACK PEN/PENCIL TO FILL IN THE CIRCLE.**



S#	MCQ'S MATERIAL	KEY	CL	DL
1.	$\lim\limits_{x\to\infty} \frac{1}{5^n} = ?$ **A.** ∞ **B.** 1 **C.** 0 **D.** None of these	**C**	**K/A**	**E**
2.	$\lim\limits_{x\to\infty} \left(1 + \frac{1}{n}\right)^n = ?$ **A.** 1 **B.** e **C.** ∞ **D.** None of these	**B**	**K/A**	**E**
3.	$\lim\limits_{x\to\infty} \left(1 + \frac{1}{n}\right)^{5n} = ?$ **A.** e **B.** e^2	**C**	**K/A**	**M**

	C. e^5 **D.** None of these			
4.	$\lim\limits_{x\to\infty} \frac{7^n - 1}{7^n} = ?$ **A.** 7 **B.** 1 **C.** 7^n **D.** None of these	**B**	**K/A**	**M**
5.	The limit of a ____________ sequence is Unique. **A.** Divergent **B.** Convergent **C.** Infinite **D.** None of these	**B**	**K/A**	**E**
6.	$\lim\limits_{x\to 0} \frac{\sqrt{1+x} -1}{x} = ?$ **A.** 1 **B.** $\frac{1}{2}$ **C.** $\frac{1}{4}$ **D.** 0	**B**	**K/A**	**E**
7.	$\lim\limits_{x\to 0} \frac{\text{Sin}3x}{\text{Tan}4x} = ?$ **A.** $\frac{2}{7}$ **B.** $\frac{7}{4}$ **C.** $\frac{4}{3}$ **D.** $\frac{3}{4}$	**D**	**K/A**	**M**
8.	$\lim\limits_{x\to 0} \frac{\sqrt{x} - 1}{x - 1} = ?$ **A.** 1 **B.** $\frac{1}{2}$ **C.** 2 **D.** 0	**D**	**K/A**	**M**
9.	$\lim\limits_{x\to 0} \frac{\text{Tanx}}{x} = ?$ **A.** 0 **B.** 1 **C.** 2 **D.** 3	**B**	**K/A**	**E**
10.	1. Limits of $\frac{\text{Sin}^2 3x}{x^2}$ tends to 0 is :	**A**	**K/A**	**E**

	A. 9 **B.** $\frac{1}{9}$ **C.** 4 **D.** $\frac{1}{4}$			
11.	The distance between two points (3, 2) and (7, 5) is A. 2 B. 3 C. 4 D. 5	**D**	**K/A**	**E**
12.	The coordinates of a point situated on y-axis at a distance of 6 units from x-axis. A. (0, 6) B. (6, 0) C. (6, 6) D. None of these	**A**	**K/A**	**E**
13.	In which quadrant does (-4, 3) lie ? A. I B. II C. III D. None of these	**B**	**K/A**	**M**
14.	The ratio in which the line segment joining the points A(2, -3), B(5, 6) is divided by x-axis **A.** 1 : 2 **B.** 2 : 1 **C.** 3 : 2 **D.** None of these	**A**	**K/A**	**M**
15.	1. The ratio in which the line segment joining the points P(-4, 2), Q(8, 3) is divided by y-axis **A.** 3 : 1 **B.** 1 : 3 **C.** 1 : 2 **D.** None of these	**C**	**K/A**	**E**
16.	What is the y-coordinates of any point on the x-axis? **A.** 0 **B.** 1 **C.** y **D.** None of these	**A**	**K/A**	**E**
17.	What is the x-coordinates of any point on the y-axis? A. 0 B. 1 C. Y D. None of these	**A**	**K/A**	**M**
18.	The (undirected) distance between two points $P_1(x_1, y_1)$ and P_2 (x_2, y_2) on the coordinates plane is given by: **A.** $\lvert P_1 P_2 \rvert = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	**A**	**K/A**	**M**

	B. $\lvert P_1 P_2 \rvert = \sqrt{\left(x_1^2 - y_1^2\right)}$ **C.** $\lvert P_1 P_2 \rvert = \left(x_2 - x_1\right)^2 - \left(y_2 - y_1\right)^2$ D. None of these			
19.	What is the slope of any line parallel to y-axis ? **A.** 0 **B.** 1 **C.** ∞ **D.** None of these	**C**	**K/A**	**E**
20.	What is the equation of the line passing through two given points $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$. **A.** $y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}\left(x - x_1\right)$ B. $y + y_1 = \frac{y_2 - y_1}{x_2 - x_1}\left(x + x_1\right)$ **C.** $y_1 + y = \frac{y_2 - y_1}{x_2 - x_1}\left(x + x_1\right)$ D. None of these	**A**	**K/A**	**E**
21.	What will be the equation of the line passing through the points (1, -2) and (-3, 5) ? **A.** $7x + 4y + 1 = 0$ **B.** $7x – 4y + 1 = 0$ **C.** $7x + 4y - 1 = 0$ **D.** None of these	**A**	**K/A**	**M**
22.	What is the equation of the line passing through two given points $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$ **A.** $\begin{vmatrix} 1 & y & 1 \\ 1 & y_1 & 1 \\ 1 & y_1 & 1 \end{vmatrix}$ **B.** $\begin{vmatrix} x & y & 1 \\ x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \end{vmatrix} = 0$ **C.** $\begin{vmatrix} x & y & 1 \\ x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \end{vmatrix} = 1$ D. None of these	**B**	**K/A**	**M**
23.	For what value of m, the lines $2x – 3y – 7 = 0$, $4x – 3y – 11 = 0$ and $2x + my + 1 = 0$ are concurrent? **A.** 4 **B.** -5 **C.** 5 **D.** None of these	**C**	**K/A**	**E**

24.	Right bisector of sides of a triangle are : A. parallel B. concurrent C. perpendicular D. None of these	**C**	**K/A**	**E**
25.	What does any equation of the first degree in x and y, called linear equation represents? **A.** A Plane **B.** A Line **C.** A Circle **D.** None of these	**B**	**K/A**	**M**
26.	What is the condition of perpendicularity for the lines given below? $a_1 x + b_1 y + c_1 = 0$, $a_2 x + b_2 y + c_2 = 0$? **A.** $a_1a_2 - b_1b_2 = 0$ **B.** $a_1a_2 + b_1b_2 = 0$ **C.** $\frac{a_1}{a_2} = \frac{b_1}{b_2}$ **D.** None of these	**B**	**K/A**	**M**
27.	What is the area of the triangle with vertices $P_1(x_1, y_1)$, $P_2(x_2, y_2)$ and $P_3(x_3, y_3)$ are collinear, then the area of the triangle region must be A. Zero B. Negative C. Unity D. None of these	**A**	**K/A**	**E**
28.	Find the distance of the point (3, 4) to the line $4x – 3y + 1 = 0$ **A.** 5 **B.** 4 **C.** 3 **D.** 1/5	**D**	**K/A**	**E**
29.	Find the area of the triangle whose vertices are (3, 1), (-2, 5), (-4, -5)? A. Δ = 25 sq. units B. Δ = 26 sq. units C. Δ = 29 sq. units D. Δ = 29 sq. units	**C**	**K/A**	**M**
30.	The point of concurrency of 3 lines is $5x – 3y – 7 = 0$ $3x – 4y – 10 = 0$ $x + 2y = 0$ A. (1, -2) B. (2, 1) C. (2, -1) D. (0, 2)	**C**	**K/A**	**M**
31.	For what value of “K” the three lines be concurrently $y = 3x – 1$, $2y = x + 3$; $3y = kx + 4$ **A.** 4 **B.** 3	**C**	**K/A**	**E**

	C. 2 **D.** 7			
32.	The condition if the pair of lines $ax^2 + 2hxy + by^2 = 0$ is parallel : **A.** $h + a - b = 0$ **B.** $b^2 - ha = 0$ **C.** $h - ab = 0$ **D.** None of these	**D**	**K/A**	**E**
33.	The condition if the pair of lines $ax^2 + 2hxy + by^2 = 0$ is perpendicular to each other : **A.** $a + b = 0$ **B.** $a - b = 0$ **C.** $h - ab = 0$ **D.** None of these	**A**	**K/A**	**M**
34.	If y = 7, $\frac{dy}{dx} = 7$ **A.** 6 **B.** 7x **C.** 0 **D.** 8	**C**	**K/A**	**M**
35.	If = x^2 , $\frac{dy}{dx} = ?$ **A.** 2 **B.** x **C.** 2x **D.** 0	**C**	**K/A**	**E**
36.	if y = $\frac{1}{x^2}$, $\frac{dy}{dx} = ?$ **A.** -2x **B.** $-2x^{-3}$ **C.** Both A and B **D.** None of these	**B**	**K/A**	**E**
37.	If $y = 5x^3 - 4x^2 + 7x + 9$, $\frac{dy}{dx} = ?$ **A.** $10x^2 - 8x + 7 = 0$ **B.** $15x^2 - 4x + 8 = 0$ **C.** $15x^2 - 8x + 7 = 0$ **D.** 0	**C**	**K/A**	**M**
38.	If $y = (ax^2 + bx + c)^p$, $\frac{dy}{dx} = ?$ **A.** $P(ax^2 + bx + c)^{p-1}$ **B.** $P(ax^2 + bx + c)^{p-1} (2ax + b)$ **C.** $P(2ax + b)$ **D.** None of these	**B**	**K/A**	**M**

39.	If y = $(x^3 + 10x^2 + 3)^{2/5}$, $\frac{dy}{dx} = ?$ **A.** $\frac{2}{5}(3x^2 + 20x)(x^3 + 10x^2 + 3)^{-3/5}$ **B.** $\frac{2}{3}(x^3 + 10x + 3)^{3/5}$ **C.** $(3x^2 + 10x)$ **D.** None of these	**A**	**K/A**	**E**
40.	If (x + 4) (x – 2) , $\frac{dy}{dx} = ?$ A. 2x + 6x B. 2x + 2 C. Both A and B D. None of these	**B**	**K/A**	**E**
41.	If $y = \left(\sqrt{x}+3\right)\left(\sqrt{x}-3\right)$, $\frac{dy}{dx} = ?$ **A.** 1 **B.** -9 **C.** 9 **D.** x	**A**	**K/A**	**M**
42.	If y = $Cos^2 3x$, $\frac{dy}{dx} = ?$ **A.** 2Cos3x Sin3x **B.** -6Cos3x Sin3x **C.** -6Cos3x **D.** None of these	**B**	**K/A**	**M**
43.	If y = $\frac{1 - e^x}{1 + e^x}$, $\frac{dy}{dx} = ?$ A. $\frac{-2e^x}{(1 + e^x)^2}$ B. $\frac{1}{(1 + e^x)}$ C. $\frac{1}{(1 + e^x)^2}$ D. None of these	**A**	**K/A**	**E**
44.	If y = ln Cosx , $\frac{dy}{dx} = ?$ A. –Tanx B. Cotx C. 1 D. Sinx	A	**K/A**	**E**
45.	If y = ln $(x^2 + 1)$, $\frac{dy}{dx} = ?$ **A.** $\frac{2}{x^2 + 1}$	**B**	**K/A**	**M**

	B. $\frac{2x}{x^2+1}$ **C.** $\frac{1}{1+x^2}$ **D.** None of these			
46.	Maximum and Minimum values are also called : A. Extreme values B. Turning values C. Both A and B D. None of these	**A**	**K/A**	**E**
47.	The points where a function has a maximum of a minimum value are called : **A.** Turning-points **B.** Stationary points **C.** Both A and B **D.** None of these	**A**	**K/A**	**E**
48.	The second derivative condition for f(x) to have maximum value f(a) at x = a is : **A.** $\frac{dy}{dx}$ = 0 at x =a **B.** $\frac{d^2}{dx^2}$ is –ve at x = a **C.** Both A and B **D.** None of these	**B**	**K/A**	**M**
49.	The condition for f(x) to have a minimum value at x = a is : **A.** $\frac{dy}{dx}$ = 0, at x = a **B.** $\frac{dy^2}{dx^2}$ is +ve at x = a **C.** Both A and B **D.** None of these	**B**	**K/A**	**M**
50.	If $f'(x) = 0$ does not give any real values of x_1 the function f (x) has ___________ values. **A.** Maximum **B.** Minimum **C.** Neither Maximum nor Minimum **D.** None of these	**C**	**K/A**	**E**
51.	Find the equation of the Tangent of the following curve y = x^2 at (1, 1) **A.** 2x – y – 1 = 0 **B.** 2x – y + 1 = 0 **C.** y – 2x + 9 = 0 **D.** 2x – y – 7 = 0	**A**	**K/A**	**E**
52.	Find the equation of the tangent y = $x^3 - 2x^2 + 4$ at (2, 4). **A.** y – 4 = $-\frac{1}{4}$ (x - 2) **B.** y – 1 = x – 1	**A**	**K/A**	**M**

	C. $y - 4 = 4(x - 2)$ **D.** None of these			
53.	Find the equation of normal to $x^2 + 3xy + y^2 = 5$ at (1, 1) **A.** $y = x$ **B.** $y^2 = x^2$ **C.** $y - x - 1 = 0$ **D.** **D.** $y - x - 2 = 0$	**A**	**K/A**	**M**
54.	Find the extreme value of the function "*f*" such that: $f(x) = \frac{1}{3}x^3 - 2x^2 + 3x + 1. \quad \forall x \in R$ **A.** $\left(\frac{7}{3}, 1\right)$ **B.** $\left(\frac{1}{3}, 7\right)$ **C.** $\left(\frac{1}{7}, 3\right)$ **D.** None of these	**D**	**K/A**	**E**
55.	$\int e^x \, dx$ A. X B. e^x C. e D. None of these	**B**	**K/A**	**E**
56.	$\int \frac{dx}{1+x^2} =$ A. tanx B. $\tan^{-1}x$ C. x D. None of these	**B**	**K/A**	**M**
57.	$\int \text{Cosec}^2(5x+4)\, dx =$ A. $-\frac{\text{Cot}(5x+4)}{5}$ B. $\text{Cot}(5x+4)$ C. $(5x+4)$ D. None of these	A	**K/A**	**M**
58.	$\int (x+5)^{\frac{3}{2}}\, dx =$ A. $\frac{2}{5}(x+5)^{\frac{5}{2}}$ B. $x^{\frac{5}{2}}$ C. x D. None of these	A	**K/A**	**E**

59.	$\int x^{\frac{-3}{2}}\ dx\ =$ A. $2x^{\frac{-1}{2}}$ +C B. x C. $x^{\frac{1}{2}}$ D. None of these	A	**K/A**	**E**
60.	$\int x^{-1}dx =$ A. $-\frac{1}{x}$ B. lnx C. 1 D. None of these	B	**K/A**	**M**
61.	$\int\left[\frac{a}{x}\ -1\right]dx = ?$ A. a ln $x + c$ B. –x C. a ln x – x + c D. $\frac{a}{x}$	C	**K/A**	**M**
62.	$\int\frac{y+3}{(y^2\ +6y)^{1/2}}\ dy$ A. $\frac{1}{2}(y^2\ +6y)^{1/2}+c$ B. $(y^2\ +6y)^{-1/2}+c$ C. $(y^2\ +6y)^{1/2}+c$ D. None of these	A	**K/A**	**E**
63.	$\int\frac{8x^2}{(x^3\ +2)^3}\ dx$ A. $\frac{8}{3}(x^3+2)^{-2}+C$ B. $\frac{-4}{6}(x^3+2)^{-4}+C$ C. $-\frac{4}{3}(x^3+2)^{-2}+C$ D. None of these	C	**K/A**	**E**
64.	$\int\frac{(\ln x)^7}{x}\ dx = ?$ A. $\frac{1}{8}(\ln x)^8\ +c$	A	**K/A**	**M**

	B. $\frac{1}{7}(\ln x)^7 + c$ C. $\frac{1}{8}(\ln x)^7 + c$ D. $\frac{1}{8}(\ln x)^{-7} + c$			
65.	The center and radius of the circle $x^2 + y^2 - 6x + 4y - 36 = 0$ are respectively **A.** (-6, 4), 6 **B.** (-3, 2) **C.** (3, -2), 7 **D.** None of these	C	**K/A**	**M**
66.	The equation of the circle with centre (-3, 2) and radius 7 is: **A.** $x^2 + y^2 - 3x + 2y + 7 = 0$ B. $x^2 + y^2 + 6x - 4y - 36 = 0$ **C.** $x^2 + y^2 - 6x + 4y - 36 = 0$ D. None of these	B	**K/A**	**E**
67.	The equation of the circle, the co-ordinates of the end points of whose diameter are (3, 4) & (-3, -4), is; **A.** $x^2 + y^2 + 25 = 0$ **B.** $x^2 + y^2 = 16$ **C.** $x^2 + y^2 = 25$ **D.** None of these	C	**K/A**	**E**
68.	The equation of the tangent to the circle $x^2 + y^2 = 25$ at the point (-3, -4) is: **A.** $3x + 4y + 25 = 0$ **B.** $3x + 4y - 25 = 0$ **C.** $4x + 3y + 25 = 0$ **D.** $4x + 3y - 25 = 0$	A	**K/A**	**M**
69.	A plane cutting a cone perpendicular to its axis is called? **A.** Circle **B.** Parabola **C.** Hyperbola **D.** Ellipse	A	**K/A**	**M**
70.	The length of the tangent to the circle $3x^2 + 3y^2 -7x - 6y = 12$ from the point (12, -14) is : **A.** 9 Units **B.** 18.33 Units **C.** 5 Units **D.** 1 Units	B	**K/A**	**E**
71.	The point of intersection of the parabola $y^2 = 4x$ and the straight line x = 4 are: **A.** (2, 3), (4, -4) **B.** (3, 4), (4, -4) **C.** (4, 4), (4, -4) **D.** None of these	C	**K/A**	**E**

72.	The point of intersection of the circle $x^2 + y^2 = 25$and the line $y = 4$ are: **A.** (3, 4), (-3, -4) **B.** (2, 3), (3, 4) **C.** (3, $\pm$4), (-3, $\pm$4) **D.** (-4, 3), (3, -4)	A	**K/A**	**M**
73.	The circles $x^2 + y^2 + 2ax + c = 0$ and $x^2 + y^2 + 2by + c = 0$ touch if $\frac{1}{a^2} + \frac{1}{b^2} = ?$ **A.** $\frac{1}{a}$ **B.** $\frac{1}{c}$ **C.** $\frac{1}{b}$ **D.** 1	B	**K/A**	**M**
74.	Equation of tangent of circle $x^2 + y^2 + 6x – 6y + 2 = 0$ at (1/5, 3/5) is: **A.** $3x – 4y + 2 = 0$ **B.** $4x – 3y + 1 = 0$ **C.** $5x – 3y + 1 = 0$ **D.** None of these	B	**K/A**	**E**
75.	What will be the volume of the parallelepiped whose coterminous edges are a, b and, where a = 3i + 2k , b = i + 2j + k . c = j + 4k **A.** 10 Cubic Units **B.** 15 Cubic Units **C.** 20 Cubic Units **D.** 23 Cubic Units	D	**K/A**	**E**
76.	If F = 3i – j + k , d = 2i + j + 4k , work done = ? **A.** -9 **B.** 9 **C.** 1 **D.** None of these	B	**K/A**	**M**
77.	Any vector whose direction is taken as arbitrarily and magnitude is 0 is called as : **A.** A null vector **B.** A unit vector **C.** inverse of a vector **D.** None of these	A	**K/A**	**M**
78.	Let $\hat{a}$ be any vector and $\lvert\vec{a}\rvert$ be its magnitude and $\hat{a}$ is unit vector then $\hat{a}$ = ? **A.** $\hat{a} = \lvert\vec{a}\rvert$ **B.** $\hat{a} = \frac{\hat{a}}{\lvert\vec{a}\rvert}$	B	**K/A**	**E**

	C. $\hat{a} = \lvert\vec{a}\rvert\,\vec{a}$ **D.** None of these			
79.	The unit vector $\vec{i}$ can be expressed as : **A.** [0, 0, 1] **B.** [1, 0, 0] **C.** [1, 1, 1] **D.** [0, 0, 0]	B	**K/A**	**E**
80.	For any vector $\vec{a} = (a_1, a_3, a_3)$ which relation is true : **A.** $\underline{a} = a_1\underline{i} + a_2\underline{i} + a_3\underline{k}$ **B.** $\vec{a} = a_1 i + a_2 j - a_3 k$ **C.** $\underline{a} = a_1^2\underline{i} + a_2^2\underline{i} + a_3^2\underline{k}$ **D.** None of these	D	**K/A**	**M**
81.	The vector which defines the position of the vector relative to origin is called as : **A.** position vector of that vector **B.** Resultant vector of that Vector **C.** Pointing vector **D.** Null vector	A	**K/A**	**M**