முழுப்பதிப்புரிமையுடையது [All Rights Reserved]

School Based Assessment-2027 A/L

General Certificate of Education (Adv. Level) 1st Term – 2026

இணைந்த கணிதம் Combined Mathematics	Grade 12	E	10	Three hours and ten minutes

Index No. | | | | | | |

Instructions

- This question paper consists of two parts;
  Part A (questions 1-10) and **part B**(questions 11- 17).

Part - A

- Answer **all** questions. Answers should be written in the space provided on the questions paper. If additional space needed, you may use additional answer sheets.

Part - B

- Answer only 5 questions.
- After the allocated time hand over the paper to the supervisor with both parts attached together.
- **Only part B** of the paper is allowed to be taken out of the Examination Hall..

(10) Combined Mathematics - II		
Part	**Question No.**	**Marks**
A	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
B	11	
	12	
	13	
	14	
	15	
	16	
	17	
Total		

Combined Mathematics-I	
Combined Mathematics-II	
Final Marks	

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Part - A

01) Find the range of values of such that $( ) = {}^{2}{}^{2} + 2(2 - 5) + 9 ; (\neq 0)$ is positive for all values of

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02) Find the real values of which satisfying the inequality $\frac{}{-1} < 3$. Hence, Find all the real values of which satisfying the inequality $\frac{}{3\ -1} < 1$.

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03) Write $\frac{1}{(\ -1)(\ -2)}$ into partial fraction, Hence $\frac{1}{(\ +1)(\ +2)}$ into partial fraction

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04) If $\quad = \quad + \quad$ then, show that $^3 - \ ^3 - \ ^3 = 3\ bc$.
Hence factorise: $27(\ +2)^3 - (2\ +3)^3 - (\ +3)^3$

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05) and are non-zero vectors. Define · .
If | + 2 | = | − 2 | then, find the angle between and

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06) The position vector of , and with respect to are 14 − 2 , −4 + 10 and 2 + 6 respectively.
Show that , , are in collinear points.

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07) The forces 3 , 5 and 7 are act a point, and the forces are in equilibrium. Find the angle between the forces 3 and 5 .

08) The incenter of a triangle is . Forces , find act along OA, OB, OC respectively and the system is in equilibrium. Show that : : $= \cos\frac{}{2} : \cos\frac{}{2} : \cos\frac{}{2}$.

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09) Two forces and are acting on a point such that their resultant is . If is doubled show that the new resultant is perpendicular to and its magnitude is $\sqrt{4^{\ 2} - \ ^{2}}$

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10) Lets , and are angles of a triangle. Show that, $\sin \ + \sin \ + \sin \ = 4\cos\frac{}{2} \cdot \cos\frac{}{2} \cdot \cos\frac{}{2}$

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Part - B

11)

a) and are the roots of the equation $^2 + px + = 0$ where ; , . Find the quadratic equation, whose roots are ^{2} and ^{2}.Hence, deduce that quadratic equation, whose roots are $^2 + 1$ and $^2 + 1$.

b) When the polynomial function ( ) is divided by $(- 1)(- 2)(- 3)$, the remainder is $(- 2)(- 3) + (- 3)(- 1) + (- 1)(- 2)$, find the values of (1), (2) and (3) in terms of , and c . If there is no terms in ^{2} in the remainder, when $^5 + ^2$ is divided by $(- 1)(- 2)(- 3)$, find the value of .

c) Let $( ) = 3 ^2 + 6 + 5$. Write ( ) in the format of $(+)^2 +$, where , and are determining constants. Hence the minimum value of ( ) and maximum value of $\frac{1}{1+ ( )}$.

12)

a) Solve the following equations:

1) $2 ^4 + ^3 - 11 ^2 + + 2 = 0$
2) $(+ 2)(+ 3)(+ 8)(+ 12) = 4 ^2$
3) $(6 -)^4 + (8 -)^4 = 16$
4) $64 \cdot 9 - 84 \cdot 12 + 27 \cdot 16 = 0$

b) If , $\in ^+, \log_{27} + \log_9 = \frac{7}{2}$ $\log_{27} + \log_9 = \frac{2}{3}$ then, find the values of and .

13)

a) Prove that: $\sin^2 + \cos^2 = 1$

b) Write the expansion of $\cos(+)$. Hence prove that $\cos 2 = \cos^2 - \sin^2$. Also, show that $\cos^2 = \frac{1}{2}(1 + \cos 2)$ and $\sin^2 = \frac{1}{2}(1 - \cos 2)$

Show that $\sin 22\frac{1}{2}^\circ = \frac{1}{2}(\sqrt{2 - \sqrt{2}})$ and $\cos 22\frac{1}{2}^\circ = \frac{1}{2}(\sqrt{2 + \sqrt{2}})$.

Hence prove that $\tan 22\frac{1}{2}^\circ = \sqrt{2} - 1$ and find the value of $\tan 67\frac{1}{2}^\circ$.

c) If $\sin = \sin(-) ; k\epsilon - \{-1,1\}$ then, show that $\tan(\frac{2 -}{2}) = \frac{-1}{+1}\tan\frac{}{2}$

d) If $\tan = \frac{\sin \cos}{1 - \sin^2}$ then, show that $\tan(-) = (1 -)\tan$

14)

a) Solve the following trigonometric equations.

i. $2\sin^2 + (2 + \sqrt{3})\sin + \sqrt{3} = 0$
ii. $2\sin^2 - \sqrt{3}\cos + 1 = 0$
iii. $\sin + \cos = \sqrt{2}$
iv. $\sin 4 + \sin 3 + \sin 5 = 0$
v. $\sqrt{3}\tan - 1 = \tan\frac{}{2}(\sqrt{3} + \tan)$

b) Show that $4\sin \sin(60° -)\sin(60° +) = \sin 3$ and hence deduces that $\sin 20° \sin 40° \sin 80° = \frac{\sqrt{3}}{8}$

c) If $\cos + \sin + = 0 ; \cos + \sin + = 0$ then, show that $(mr - nq)^2 + (np - lr)^2 = (lq - mp)^2$

15)

a) Find the value of following

i. $2\cos\frac{}{13}\cos\frac{9}{13}+\cos\frac{3}{13}+\cos\frac{5}{13}$

ii. $\tan 35°\tan 40°\tan 45°\tan 50°\tan 55°$

iii. $\sin^2 5°+\sin^2 10°+\sin^2 15°+\cdots\ldots+\sin^2 90°$

b) Prove the following

i. $\frac{\sin\ +\sin 3\ +\sin 5\ +\sin 7}{\cos\ +\cos 3\ +\cos 5\ +\cos 7}=\tan 4$

ii. $(1+\tan\ )^2+(1+\cot\ )^2=(\sec\ +\operatorname{cosec}\ )^2$

iii. $\frac{1+\sin\ -\cos}{1+\sin\ +\cos}=\tan\frac{}{2}$

iv. $\sec\ +\tan\ =\tan(\frac{}{4}+\frac{}{2})$

v. $\frac{\sin\ +\sin 2}{1+\cos\ +\cos 2}=\tan$

vi. $\tan 3\ \tan 2\ \tan\ =\tan 3\ -\tan 2\ -\tan$

16)

a) and are non-parallel and non-zero vectors. If + = then, show that = 0 and = 0 where , ∈

b) In parallelogram , is mid-point of BC and is mid-point of AB. OD and EC intersect at . If $\overrightarrow{OA}=$, $\overrightarrow{OC}=$ then,

i. Show that $\overrightarrow{FD}=(\ +\frac{1}{2}\ )$ where is parameter.

ii. Show that $\overrightarrow{CF}=(\ -\frac{1}{2}\ )$ where is parameter.

iii. Hence find $CF:FE$ and $OF:FD$ using above parts

c) Let = − 2 = −3 + . If + is parallel to − − 3 then find the value of . Here is the scaler.

17)

a) The resultant of two forces and act at a point in angle is . (>)If each forces are increased by then, the new resultant make an angle with .
Show that tan $=\frac{(\ -\ )\sin}{+\ +\ +(\ +\ )\cos}$.

b) is centre of regular hexagon DE . Forces 2,7, , ,3,13 act along OA, OB, OC, OD, OE, OF respectively. If the system is in equilibrium then, find the values of and

c) AB is a uniform rod of length 5a and weight w. It is suspended from a fixed point by light strings OA and OB length of 4 and 5 repectively. If rod is in equilibrium then, find the tension of strings

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