



ASIAN GRAMMAR SCHOOL

Combined Mathematics I

Term Test

(March – 2018)

Grade 12

Marks

Prepared by: N I Pushpakumara

Time: 02 1/2 hours

Name:

Answer all questions

Part 01

1. Prove that $\frac{\sin 2A}{1 - \cos 2A} = \cot A$

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2. If $g(x) = 2x^2 - x$, $x \in \mathbb{R}$; find $g(x^2)$

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3. Find the limit

$$\lim_{h \rightarrow 0} \frac{4 - \sqrt{16 + h}}{h}$$

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4. A chord AB of length 5.5cm subtends an angle of 70° at the centre O of a circle.
Taking $\pi = \frac{22}{7}$ calculate the radius of the circle.

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5. Show that $(a+b)$ is a factor of the equation $x^3 - 3abx - (a^3 + b^3) = 0$

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10. Find the resultant of two vectors of magnitudes 8 units and 10 units if the angle between them is 120° .

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Part 02

1.
 - a) Given that $A + B + C = \pi$, Prove that $\tan A + \tan B + \tan C = \tan A \tan B \tan C$
 - b) Show that $\sin^{-1} \frac{3}{5} + \sin^{-1} \frac{5}{13} = \sin^{-1} \frac{56}{65}$
 - c) In the usual notation, using the sine rule for a triangle ABC, show that $a(b-c) \csc \frac{A}{2} \cot \frac{A}{2} = (b-c)^2 \tan \frac{(b-c)}{2} \sec \frac{(b-c)}{2}$
2.
 - a) The remainder when $f(x) = 2x^4 + ax^2 + bx - 60$ is divided by $(x-1)$ is -94. If $(x-3)$ is a factor of $f(x)$; find the value of a and b .
 - b) If the remainder when the polynomial function $5x^3 + ax^2 + 6x + 4$ is divided $(x-2)$ is 3 times as the remainder when $4x^3 - 5x^2 + ax + 4$ is divided by $(x-2)$, find the value of a .
3.
 - a) Express $\frac{4x^2-3x+5}{(x+2)(x-1)^2}$ in partial fractions.
 - b) Solve the equation $49^x = \frac{1}{343}$
 - c) Evaluate $\lim_{x \rightarrow \frac{\pi}{2}} \frac{\cos x}{\frac{\pi}{2} - x}$

6. Find the horizontal component of a force of 10N inclined at 30° to the vertical.

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7. Solve $49^x = \frac{1}{343}$

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8. Rationalize the denominator of $\frac{2}{\sqrt{7}+2}$

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9. Find the value of $\tan^{-1}(-\sqrt{3})$

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ASIAN GRAMMAR SCHOOL

Combined Mathematics II

Term Test March – 2018

Grade 12

Marks

Prepared by: N I Pushpakumara

Time: 02 1/2 hours

Name:

Answer all questions

Part A

1. Express the domain and the range of the function $f(x) = x^2 + 1$

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2. Find the length of the arc of a circle of radius 6cm, which subtends an angle $\frac{\pi}{6}$ at the centre.

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3. If $\cos(A - B) = \cos A \cos B + \sin A \sin B$, find the value of $\cos 15^\circ$.

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4. Find the constants A,B and C if $A(x^2 + 2) + (x - 1)(Bx + C) \equiv 3(x + 1)$

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5. Prove the identity, $(\csc A + \sin A)(\csc A - \sin A) = \cot^2 A + \cos^2 A$

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6. Solve the equation $9^x = 3^x + 6$ (hint; $3^x = y$)

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7. Find the limit $\lim_{x \rightarrow 1} \frac{x^3 - 1}{x^4 - 1}$

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8. Let $f(x) = 2x - 1$, find the value of $f(a + 5)$

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9. Mark the interval $[-2, 3]$ on a number line.

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10. If $\sec \theta = \frac{-13}{12}$, where θ is in the 3rd quadrant; find $\sin \theta$.

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Part B

1. A motor car with initial velocity $u \text{ ms}^{-1}$ and having a uniform acceleration travels distance $2s \text{ m}$ in $t_1 \text{ s}$. then it travels for $t_2 \text{ s}$ uniform retardation a distance $s \text{ m}$ and comes to rest. Show that $s = \frac{u}{2} \left[\frac{t_1 t_2}{2t_2 - t_1} \right]$

2.
 - a) ABCD is a parallelogram. The mid points of the sides AB and CD are M and N respectively. Prove that AMCN is a parallelogram.
 - b) Find a, b
 - i. $a = 2i + j, b = i - 3j$
 - ii. $a = 7i - 3j, b = 5j$
 - c) If $3i + 2j$ and $2i + \lambda j$ are parallel vectors, find the value of λ .

3.
 - a) A cake is 35cm in diameter. It is to be shared among 12 people; so it is cut into 12 equal slices. Find the area of each slice of cake. ($\pi = \frac{22}{7}$)
 - b) OAB is a segment of a circle of radius $2a$ subtending an angle of 45° at the centre O. C and D are mid points of OB and OA respectively. CD is a curved line parallel to the curved line PQ. Find,
 - i. The perimeter
 - ii. Area of the portion bounded by ABCD.