နိုင်ငံခြား…ကင်စစ်ဆေးသည့်မေးခွန်းလွှာ

2019

MATRICULATION EXAMINATION

DEPARTMENT OF MYANMAR EXAMINATION

MATHEMATICS **Time Allowed: (3) Hours**

WRITE YOUR ANSWERS IN THE ANSWER BOOKLET.

SECTION (A)

(Answer **ALL** questions)

1.(a) Functions f and g are defined by $f(x) = x^2 - 1$, and $g(x) = 3x + 1$. Find the values of x which satisfy the equation $(g \circ f)(x) = 7x - 4$. (3 marks)

(b) When $f(x) = (x-1)^3 + 6(px+4)^2$ is divided by $x + 2$, the remainder is -3. Find the values of p. (3 marks)

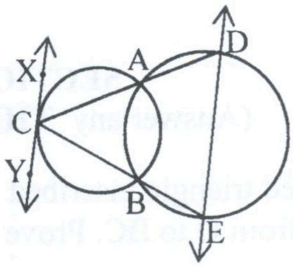
2.(a) Find and simplify the coefficient of x^6 in the expansion of $(x - \frac{3}{x})^{14}$, $x \neq 0$. (3 marks)

(b) How many terms of the arithmetic progression 9, 7, 5, . . . add up to 24? (3 marks)

3.(a) Given that $2\begin{pmatrix} 1 & 4 \\ -6 & 3 \end{pmatrix} + \begin{pmatrix} 1 & 2 \\ -1 & 3 \end{pmatrix}\begin{pmatrix} 3 & 4 \\ 5 & -4 \end{pmatrix} = \begin{pmatrix} a & b \\ 0 & c \end{pmatrix}$, find the values of a, b and c. (3 marks)

(b) A die is thrown. If the probability of getting a number less than x is $\frac{2}{3}$, find x. (3 marks)

4.(a) Given: XY is the tangent at C.
Prove : XY // DE. (3 marks)



(b) The coordinates of A, B and C are (1, 0), (4, 2) and (5, 4) respectively. Use vector method to determine the coordinates of D if ACBD is a parallelogram. (3 marks)

5.(a) Solve the equation $\cos^2 x = 2 + \cos x$ for $0^\circ \leq x \leq 360^\circ$. (3 marks)

(b) Differentiate $x^2 - 3x$ with respect to x from the first principles. (3 marks)

SECTION (B)

(Answer any **FOUR** questions)

6.(a) Functions $f : R \rightarrow R$ and $g : R \rightarrow R$ are defined by $f(x) = 3x - 1$ and $g(x) = x + 2$. Find the value of x for which $(f^{-1} \circ g)(x) = (g^{-1} \circ f)(x) - 4$. (5 marks)

(b) The polynomial $ax^3 + bx^2 - 5x + 2a$ is exactly divisible by $x^2 - 3x - 4$. Find the values of a and b. What is the remainder when it is divided by $x + 2$? (5 marks)

7.(a) A binary operation $\odot$ on the set R of real numbers is defined by $x \odot y = x^2 + y^2$. Evaluate $[(1 \odot 3) \odot 2] + [1 \odot (3 \odot 2)]$. Show that $x \odot (y \odot x) = (x \odot y) \odot x$. (5 marks)

(b) If the coefficients of x^r and x^{r+2} in the expansion of $(1 + x)^{2n}$ are equal, show that $r = n - 1$. (5 marks)

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8.(a) Find the solution set in R of the inequation $x^2 - 2x \le 0$ by algebraic method and illustrate it on the number line. (5 marks)

(b) The sum of the first six terms of an A.P. is 96. The sum of the first ten terms is one-third of the sum of the first twenty terms. Calculate the first term and the tenth term. (5 marks)

9.(a) The sum of the first n terms of a certain sequence is given by $S_n = \frac{1}{2}(3^n - 1)$.
Find the first 3 terms of the sequence and express the n^{th} term in terms of n. (5 marks)

(b) Using the definition of inverse matrix, find the inverse of the matrix $\begin{pmatrix} 3 & 5 \\ 2 & 2 \end{pmatrix}$. (5 marks)

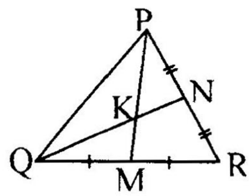
10.(a) Find the inverse of the matrix $\begin{pmatrix} 3 & 4 \\ 2 & 6 \end{pmatrix}$. Use it to determine the coordinates of the point of intersection of the lines $3x + 4y = 18$ and $6y + 2x = 22$. (5 marks)

(b) Construct the table of outcomes for rolling two dice, a blue die and a black die. Find the probability that the score on the blue die is less than that on the black die. Find also the probability that the score on blue die is prime and the score on the black die is even. (5 marks)

SECTION (C)
(Answer any **THREE** questions)

11.(a) ABC is an acute-angled triangle inscribed in a circle whose centre is O, and OD is the perpendicular drawn from O to BC. Prove $\angle BOD = \angle BAC$. (5 marks)

(b) Given: ΔPQR, with two medians PM and QN intersecting at K.
Prove: $\alpha(\Delta PNK) = \alpha(\Delta QMK)$. (5 marks)



12.(a) Two circles cut at C, D and through C any line ACB is drawn meet the circles at A, B. AD and BD are joined and produced to meet the circles again at E, F. If AF, BE produced meet at G, prove that D, F, G, E are concyclic. (5 marks)

(b) If $\alpha + \beta + \gamma = 180°$, prove that $\sin 2\alpha + \sin 2\beta + \sin 2\gamma = 4 \sin\alpha \sin\beta \sin\gamma$. (5 marks)

13.(a) In ΔABC, if $\angle A : \angle B : \angle C = 1 : 3 : 8$ and $AB = 9$, find AC. (5 marks)

(b) If $y = \ln(\sin^3 2x)$, then prove that $3\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 + 36 = 0$. (5 marks)

14.(a) By using geometric vectors, show that the diagonals of a parallelogram bisect each other. (5 marks)

(b) Show that the point $(1, \frac{\pi}{2})$ lies on the curve $2xy + \pi \sin y = 2\pi$. Then find the equations of tangent and normal to the curve at the point $(1, \frac{\pi}{2})$. (5 marks)