

Objective
per Code
6198

Intermediate Part First
MATHEMATICS (Objective) Group - II
Time: 30 Minutes Marks: 20



No.1 You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill the relevant circle in front of that question number on computerized answer sheet. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero marks in that question. Attempt as many questions as given in objective type question paper and leave other circles blank.

Questions	A	B	C	D
A fair coin is tossed twice then probability of getting one head and one tail is:	1	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$
Arithmetic mean between $2 + \sqrt{2}$ and $2 - \sqrt{2}$ is:	0	2	4	$2\sqrt{2}$
If $a_n = 3n - 11$, then 6th term is:	13	7	15	11
The partial fractions of $\frac{x+5}{(x+1)(x^2+1)}$ will be of the form:	$\frac{A}{x+1} + \frac{B}{x^2+1}$	$\frac{A}{x+1} + \frac{Bx+C}{x^2+1}$	$\frac{Ax+B}{x+1} + \frac{C}{x^2+1}$	$\frac{A}{x+1} + \frac{Bx}{x^2+1}$
If ω is cube root of unity then $\omega^{20} + \omega^{28} + 1 =$:	1	2	0	-1
If α, β are the roots of $3x^2 - 2x + 4 = 0$ then $(\alpha+1)(\beta+1) =$:	$\frac{3}{4}$	$\frac{4}{3}$	$\frac{4}{3}$	3
If $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ -3 & 2 \end{bmatrix}$ then the value of y will be:	2	-2	4	-4
If A is 4×4 matrix then $ KA =$:	$K A ^4$	$K^2 A ^2$	$K^4 A $	$K^4 A $
If $A \cap B = \phi$, then $n(A \cup B)$ is equal to:	$n(A) + n(B)$	$n(A \cap B)$	$n(A)$	$n(B)$
Multiplicative inverse of $(1, 0)$ is:	$(1, 0)$	$(1, 0)$	$(-1, 0)$	$(0, -1)$
The solution of $1 + \cos x = 0$ if $0 \leq x < 2\pi$ is:	$\{0\}$	$\{\frac{\pi}{3}\}$	$\{\frac{\pi}{3}\}$	$\{\pi\}$
$\cos(\tan^{-1} \sqrt{3}) =$:	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\sqrt{3}$
If the shadow of a tree is equal to its height then the angle of elevation of the sun is:	45°	30°	60°	90°
The period of $3 \cos \frac{x}{5}$ is:	π	10π	$\frac{\pi}{10}$	$\frac{\pi}{5}$
$\cos 48^\circ + \cos 12^\circ =$:	$2 \cos 18^\circ$	$3 \cos 18^\circ$	$\sqrt{3} \cos 18^\circ$	$\sqrt{2} \cos 18^\circ$
$\sqrt{2} \sin 45^\circ + \frac{1}{\sqrt{2}} \csc 45^\circ =$:	1	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	2
The number of terms in the expansion of $(x+y)^9$ is:	9	8	10	11
If $\sin \theta = \frac{1}{2}$ and $\frac{\pi}{2} < \theta < \pi$ then $\cos \theta =$:	$\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$
Sum of binomial coefficients in the expansion of $(1+x)^5$ is:	32	16	10	8
${}^6P_3 =$:	36	6	18	120

Group-2

FBD-11-G2-19

Intermediate Part First

Roll No. _____

MATHEMATICS (Subjective) Group – II

Time: 02:30 Hours Marks: 80

SECTION – I

Attempt any EIGHT parts:

16

- i) Simplify by justifying each step: $\frac{4+16x}{4}$
- ii) Find the multiplicative inverse of the complex number $(\sqrt{2} - i\sqrt{5})$
- iii) Prove that $\bar{z} = z$ if and only if z is real.
- iv) Write any two proper subsets of the set $\{x \mid x \in \mathbb{Q} \wedge 0 < x \leq 2\}$
- v) Write inverse and contrapositive of the conditional $q \rightarrow p$
- vi) Define a semi-group.
- vii) Find x and y if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix} = \begin{bmatrix} y & 1 \\ -3 & 2x \end{bmatrix}$
- viii) If A and B are square matrices of the same order, then explain why in general $(A+B)(A-B) \neq A^2 - B^2$
- ix) Define rank of a matrix.
- x) Solve the equation: $x^3 + x^2 + x + 1 = 0$
- xi) Discuss the nature of the roots of the equation: $2x^2 - 5x + 1 = 0$
- xii) When $x^4 + 2x^3 + kx^2 + 3$ is divided by $x - 2$, the remainder is 1. Find the value of k .

Attempt any EIGHT parts:

16

- i) Define an identity equation and give its example.
- ii) Resolve into partial fractions: $\frac{1}{x^2 - 1}$
- iii) Write in mixed form: $\frac{6x^3 + 5x^2 + 7}{2x^2 - x + 1}$
- iv) If $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in A.P. Show that common difference is $\frac{a-c}{2ac}$
- v) Find the sum of 20 terms of the series, whose n th term is $3n + 1$
- vi) If x and y are positive distinct real numbers, show that G.M between x and y is less than A.M.
- vii) If $y = \frac{x}{2} + \frac{x^2}{4} + \frac{x^3}{8} + \dots, 0 < x < 2$, prove that $x = \frac{2y}{1+y}$
- viii) Find the 12th term of harmonic sequence $\frac{1}{3}, \frac{2}{9}, \frac{1}{6}, \dots$
- ix) Express in factorial form: $\frac{(n+1)(n)(n-1)}{3 \cdot 2 \cdot 1}$
- x) Prove that $n! > 2^n - 1$ is true for $n = 5, n = 6$
- xi) Using binomial theorem find the value of $(1.03)^{\frac{1}{3}}$ upto three decimal places.
- xii) Use binomial series to find $(1.03)^{\frac{1}{3}}$ upto three places of decimals.

Attempt any NINE parts:

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- i) Convert $54^\circ 45'$ into radians.
- ii) Evaluate $\frac{\tan \frac{\pi}{3} - \tan \frac{\pi}{6}}{1 + \tan \frac{\pi}{3} \tan \frac{\pi}{6}}$
- iii) Prove that $2\cos^2 \theta - 1 = 1 - 2\sin^2 \theta$
- iv) Prove that $\tan\left(\frac{\pi}{4} + \theta\right) + \tan\left(\frac{3\pi}{4} + \theta\right) = 0$
- v) If α, β, γ are angles of a triangle ABC then prove that $\tan(\alpha + \beta) + \tan \gamma = 0$

(Continued P 2)

- 2 -

- (vi) Prove that $\frac{1 - \cos \alpha}{\sin \alpha} = \tan \frac{\alpha}{2}$
- (vii) Find the period of $\tan 4x$
- (viii) State the law of cosines (any two).
- (ix) At the top of a cliff 80 meters high the angle of depression of a boat is 12° . How far is the boat from the cliff?
- (x) Define angle of elevation.
- (xi) Show that $\sin (2 \cos^{-1} x) = 2x \sqrt{1 - x^2}$
- (xii) Find solution of equation $\sec x = -2$ which lie in $[0, 2\pi]$
- (xiii) Solve the equation $1 + \cos x = 0$

SECTION - II Attempt any THREE questions. Each question carries 10 marks.

- (a) If $(G, \times)$ is a group and $a \in G$, then show that inverse of a is unique in G . 05
- (b) If ℓ, m, n are the p th, q th and r th terms of an A.P. Show that $p(m - n) + q(n - \ell) + r(\ell - m) = 0$ 05
- (a) Solve the given system of equations by Cramer's rule:
$$\begin{aligned} 2x + 2y + z &= 3 \\ 3x - 2y - 2z &= 1 \\ 5x + y - 3z &= 2 \end{aligned}$$
 05
- (b) Two dice are thrown. What is the probability that the sum of the number of dots appearing on them is 4 or 6? 05
- (a) Show that the roots of $x^2 + (mx + c)^2 = a^2$ will be equal if $c^2 = a^2(1 + m^2)$ 05
- (b) Find the term in the expansion of $\left(\frac{3}{2}x - \frac{1}{3x}\right)^{11}$ involving x^5 05
- (a) If $\tan \theta = \frac{1}{\sqrt{7}}$ and the terminal arm of the angle is not in the III quad. Find the value of $\frac{\csc^2 \theta - \sec^2 \theta}{\csc^2 \theta + \sec^2 \theta}$ 05
- (b) Without using calculator show that $\cos 20^\circ \cos 40^\circ \cos 80^\circ = \frac{1}{8}$ 05
- (a) Prove that $\Delta = 4R r \cos \frac{\alpha}{2} \cos \frac{\beta}{2} \cos \frac{\gamma}{2}$ 05
- (b) Prove that $\cos^{-1} \frac{63}{65} + 2 \tan^{-1} \frac{1}{5} = \sin^{-1} \frac{3}{5}$ 05

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