Mathematics HSSC-I: Annual 2018: FBISE (GP-1)

Total Marks: 100 (Section A: 20, Section B: 40, Section C: 40)

Federal Board of Intermediate and Secondary Education, Islamabad

SECTION - A (Marks 20)

Note: Section-A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which should be completed In the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q 1. Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.

1. What is the value of i^{13}?

   (A) $-i$ (B) i (C) -1 (D) 1

2. How many inverse elements correspond to each element of group?

   (A) At least two (B) Only one (C) At least one (D) Two

3. If A is any matrix of order $m \times n$ then minor of matrix of any one element has order:

   (A) $m \times n$ (B) $(m-1) \times n$ (C) $m \times (n-1)$ (D) $(m-1) \times (n-1)$

4. What is the value of $(-1+\sqrt{3}i)^4 + (-1-\sqrt{3}i)^4$?

   (A) 16 (B) -16 (C) 4 (D) -4

5. The prtial fraction $\frac{1}{1+x^3}$ will be in the form of:

   (A) $\frac{A}{1-x} + \frac{Bx+C}{1+x+x^2}$ (B) $\frac{A}{1+x} + \frac{Bx+C}{1+x^2}$ (C) $\frac{A}{1+x} + \frac{Bx+C}{x^2-x+1}$

   (D) $\frac{A}{1+x} + \frac{Bx+C}{x^2-x+1}$

6. What is the value of S_{19} if terms of $A.P$ are $2 + \frac{7}{2} + 5 + \frac{13}{2} + ...19th$

   (A) $\frac{129}{2}$ (B) $\frac{529}{2}$ (C) $\frac{829}{2}$ (D) $\frac{589}{2}$

7. What is the value of n, if ${}^nC_8 = {}^n C_{12}$?

   (A) 8 (B) 12 (C) 4 (D) 20

8. What is the term independent of a in expension of $(\frac{a}{2} - \frac{2}{a})^6$?

   (A) $\frac{15}{4}$ (B) -20 (C) $\frac{-15}{4}$ (D) 20

9. What is the Arc length if an arc subtends an angle $60°20'$ with radious $18mm$?

   (A) 20.6 (B) 20.5 (C) 25.5 (D) 26.5

10. What is the value of $sin90°$

(A) $4\cos^3\theta - 3\cos^3\theta$ (B) $3\cos^3 3\theta - 4\cos 3\theta$ (C) $3\sin 3\theta - 4\sin^3 3\theta$ (D) $4\sin 3\theta - 3\sin^3\theta$

11. What is the value of $\cos(\frac{3\pi}{2} + \theta)$?

(A) $\cos\theta$ (B) $\sin\theta$ (C) $-\sin\theta$ (D) $-\cos\theta$

12. In a triangle if $a = 17, b = 10, c = 2$, then what is the value of R

(A) $\frac{85}{8}$ (B) $\frac{83}{8}$ (C) $\frac{81}{8}$ (D) $\frac{87}{8}$

13. What is the value of $\frac{\pi}{2} - \sin^{-1} x$?

(A) $\sin^{-1} x$ (B) $-\sin^{-1} x$ (C) $\cos^{-1} x$ (D) $-\cos^{-1} x$

14. What is the representation of conjuction of two statements p and q?

(A) $p \wedge q$ (B) $p \vee q$ (C) $p \longrightarrow q$ (D) $p \longleftrightarrow q$

15. If a sequence has condition $a_n - a_{n-1} = n + 1$, $a_4 = 14$ then a_5 has value:

(A) 16 (B) 20 (C) 26 (D) 24

16. $\frac{\sqrt{(S-b)(S-c)}}{\sqrt{S(S-a)}}$

(A) $\sin\frac{\alpha}{2}$ (B) $\tan\frac{\beta}{2}$ (C) $\tan\frac{\gamma}{2}$ (D) $\tan\frac{\alpha}{2}$

17. What is the range of $\cot^{-1}(x)$?

(A) $-1 < x < 1$ (B) $0 \leq x \leq \pi$ (C) $0 < x < \pi$ (D) $-\frac{\pi}{2} < x < \frac{\pi}{2}$

18. What is the multiplicative inverse of $1 - 2i$

(A) $\frac{1-2i}{4}$ (B) $\frac{1+2i}{5}$ (C) $\frac{1+2i}{\sqrt{5}}$ (D) $\frac{1-2i}{\sqrt{5}}$

19. The solution set of $\cos x - \sin x = 0$ in $[0, \pi]$ is:

(A) $\frac{5\pi}{4}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{4}$ (D) $\frac{5\pi}{3}$

20. What is the rank of $\begin{bmatrix} 1 & 2 & 5 \\ 0 & 0 & 0 \\ 3 & 2 & 0 \end{bmatrix}$

(A) 3 (B) 2 (C) 1 (D) 0

ANSWERS

1. B 2. B 3. D 4. B 5. C 6. D 7. D 8. B 9. B 10. C 11. C
12. A 13. C 14. A 15. B 16. D 17. C 18. B 19. C 20. B

Section–B

Q # 2. Attempt any TEN parts. All parts carry equal marks. (10 × 4 = 40)

(i) If $Z_1 = 2+i, Z_2 = 3-2i, Z_3 = 1+3i$ then find the value of $\frac{\overline{Z_1}\cdot\overline{Z_2}}{\overline{Z_3}}$ in the form of $a+bi$.	Ch#1, Example 2, Ex#1.3
(ii) By using truth table prove that $p \vee (\sim p \wedge \sim q) \vee (p \wedge q) = q \vee (\sim p \wedge \sim q)$.	Ch#2, Ex#2.4, Q#5
(iii) Show that $\begin{vmatrix} x & 1 & 1 & 1 \\ 1 & x & 1 & 1 \\ 1 & 1 & x & 1 \\ 1 & 1 & 1 & x \end{vmatrix} = (x+3)(x-1)^3$.	Ch#3, Ex 3.3, Q#8
(iv) Solve the equation $4.2^{2x+1} - 9.2^x + 1 = 0$.	Ch#4, Ex 4.2, Q#14
(v) Resolve into partial fraction $\frac{(2x+1)}{(x+3)(x-1)(x+2)^2}$.	Ch#5, Ex 5.2, Q#11
(vi) Find the sum of n^{th} term of series $r + (1+k)r^2 + (1+k+k^2)r^3 + \ldots$	Ch#6, Ex 6.8, Q#3(ii)
(vii) Find the number grater then 23000 that can be formed from digit $1,2,3,5,6$ without repeating any digit.	Ch#7, Ex 7.2, Q#8
(viii) If x is so small that its square and higher power may be neglected then show that $\frac{(1+x)^{\frac{1}{2}}(4-3x)^{\frac{3}{2}}}{(8+5x)^{\frac{1}{3}}} \approx 4\left(1-\frac{5x}{6}\right)$.	Ch#8, Ex 8.3, Q#4(v)
(ix) Find correct to the nearest centimeters distance at which a coin of diameter $1cm$ should be held so as to conceal the full moon whose diameter substance an angle of $31'$ at the eye of observer on the earth.	Ch#9, Example#7, Ex 9.1
(x) Prove that $\sqrt{\frac{1+\sin\alpha}{1-\sin\alpha}} = \frac{\sin\frac{\alpha}{2}+\cos\frac{\alpha}{2}}{\sin\frac{\alpha}{2}-\cos\frac{\alpha}{2}}$.	Ch#10, Ex 10.3, Q#6
(xi) Draw the graph of $y = \cos x$ from 0 to 2π.	Ch#11, Page#344
(xii) By using usual notation prove that $r_1 = \frac{\Delta}{s-a}$	Ch#12, Page#381
(xiii) Show that $\cos^{-1}(-x) = \pi - \cos^{-1}(x)$.	Ch#13, Ex 13.2, Q#18
(xiv) Find the solution set of $\sin 3x + \sin 2x + \sin x = 0$.	Ch#14, Ex 14, Q#16

Section C (40 Marks (5×8 each))	
Note: *Attempt any* ***Five*** *questions. Graph paper will be supplied on demand.*	
Q # 3 Use matrix to solve the following system: $2x_1 + x_2 + 3x_3 = 3$ $x_1 + x_2 - 2x_3 = 0$ $-3x_1 - x_2 + 2x_3 = -4$	Ch#3, Ex 3.5, Q#2(ii)
Q # 4 Solve the system of equation: $x^2 - y^2 = 5$, $4x^2 - 3xy = 18$	Ch#4, Ex 4.9, Example#3
Q # 5 If the numbers $\frac{1}{2}, \frac{4}{21}$ and $\frac{1}{36}$ are subtracted from three consecutive term of G.P the resulting numbers are in H.P. Find the numbers if there product is $\frac{1}{27}$.	Ch#6, Ex 6.10, Q#18
Q # 6 Identify the following series and find its sum: $1-\frac{1}{2}\left(\frac{1}{2}\right)+\frac{1.3}{2.4}\left(\frac{1}{2}\right)^2-\frac{1.3.5}{2.4.6}\left(\frac{1}{2}\right)^3+\ldots$	Ch#8, Ex 8.3, Q#9(ii)
Q # 7 Find the value of $\sin(\alpha+\beta)$ and $\cos(\alpha+\beta)$ if $\tan\alpha = \frac{-15}{8}$ and $\sin\beta = \frac{-7}{25}$, neither α nor β lie in $4th$ quadrant.	Ch#10, Ex10.2, Q#10(ii)
Q # 8 Prove that $\cos^{-1}\frac{63}{65} + 2\tan^{-1}\frac{1}{5} = \sin^{-1}\frac{3}{5}$	Ch#13, Ex 13.2, Q#8
Q # 9 Show that the set consisting of elements of form $\{a+\sqrt{3}b(a,b)\}$ is an abelian group w.r.t. addition.	Ch#2, Ex 2.8, Q#7