Mathematics HSSC-I: Annual 2018: FBISE (GP-2)

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

Federal Board of Intermediate and Secondary Education, Islamabad

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. In a matrix $A = \begin{bmatrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{bmatrix}$ what is the value of A_{12}?

   (A) 9 (B) -9 (C) 6 (D) -6

2. If $r = 1$ or $r = 0$ what is the value of ${}^{n}c_r$?

   (A) 0 (B) r (C) 1 (D) n

3. What is the value of $\frac{2}{1-i}$

   (A) $2(1+i)$ (B) $2(1-i)$ (C) $1+i$ (D) $1-i$

4. If set A has 5 has elements, then how many binary relations are in $A \times A$?

   (A) 2^{25} (B) $2^{25}-1$ (C) 25 (D) 2^5

5. If A is matrix of order $m \times n$ and B is matrix of order $n \times l$, then what is the matrix of order $A \times B$?

   (A) $m \times n$ (B) $l \times m$ (C) $l \times n$ (D) $m \times l$

6. What is product of the root of quadratic equation $x^2 - 3x + 6 = 0$

   (A) 6 (B) -6 (C) 3 (D) -3

7. What is the partial fraction of $\frac{7x+25}{(x+3)(x+4)}$?

   (A) $\frac{4}{x+3} - \frac{3}{x+4}$ (B) $\frac{4}{x+4} - \frac{3}{x+3}$ (C) $\frac{4}{x+3} + \frac{3}{x+4}$ (D) $\frac{4}{x+4} + \frac{3}{x+3}$

8. What is the sum of infinite $G.P$ $2, \sqrt{2}, 1, ...$?

   (A) $4 - \sqrt{2}$ (B) $4 + 2\sqrt{2}$ (C) $2\sqrt{2}$ (D) $2 + 2\sqrt{2}$

9. what is the value of $r!{}^{n}C_r$?

   (A) ${}^{n+1}P_r$ (B) ${}^{n-1}C_r$ (C) ${}^{n}P_r$ (D) ${}^{n+1}C_r$

10. For what value of n the expression $3^n > n!$ is UNTRUE if $n \epsilon Z$

(A) $n = 6$ (B) $n = 7$ (C) $n = 2$ (D) $n = 3$

11. Which of the following angles are coterminal?

(A) $\frac{\pi}{3}, \frac{4\pi}{3}$ (B) $\frac{\pi}{3}, \frac{5\pi}{6}$ (C) $\frac{\pi}{3}, \frac{13\pi}{3}$ (D) $\frac{5\pi}{3}, \frac{\pi}{3}$

12. What is the value of $\tan 3\theta$?

(A) $\frac{3\tan\theta + tan^3\theta}{1+3\tan^2\theta}$ (B) $\frac{3\tan\theta - tan^3\theta}{1-3\tan^2\theta}$ (C) $\frac{3\tan\theta + tan^3\theta}{1-3\tan\theta}$ (D) $\frac{3\tan\theta - tan^3\theta}{1+3\tan\theta}$

13. What is the period of $3\cos\frac{x}{5}$?

(A) 13π (B) 10π (C) $\frac{15\pi}{3}$ (D) $\frac{13\pi}{5}$

14. What is the range of function $y = \cot x$?

(A) $-1 \leq y \leq 1$ (B) $-1 \leq x \leq 1$ (C) $-\infty \leq x \leq \infty$ (D) $-\infty \leq y \leq \infty$

15. What is the value of r_2?

(A) $S\tan\frac{r}{2}$ (B) $S\tan\beta$ (C) $S\tan\frac{\alpha}{2}$ (D) $S\tan\frac{\beta}{2}$

16. What is solution of $1 + \cos x = 0$ for complete period?

(A) $\{-\pi + n\pi\}$ (B) $\{\pi + n\pi\}$ (C) $\{-\pi + 2n\pi\}$ (D) $\{\pi + 2n\pi\}$

17. What is the area of triangle in square units if $b = 21.6$, $c = 30.2$, $\alpha = 52°40'$

(A) 295.3 (B) 952.3 (C) 259.3 (D) 529.3

18. A die is rolled, what is the probability that dots on top are greater than 4?

(A) $\frac{1}{6}$ (B) $\frac{1}{3}$ (C) $\frac{1}{2}$ (D) $\frac{1}{4}$

19. What is the multiplicative inverse of $1 + 2i$?

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

20. What is the value of $\tan^{-1} x$

(A) $\frac{\pi}{2} + \cot^{-1} x$ (B) $\frac{\pi}{2} + \tan^{-1} x$ (C) $\frac{\pi}{2} - \cot^{-1} x$ (D) $\frac{\pi}{2} - \tan^{-1} x$

ANSWERS

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

Section –B

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

(i) Separate into real and imaginary part $\frac{(-2+3i)^2}{1+i}$.	Ch#1, Ex#1.2, Q#16(ii)
(ii) If $S=\{1,-1,i,-i\}$, show that S is an abelian group under multiplication.	Ch#2, Ex#2.7, Example#4
(iii) Show that $\begin{vmatrix} b+c & a & a^2 \\ c+a & b & b^2 \\ a+b & c & c^2 \end{vmatrix} = (a+b+c)(a-b)(b-c)(c-a)$.	Ch#3, Ex 3.3, Q#3(xi)
(iv) Solve the system of equation $3x+4y=25, \frac{3}{x}+\frac{4}{y}=2$	Ch#4, Ex 4.8, Q#6
(v) Resolve into partial fraction $\frac{4x}{(x+1)^2(x-1)}$	Ch#5, Ex 5.2, Q#3
(vi) Obtain the sum of all integers in the first 1000 integers which are neither divisible by 5 nor by 2.	Ch#6, Ex 6.4 Q#9
(vii) Prove that ${}^nC_r + {}^nC_{r-1} = {}^{n+1}C_r$.	Ch#7, Ex 7.4, Q#10
(viii) Find the term independent of x in the expression of $(1+x^2)^3\left(1+\frac{1}{x^2}\right)^4$.	Ch#8, Ex 8.2, Q#9(iii)
(ix) If $\cot\theta=\frac{5}{2}$ and terminal arm if angle is in 1st quadrant, then find the value of $\frac{3\sin\theta+4\cos\theta}{\cos\theta-\sin\theta}$.	Ch#9, Ex 9.2, Q#8
(x) If α,β,γ are the angles of triangle ABC, then show that $\cot\frac{\alpha}{2}+\cot\frac{\beta}{2}+\cot\frac{\gamma}{2}=\cot\frac{\alpha}{2}\cot\frac{\beta}{2}\cot\frac{\gamma}{2}$	Ch#10, Ex 10.2, Q#12
(xi) Prove that $\frac{\operatorname{cosec}\theta+2\operatorname{cosec}2\theta}{\sec\theta}=\cot\frac{\theta}{2}$.	Ch#10, Ex#10.3, Q#7
(xii) Prove that $r=\frac{\Delta}{s}$ (with usual notation).	Ch#12, pag#379
(xiii) Prove that $2\tan^{-1}\frac{1}{3}+\tan^{-1}\frac{1}{7}=\frac{\pi}{4}$	Ch#13, Ex 13.2, Q#12
(xiv) Find the solution set of $3\cos^2\theta-2\sqrt{3}\sin\theta\cos\theta-3\sin^2\theta=0$.	Ch#14, Ex 14, Q#7

Section C (40 Marks (5×8 each))

*Note: Attempt any **Five** questions. Graph paper will be supplied on demand.*

Q # 3 Solve the following system of equation by using the augmented matrix into reduced echelon forms.	Ch#3, Ex 3.5, Q#3(ii)

$x+2y+z=2$ $2x+y+2z=-1$ $2x+3y-z=9$	
Q # 4 Solve the equation $\sqrt{x^2+4x-21}+\sqrt{x^2-x-6}=\sqrt{6x^2-5x-39}$.	Ch#4, pag#149
Q # 5 If three consecutive in an *A.P.* are increased by $1,4,15$ respectively the resulting number are in *G.P.* Find the original number if their sum is 6.	Ch#6, Ex 6.6, Q#14
Q # 6 If $y=\frac{1}{3}+\frac{1.3}{2!}\left(\frac{1}{3}\right)^2+\frac{1.3.5}{3!}\left(\frac{1}{3}\right)^3+\ldots\ldots$ then prove that $y^2+2y-2=0$	Ch#8, Ex 8.3, Q#11
Q # 7 Prove that $\sin\frac{\pi}{9}\sin\frac{2\pi}{9}\sin\frac{\pi}{3}\sin\frac{4\pi}{9}=\frac{3}{16}$.	Ch#10, Ex10.4, Q#5(ii)
Q # 8 Prove that $r_1+r_2+r_3-r=4R$.	Ch#12, Ex 12.8, Q#5(iii)
Q # 9 Find the solution set of $\cos 2x=\sin 3x$.	Ch#14, Ex 14, Q#10