PAPER NO. 10 — D G KHAN BOARD (FIRST GROUP) — ANNUAL 2018

Roll No. ____________________ (To be filled in by the candidate)

Maximum Marks: 20 **(OBJECTIVE TYPE)** Time Allowed : 30 Minutes

NOTE: Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink. Cutting or filling two or more circles will result in zero mark in that question.

Q1. 20

1. The fractions $\frac{x-3}{x+1}$ is
   (A) Improper (B) Proper
   (C) Identity (D) Equivalent
2. A geometric mean (G.M) between "a" and "b" is
   (A) $\frac{a+b}{2}$ (B) $\frac{2}{a+b}$
   (C) $\sqrt{ab}$ (D) $\frac{2ab}{a+b}$
3. The formula for the sum of n terms of an A.P is
   (A) $\frac{n}{2}\{2a+(n+1)d\}$ (B) $\frac{n}{2}\{a+(n-1)d\}$
   (C) $\frac{n}{2}\{2a+(n-1)d\}$ (D) $\frac{n}{2}\{a-(n-1)d\}$
4. From a box containing 5 green and 3 red balls, one ball is taken out. The probability that the ball drawn is black is.
   (A) 1 (B) $\frac{1}{2}$
   (C) $\frac{1}{8}$ (D) 0
5. Value of $\frac{9!}{6!\ 3!}$ is:
   (A) 84 (B) 48
   (C) 24 (D) 42
6. Expansion of $(1+2x)^{15}$ is valid if
   (A) $|x| < 1$ (B) $|x| < 2$
   (C) $|x| < \frac{1}{2}$ (D) $|x| \le 1$

7. The expression $n^2 - n + 41$ represents a prime number for $n \in N$ where

(A) $n \le 10$ (B) $n \le 20$

(C) $n \le 40$ (D) $n \le 5$

8. If $\sin\theta = \frac{1}{2}$ then θ is equal to

(A) 30° (B) 45°

(C) 60° (D) 90°

---

9. $\cos 2\theta$ is equal to

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

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

10. The smallest positive integer p for which $f(p+x) = f(x)$ is called.

(A) Domain (B) Range

(C) Co-Domain (D) Period

11. With usual notation in triangle ΔABC. If $a = 7$, $b = 3$, $c = 5$ then value of 'S' is equal to

(A) 15 (B) $\frac{15}{2}$

(C) 55 (D) 105

12. If ΔABC is right anlge triangle, the law of cosine reduces to the

(A) Law of Sine (B) Area of triangle

(C) Law of tangent (D) Pythagoras theorem

13. The value of $\frac{\pi}{2} - \sin^{-1}x$ is equal to

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

(C) $\cos x$ (D) $\sin x$

14. An equation containing at least one trigonometric function is called

(A) algebraic equation (B) quadratic equation

(C) linear equation (D) trigonometric equation

15. The number π is

(A) a whole number (B) a natural number

(C) a rational number (D) an irrational number

16. The number of ways in which a set can be described are

(A) 1 (B) 2

(C) 3 (D) 4

17. If A and B are matrices, then $(AB)^t =$

(A) B^tA^t (B) A^tB^t

(C) AB (D) BA

18. **Rank of the matrix $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ is.**

(A) 1 (B) 2

(C) 3 (D) 4

19. **The roots of the equation $ax^2 + bx + c = 0$ will be imaginary if**

(A) $b^2 - 4ac = 0$ (B) $b^2 - 4ac > 0$

(C) $b^2 - 4ac < 0$ (D) $b^2 - 4ac = 1$

20. **If $b^2 - 4ac > 0$ and perfect square then roots are**

(A) Rational (B) Irrational

(C) Equal (D) Complex

D.G.Khan Board 2018 (First Group)

Roll No. (To be filled in by the candidate)

Maximum Marks: 80 **(SUBJECTIVE TYPE)** Time Allowed: 2.30 Hours

PART - I

Q2. Attempt any eight parts **(16)**

(i) Check the closure property of addition and multiplication for the set {0, -1}

(ii) If z_1 and z_2 are complex numbers then show that $\overline{z_1 z_2} = \bar{z}_1 \bar{z}_2$

(iii) Express the complex number $(1 + i\sqrt{3})$ in the polar form

(iv) If A = {1, 2, 3} then find the power set of A

(v) Define tautology and absurdity

(vi) Define Group

(vii) If $A = \begin{bmatrix} 2i & i \\ i & -i \end{bmatrix}$ then find A^{-1}

(viii) Define cofactor of an element of a matrix and give an example

(ix) Without expansion show that $\begin{vmatrix} \alpha & \beta+\gamma & 1 \\ \beta & \gamma+\alpha & 1 \\ \gamma & \alpha+\beta & 1 \end{vmatrix} = 0$

(x) Find the condition when one root of $x^2 + px + q = 0$ is double the other

(xi) Show that the roots of $px^2 - (p - q)x - q = 0$ are rational

(xii) If w is the cube root of unity then show that $x^3 + y^3 = (x + y)(x + wy)(x + w^2y)$

Q3. Attempt any eight parts. **(16)**

(i) Define partial fraction. Give example

(ii) If $\frac{1}{a}, \frac{1}{b}$ and $\frac{1}{c}$ are in A.P. Show that common difference is $\frac{a-c}{2ac}$

(iii) Insert two G.M.s between 1 and 8

(iv) If the number $\frac{1}{k}, \frac{1}{2k+1}$ and $\frac{1}{4k-1}$ are in H.P. find k.

(v) If H.M. and A.M. between two numbers are 4 and $\frac{9}{2}$ respectively, find the number

(vi) Find the sum of first 13 terms of the geometric sequence 1, $\frac{1}{3}, \frac{1}{9}$, ……

(vii) Find the value of n when ${}^{11}P_n = 11.10.9$ P is permutation.

(viii) Find the number of diagonals of a 6 – sided figure

(ix) In how many ways 4 keys can be arranged on a circular key ring?

(x) Verify that the inequality for 4, 5: $n! > n^2$ for n = 4, 5

(xv) Expand [illegible] up to 2 terms by Binomial theorem

(xvi) Find the value of [illegible] to [illegible] places of decimal by using Binomial series

Q4. Attempt any nine parts. (18)

(i) Find value of r in a circle when l = 56 cm, θ = 45°

(ii) When $\theta = \frac{-9}{2}\pi$, with the help of general angle, find values of $\sin\theta$ and $\cos\theta$

(iii) Prove that: $\frac{2\tan\theta}{1+\tan^2\theta} = 2\sin\theta\cos\theta$

(iv) Prove that: $\cos(\alpha + 45°) = \frac{1}{\sqrt{2}}(\cos\alpha - \sin\alpha)$

(v) Express $\sin 5x + \sin 7x$ as a product

(vi) Prove that $\sqrt{\frac{1+\sin\alpha}{1-\sin\alpha}} = \frac{\sin\frac{\alpha}{2}+\cos\frac{\alpha}{2}}{\sin\frac{\alpha}{2}-\cos\frac{\alpha}{2}}$

(vii) Find the period of $\sin\frac{x}{3}$

(viii) When the angle between the ground and the sun is 30°, flag pole casts a shadow of 40m long. Find the height of the top of the flag.

(ix) Find the smallest angle of the triangle ΔABC, when a = 37.34, b = 3.24, c = 35.06

(x) Find the area of the triangle ΔABC having its two sides and the included angle as: b = 37, c = 45, μ = 30° 50'

(xi) Show that $\sin(2\cos^{-1}x) = 2x\sqrt{1-x^2}$

(xii) Define general trigonometric equation.

(xiii) Using reference angle find the solutions (roots) of $\sin x = \frac{-\sqrt{3}}{2}, x \in [0, 2\pi]$

PART - II

Note: Attempt any THREE questions.

Q5. (a) Give the logical proof of De, Morgan,s laws 5

(b) Prove the $\begin{vmatrix} b+c & a & a^2 \\ c+a & b & b^2 \\ a+b & c & c^2 \end{vmatrix} = (a+b+c)(a-b)(b-c)(c-a)$ 5

Q6. (a) Solve $\frac{a}{ax-1} + \frac{b}{bx-1} = a+b : x \neq \frac{1}{a}$ **and** $x \neq \frac{1}{b}$ 5

(b) Split $\frac{7x+25}{(x+3)(x+4)}$ **into partial fractions form** 5

Q7. (a) For what value of n, $\frac{a^n+b^n}{a^{n-1}+b^{n-1}}$ **is the positive geometric mean between "a" and "b"** 5

(b) Identify the series as binomial expansion also find the sum of the series

$1+\frac{3}{4}+\frac{3.5}{4.8}+\frac{3.5.7}{4.8.12}+\dots\dots\dots$ 5

Q8. (a) Prove that: $\sin^6\theta - \cos^6\theta = (\sin^2\theta - \cos^2\theta)(1 - \sin^2\theta\cos^2\theta)$ 5

(b) Prove that: $\sin 10^\circ \sin 30^\circ \sin 50^\circ \sin 70^\circ = \frac{1}{16}$ (without using calculator) 5

Q9. (a) Prove that $R = \frac{abc}{4\Delta}$ where a, b, c are the lengths of the sides of triangle and "Δ" denotes the area of triangle. 5

(b) Prove that (i) $\tan^{-1}\frac{120}{199} = 2\cos^{-1}\frac{12}{13}$ (ii) $\sin^{-1}\frac{5}{13} + \sin^{-1}\frac{7}{25} = \cos^{-1}\frac{253}{325}$ 5

PAPER NO. 11 — D G KHAN BOARD (SECOND GROUP) — ANNUAL 2018

Roll No. ____________________ (To be filled in by the candidate)

Maximum Marks: 20 **(OBJECTIVE TYPE)** Time Allowed : 30 Minutes

NOTE: Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink. Cutting or filling two or more circles will result in zero mark in that question.

Q1. 20

1. A dice is rolled once then the probability of 3 or 4 dots on the top is

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$

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

2. If in usual notations ${}^nC_6 = {}^nC_8$ then n is equal to

(A) 6 (B) 8

(C) 2 (D) 14

3. The expansion of $(3-5x)^{1/2}$ is valid if

(A) $|x| < 5/2$ (B) $|x| < 5/3$

(C) $|x| < 1$ (D) $|x| < 3/5$

4. In the expansion of $(1+x)^{-3}$ the 4th term is

(A) $-3x$ (B) $-10x^3$

(C) $6x^2$ (D) $10x^3$

5. If $\tan\theta = 8/15$ and $\pi \le \theta \le \frac{3\pi}{2}$ then $\cos\theta =$

(A) $-17/15$ (B) $17/15$

(C) $15/17$ (D) $-15/17$

6. The value of $\cos 75° =$

(A) $\frac{\sqrt{3}-1}{2\sqrt{2}}$ (B) $\frac{-\sqrt{3}+1}{2\sqrt{2}}$

(C) $\frac{\sqrt{3}+1}{2\sqrt{2}}$ (D) $\frac{-\sqrt{3}-1}{2\sqrt{2}}$

7. The period of $3\sin x$ is

(A) $3\pi/2$

(B) π

(C) 2π

(D) $\pi/3$

8. If $\alpha = 90^\circ$ then by law of cosine

(A) $c^2 = a^2 + b^2$

(B) $a^2 = b^2 + c^2$

(C) $b^2 = a^2 + c^2$

(D) $a^2 = b^2 - c^2$

---

9. Radius of escribed circle opposite to vertex B in ΔABC is

(A) $\frac{\Delta}{s}$ [illegible]

(B) $\frac{\Delta}{s-a}$

(C) $\frac{\Delta}{s-a}$

(D) $\frac{\Delta}{s-b}$

10. Domain of principal sine function is

(A) $[0, \pi/2]$

(B) $[0, \pi]$

(C) $[-\pi/2, \pi/2]$

(D) $[0, 2\pi]$

11. The solution of $\sin x + \cos x = 0$ in $[0, \pi]$ is

(A) $\frac{3\pi}{4}$

(B) $\pi/4$

(C) $\pi/6$

(D) $\pi/3$

12. Multiplicative inverse of complex number $(0, -1)$ is

(A) $(-1, 0)$

(B) $(0, 1)$

(C) $(1, 0)$

(D) $(0, -1)$

13. The contra-positive of $p \rightarrow q$ is.

(A) $q \rightarrow p$

(B) $q \rightarrow \sim p$

(C) $q \rightarrow \sim p$

(D) $\sim q \rightarrow \sim p$

14. If the matrix $\begin{vmatrix} \lambda & 1 \\ -2 & -1 \end{vmatrix}$ is singular the $\lambda =$

(A) 2

(B) 1

(C) -1

(D) -2

15. If matrix $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 1 & -1 & 1 \end{bmatrix}$ then the cofactor $A_{32} =$

(A) 1

(B) 2

(C) -1

(D) -2

[illegible]

16. The roots of equation $x^2 + 2x + 3 = 0$ will be

(A) Complex (B) Equal

(C) Rational (D) Irrational

[illegible] If w is the cube root of unity the $(1 + \omega - \omega^2)^8 =$

(A) 256 (B) -256

(C) -256 ω (D) 256 ω

18. The fraction $\frac{x^2 - 3}{3x + 1}$ is

(A) Proper fraction (B) Improper fraction

(C) Equation (D) Polynomial

19. If a_{n-1} = 3n-11 then nth term is

(A) [illegible] (B) 3n - 3

(C) [illegible] (D) 3n + 2

20. Arithmetic mean between $2+\sqrt{2}$ and $2-\sqrt{2}$ is

(A) 2 (B) 4

(C) $2\sqrt{2}$ (D) 0

D.G.Khan Board 2018 (Second Group)

Roll No. ______________________ (To be filled in by the candidate)

Maximum Marks: 80 **(SUBJECTIVE TYPE)** Time Allowed :2:30 Hours

PART-1

Q2. Attempt any eight parts. (16)

(i) Define terminating decimal . Give one example

(ii) Find multiplicative inverse of $(-4, 7)$

(iii) Show that $\forall z \in C, z^2 + \overline{z}^2$ is a real number

(iv) Write $\{x \mid x \in Q \wedge 5 \le x \le 7\}$ in the descriptive and tabular form

(v) Write converse, contra positive of $q \to p$

(vi) State Domain and range of relation $\{(x,y) \mid x + y > 5\}$ in $A = \{1,2,3,4\}$

(vii) If $B = \begin{bmatrix} 5 & -2 & 5 \\ 3 & -1 & 4 \\ -2 & 1 & -2 \end{bmatrix}$, find cofactor B_{31} and B_{32}

(viii) Find x and y if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix} = \begin{bmatrix} y & 1 \\ -3 & 2x \end{bmatrix}$

(ix) Without expansion show that $\begin{vmatrix} \alpha & \beta+\gamma & 1 \\ \beta & \gamma+\alpha & 1 \\ \gamma & \alpha+\beta & 1 \end{vmatrix} = 0$

(x) Solve: $x^2 - x = 2$ by factorization

(xi) Find four fourth roots of 16

(xii) If α, β are roots of $3x^2 - 2x + 4 = 0$, find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$

Q3. Attempt any eight parts. (16)

(i) Resolve $\frac{7x+25}{(x+3)(x+4)}$ into partial fractions

(ii) Write the first four terms of $a_n = \frac{n}{2n+1}$

(iii) Find the Arithmetic Mean (A.M) between $x - 3$ and $x + 5$

(iv) Sum up to 13 - terms of the Arithmetic series $\frac{3}{\sqrt{2}} + 2\sqrt{2} + \frac{5}{\sqrt{2}} + \ldots\ldots$

(v) Find two Geometric mean between 1 and 8

(vi) Calculate the sum of 8-terms of the Geometric series $2 + (1-i) + \frac{1}{i} + \ldots\ldots$

(vii) Evaluate $\frac{9!}{2!(9-2)!}$

(viii) Find the value of n, when (a) [illegible] and (b) $^{n}C_{[illegible]} = \frac{12 \times 11}{2!}$, (C stands for combination)

(ix) There are 5-green and 3-red balls in a box. What is the probability of getting a green ball

(x) Use mathematical induction to verify the result for n = 1,2: $1 + 2 + 4 + \ldots + 2^{n-1} = 2^n - 1$

(xi) Calculate $(2.02)^{[illegible]}$ by means of Binomial theorem

(xii) Expand up to 3-terms, taking the value of x such that the expansion is valid (8-2x)[illegible]

Q4. Attempt any nine parts. **(18)**

(i) Find r if $\ell = 56$ cm, $\theta = 45°$

(ii) Find x if $\tan^2 45° - \cos^2 60° = x \sin 45° \cos 45° \tan 60°$

(iii) Prove $\cos^2\theta - \sin^2\theta = \frac{1-\tan^2\theta}{1+\tan^2\theta}$

(iv) Prove that $\cos 306° + \cos 234° + \cos 162° + \cos 18° = 0$

(v) Prove $\tan\left(\frac{\pi}{4} - \theta\right) + \tan\left(\frac{3\pi}{4} + \theta\right) = 0$

(vi) Prove $\frac{1-\cos\alpha}{\sin\alpha} = \tan\frac{\alpha}{2}$

(vii) Find the period of $\tan\frac{x}{7}$

(viii) In the right triangle ΔABC, $\alpha = 37° 20'$, $a = 243$, $\gamma = 90°$. Find "β" and "C".

(ix) Find the area of a ΔABC, in which $a = 18, b = 24, c = 30$

(x) Prove that $R = \frac{abc}{4\Delta}$, with usual notations

(xi) Prove $\tan^{-1} A + \tan^{-1} B = \tan^{-1}\left(\frac{A+B}{1-AB}\right)$

(xii) Find the solutions of the equation $\sec x = -2$, $x \in [0, 2\pi]$

(xiii) Find the values of q, satisfying the equation $3\tan^2\theta + 2\sqrt{3}\tan\theta + 1 = 0$

PART - II

Note: Attempt any THREE questions.

Q5. (a) Give logical proof of $(A \cup B)' = A' \cap B'$ when A, B are two sets **5**

(b) Without expansion, Prove that $\begin{vmatrix} x & a+x & b+c \\ x & b+x & c+a \\ x & c+x & a+b \end{vmatrix} = 0$ **5**

Q6. (a) Show that the roots of $(mx + c)^2 = 4ax$ will be equal if $c = \frac{a}{m}$ **5**

(b) Resolve $\frac{x^2}{(x-2)(x-1)^2}$ into partial fractions. **5**

Q7. (a) If S_2, S_3, S_5 are the sum of 2n, 3n, 5n terms of Arithmatic Progression (A.P), Show that $S_5 = 5(S_3 - S_2)$ **5**

5

(b) If $y = \frac{2}{5} + \frac{1.3}{2!}\left(\frac{2}{5}\right) + \frac{1.3.5}{3!}\left(\frac{2}{5}\right) + \ldots\ldots\ldots\ldots\ldots$ then prove that $y^2 + 2y - 4 = 0$ 5

Q8. (a) If $\cot\theta = {}^{15}\!/_{8}$ and the terminal arm of the angle is not in quadrant-I, Find the values of $\cos\theta$ and $\operatorname{cosec}\theta$ 5

(b) Reduce $\sin^4\theta$ to an expression involving only function of multiples of θ, raised to the first power. 5

Q9. (a) Solve the triangle ΔABC, using first law of tangent and then of law of sines:

$a = 93$, $c = 101$ and $\beta = 80^\circ$ 5

(b) Prove that: $\sin^{-1}A + \sin^{-1}B = \sin^{-1}\left(A\sqrt{1-B^2} + B\sqrt{1-A^2}\right)$ 5