D04

AUAT - 2018
TEST BASED ON MCQ
3-Year B.Sc. (Hons.) in Mathematics (D04)

(Do not open this QUESTION BOOKLET until you are asked to do so)

Full Marks: 50

Duration: 1 Hour

(Use Ball point Pen to fill up this cover page of the Question Booklet)

Roll No. of the Candidate: ....11810.70.121.........................

Date of Examination: ....20/05/2018..........................

Name of Examination Centre: .....Aliah University(Newtown).....

Signature of the Candidate: ....Quazi Zabihullah..............

IMPORTANT INSTRUCTIONS

Candidates should read the following instructions carefully and follow all the required before answering the questions:

1) The Question Booklet has paper seal pasted on it. Candidates should open the Question Booklet only when they are asked to do so by the Invigilator.
2) The Candidates must check immediately after breaking the seal that the **Question Booklet contains 40 questions**. If any discrepancy is found they must report to the Invigilator for replacement of the Question Booklet.
3) Answer will have to be given on the Special OMR Answer Sheet provided for this purpose. Question numbers progress from 1 to 40 continuously with alternative answers being shown as A, B, C and D for each question. While identifying / responding one should consider the best alternative answer and **shade only one circle with black/blue ball point pen only in the OMR answer sheet.**
4) Candidates must write his/her Name, Roll No. and Name of the Examination Centre and sign at the appropriate place on the front page of the Question Booklet provided for this purpose. In the OMR Answer sheet, write the Roll Number, name of the Examination Centre and series of the Question Booklet. Write and shade the circles for Roll No. and Category. Put your signature in the respective box. If any candidate fails to shade correct alternative in the specified place, his/her OMR Answer Sheet cannot be evaluated and will be liable to be rejected. **There will be negative marking for wrong answers**.
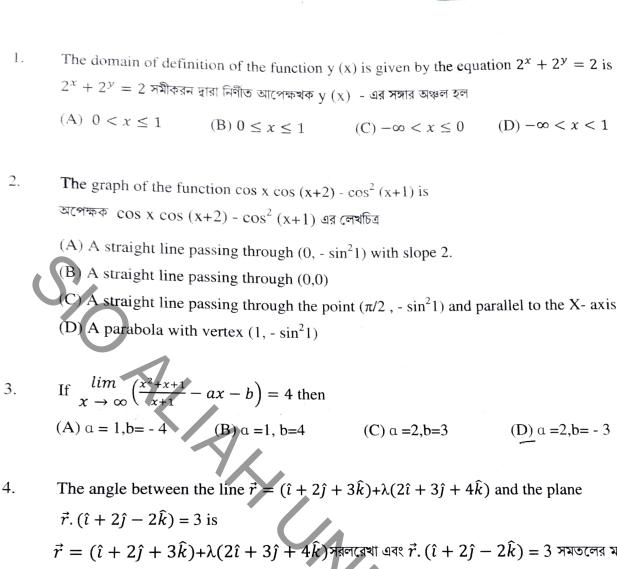5) The OMR Answer Sheet provided to you contains options to answer for 50 questions only. You must shade only one circle as your response to each of the Answers from 1 to 40 only. Shading more than one alternative or circle will lead to rejection of your response.
6) On leaving the examination hall, candidates must submit their OMR answer sheet. This is mandatory. They are allowed to keep the Question Booklet with them.
7) Darken completely only one CIRCLE which you think is correct as shown in the figure below:

Correct Method   Wrong Method

8) Answer Sheet will processed by electronic means. Any untoward/ irrelevant remarks, folding or putting stray notes on the answer sheet, any damage to the answer sheet, non-filling or wrong filling of Roll Number's on the OMR sheet shall be summarily rejected and the sole liability shall remain with the candidate.
9) Rough Work must be done at the end of the Booklet.
10) **No Candidate is allowed to leave the examination hall until end of the examination.**
11) Use of any Electronic device like Mobile, Programmable Calculator *etc.* is strictly prohibited.

1. The domain of definition of the function y (x) is given by the equation $2^x + 2^y = 2$ is

    $2^x + 2^y = 2$ সমীকরন দ্বারা নির্ণীত আপেক্ষখক y (x) - এর সঙ্গার অঞ্চল হল

    (A) $0 < x \le 1$ (B) $0 \le x \le 1$ (C) $-\infty < x \le 0$ (D) $-\infty < x < 1$

2. The graph of the function $\cos x \cos (x+2) - \cos^2 (x+1)$ is

    অপেক্ষক $\cos x \cos (x+2) - \cos^2 (x+1)$ এর লেখচিত্র

    (A) A straight line passing through $(0, -\sin^2 1)$ with slope 2.

    (B) A straight line passing through (0,0)

    (C) A straight line passing through the point $(\pi/2 , -\sin^2 1)$ and parallel to the X- axis

    (D) A parabola with vertex $(1, -\sin^2 1)$

3. If $\displaystyle \lim_{x \to \infty} \left(\frac{x^2+x+1}{x+1} - ax - b \right) = 4$ then

    (A) $a = 1, b = -4$ (B) $a = 1, b = 4$ (C) $a = 2, b = 3$ (D) $a = 2, b = -3$

4. The angle between the line $\vec{r} = (\hat{i} + 2\hat{j} + 3\hat{k}) + \lambda(2\hat{i} + 3\hat{j} + 4\hat{k})$ and the plane

    $\vec{r} \cdot (\hat{i} + 2\hat{j} - 2\hat{k}) = 3$ is

    $\vec{r} = (\hat{i} + 2\hat{j} + 3\hat{k}) + \lambda(2\hat{i} + 3\hat{j} + 4\hat{k})$ সরলরেখা এবং $\vec{r} \cdot (\hat{i} + 2\hat{j} - 2\hat{k}) = 3$ সমতলের মধ্যবর্তী কোনের

    মান —

    (A) $0°$ (B) $90°$ (C) $45°$ (D) $60°$

5. If the function $f : [1, \infty) \to [1, \infty)$ is defined by $(x) = 2^{x(x-1)}$, then $f^{-1}(x)$ is

    যদি চিত্রন $f : [1, \infty) \to [1, \infty), f(x) = 2^{x(x-1)}$ দ্বারা সঙ্গাত হয় তবে $f^{-1}(x)$ হল

    (A) $\left(\frac{1}{2}\right)^{x(x-1)}$ (B) $\frac{1}{2}\sqrt{1 + 4log_2^x}$

    (C) $\frac{1}{2}\left(1 + \sqrt{1 + 4log_2^x}\right)$ (D) $\frac{1}{2}\left(1 - \sqrt{1 + 4log_2^x}\right)$

6. If $I_n = \int_0^{\pi/4} \tan^n x \, dx$, (n= + ve integer) then the value of $I_{10} + I_8$ is

    যদি $\int_0^{\pi/4} \tan^n x \, dx$ হয় যেখানে n ধনাত্মক পূর্ণসংখ্যা, তবে $I_{10} + I_8$ এর মান হবে

    (A) $\frac{1}{8}$ (B) $\frac{1}{9}$ (C) $\frac{1}{7}$ (D) 9

7. The co-efficient of x^4 in the expression $(1 + x + x^3 + x^4)^{10}$ is

$(1 + x + x^3 + x^4)^{10}$ এর বিস্তৃতিতে x^4 - এর সহগ হল –

(A) $^{40}C_4$ (B) 210   (C) 310   (D) $^{10}C_4$

8. $\frac{d}{dx}\left(\log\frac{5}{x}\right) = ?$

(A) $\frac{-1}{x(\log x)^2 \log_e^5}$

(B) $\frac{-x\log_e^5}{x(\log x)^2}$

(C) $\frac{-1}{x(\log x)^2 \log_5^e}$

(B) $\frac{+1}{x(\log x)^2 \log_5^e}$

9. The value of $\int_0^1 (1 - x)^{99}\, dx$ is

$\int_0^1 (1 - x)^{99}\, dx$ এর মান হল

(A) $\frac{1}{10100}$ (B) $\frac{1}{10010}$ (C) $\frac{2}{10100}$ (D) $\frac{2}{10010}$

10. If $i = \sqrt{-1}$, then find the value of $\sum_{n=0}^{225} i^n$ is

$i = \sqrt{-1}$ হলে $\sum_{n=0}^{225} i^n$ এর মান হবে –

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

11. The function $f(x) = \begin{cases} \frac{x^3+x^2-16x+20}{(x-2)^2} & ; \ x \neq 2 \\ k & ; \ x = 2 \end{cases}$ is continuous at $x=2$, then the value of k is—

(A) 5   (B) 6   (C) 4   (D) 7

12. The condition so that the function $f(x) = x^3 + px^2 + qx + r$ is an increasing function for all value of x is

$f(x) = x^3 + px^2 + qx + r$ অপেক্ষকটি একটি বর্ধিষ্ণু অপেক্ষক হবে, তার শর্তটি হল

(A) $p^2 + 3q < 0$

(B) $p^2 - 3q < 0$

(C) $3p+q^2 < 0$

(D) $p^2 - 3q > 0$

13. If α, β be the roots of the equation $x^2 - px + r = o$ and $\frac{\alpha}{2}, 2\beta$ are the roots of the equation $x^2 - qx + r = o$ then the value of r is

যদি $x^2 - px + r = o$ সমীকরনের বীজদ্বয় হয় α, β এবং $x^2 - qx + r = o$ সমীকরনের বীজদুটি $\frac{\alpha}{2}, 2\beta$ হয় তবে r মান হবে-

(A) $\frac{2}{q}(p-q)(2q-p)$

(B) $\frac{2}{q}(q-2p)(2q-p)$

(C) $\frac{2}{q}(q-p)(2p-q)$

(D) $\frac{2}{q}(2p-q)(2q-p)$

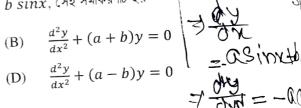14. If $y = a\cos x + b\sin x$ is a solution of a differential equation, then the differential equation is given by

যে অবকল সমীকরণের একটি সমাধান $y = a\cos x + b\sin x$, সেই সমীকরণটি হয়

(A) $\frac{d^2y}{dx^2} = y$

(B) $\frac{d^2y}{dx^2} + (a+b)y = 0$

(C) $\frac{d^2y}{dx^2} + y = 0$

(D) $\frac{d^2y}{dx^2} + (a-b)y = 0$

15. The area (sq. unit) of the common surface to the parabolas $y^2 = 4ax$ and $x^2 = 4ay$

$y^2 = 4ax$ এবং $x^2 = 4ay$ অধিবৃত্ত দুটির সাধারন অঞ্চলের ক্ষেত্রফল

(A) $\frac{64a^2}{3}$

(B) $\frac{32a^2}{3}$

(C) $\frac{16a^2}{3}$

(D) $\frac{8a^2}{3}$

16. If $\begin{bmatrix} a & b & c \\ x & y & z \\ m & n & p \end{bmatrix} = \lambda$ then the value of $\begin{bmatrix} 6a & 2b & 4c \\ 3x & y & 2z \\ 9m & 3n & 6p \end{bmatrix}$ is

যদি $\begin{bmatrix} a & b & c \\ x & y & z \\ m & n & p \end{bmatrix} = \lambda$ হয় তবে $\begin{bmatrix} 6a & 2b & 4c \\ 3x & y & 2z \\ 9m & 3n & 6p \end{bmatrix}$ এর মান

(A) 6λ

(B) 9λ

(C) 18λ

(D) 36λ

17. If A speaks 75 % true and B speaks 80 % true, then the probability of t contradictory speeches of a certain event is

A 75 % সত্য কথা বলে এবং B 80 % সত্য কথা বলে, তবে একটি ঘটনা উভয়ের পরস্পর বিরোধী বক্তব্য সম্ভাবনা

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

(B) $\frac{1}{5}$

(C) $\frac{7}{10}$

(D) $\frac{7}{20}$

18. The integrating factor of the differential equation $(1+x^2)\frac{dy}{dx} - xy = (1+x^2)^2$ is
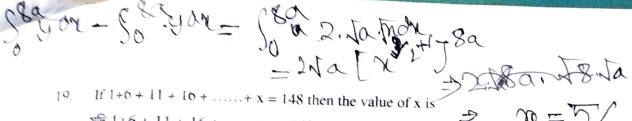
$(1+x^2)\frac{dy}{dx} - xy = (1+x^2)^2$ অবকল সমীকরনটির সমাকল গুনক হবে

(A) $\sqrt{1+x^2}$

(B) $\frac{1}{\sqrt{1+x^2}}$

(C) $-\sqrt{1+x^2}$

(D) $\frac{-1}{\sqrt{1+x^2}}$

19. If $1+6 + 11 + 16 + \ldots\ldots + x = 148$ then the value of x is

যদি $1+6 + 11 + 16 + \ldots\ldots + x = 148$ হয় তবে x এর মান

(A) 48   (B) 36   (C) 24   (D) 38

20. If the sum of two unit vectors is a unit-vector, then the value of the difference of two vectors is

যদি দুটি একক ভেক্টরের সমষ্টি একটি একক ভেক্টর হয়, তবে ভেক্টর দুটির অন্তরের মান-

(A) 2   (B) $\sqrt{2}$ (C) 3   (D) $\sqrt{3}$

21. If $y = \tan^{-1}\frac{4x}{1+5x^2} + \tan^{-1}\frac{x-1}{x+1}$, then $\frac{dy}{dx} = ?$

$y = \tan^{-1}\frac{4x}{1+5x^2} + \tan^{-1}\frac{x-1}{x+1}$, হলে $\frac{dy}{dx} = ?$ এর মান হবে-

(A) $\frac{5}{1+25x^2}$ (B) $\frac{1}{1+25x^2}$ (C) $\frac{5x}{1+25x^2}$ (D) $\frac{x}{1+25x^2}$

22. If $\int \frac{\sqrt{x}\,dx}{1+x^3} = K \tan^{-1}(\sqrt{x^3}) + c$, then the value of K is

যদি $\int \frac{\sqrt{x}\,dx}{1+x^3} = K \tan^{-1}(\sqrt{x^3}) + c$, হয়, তবে K এর মান হবে

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

23. The area of the region bounded by $y^2=4x$ and its latus rectum is

$y^2=4x$ অধিবৃত্ত এবং উহার নাভিলম্ব দ্বারা সীমাবদ্ধ অঞ্চলের ক্ষেত্রফল-

(A) 4/3 square unit   (B) 8/3 square unit

(C) 16/3 square unit   (D) 32/3 square unit

24. The solution of the differential equation $2x \frac{dy}{dx} - y = 3$ is a –

অবকল সমীকরন $2x \frac{dy}{dx} - y = 3$ এর সমাধান

(A) A Straight line   (B) A circle   (C) An ellipse   (D) A parabola

25. The shortest distance between the lines $\frac{x-1}{2}=\frac{y-2}{3}=\frac{z-3}{4}$ and $\frac{x-1}{3}=\frac{y-4}{4}=\frac{z-5}{5}$ is

সরলরেখা $\frac{x-1}{2}=\frac{y-2}{3}=\frac{z-3}{4}$ এবং সরলরেখা $\frac{x-1}{3}=\frac{y-4}{4}=\frac{z-5}{5}$ এর মধ্যে নূন্যতম দূরত্ব—

(A) $\frac{1}{6}$ unit   (B) $\frac{1}{3}$ unit   (C) $\frac{1}{\sqrt{3}}$ unit   (D) $\frac{1}{\sqrt{6}}$ unit