ZàÎÀà-2. ¡àÍuÑ âwâo y¡ Ñv §ýLâk¥ (Solve by matrix method) ß

$$x-2y+z-t+1=0$$
$$3x-2z-3t+4=0$$
$$5x-4y+t+3=0$$

OR

Ñv §ýLâk¥ (Solve) ß $6x^5+x^4-43x^3-43x^2+x+6=0$

ZàÎÀà-3. yÑyt°ju §ýà qáÊsàâxm §ýLâk¥ mnà ây÷ §ýLâk¥ â§ý Àà Àà¥¡ (rà¥¡) yÑyt°ju uà mà âwy¡iâu Ñàm¡ Ñ¡ uà yw¡yt ñ

Define coset and prove that two right (left) cosets are either disjoint or identical.

OR

¨uà âÀ¥ Ñ¥ âõjÊ yâ§ýuà * §ý yàqÕà $G=\{a, b, c, d\}$ ¥§ý yt¡Ñ Ñ¡?

Is $G=\{a, b, c, d\}$ a group with respect to defined binary operation * -

*	a	b	c	d
a	b	d	a	c
b	d	c	b	a
c	a	b	c	d
d	c	a	d	b

ZàÎÀà-4. ây÷ §ýLâk¥ â§ý â§ýyà yt¡Ñà¡ §ý yt°ju t¡ mÌu§ýàáÊmà §ýà y¡r¡o mÌumà y¡r¡o Ñàmà Ñ¡ ñ

Show that the relation of isomorphism in the set of groups is an equivalent relation.

OR

¨uà $(I,*,0)$ ¥§ý wvu Ñ¡ uâÀ

Is $(I,*,0)$ a ring if - $a*b=a+b-1$

$a\,o\,b=a+b-ab, \quad a,b\in I$

ZàÎÀà-5. $\sin^7\theta\ \cos^3\theta$ §ýà âwÐmàÊ §ýLâk¥ ñ (Expand $\sin^7\theta\ \cos^3\theta$.)

OR

$\cot^{-1}x+\tan^{-1}3=\frac{\Pi}{2}$ §ýà Ñv §ýLâk¥ ñ (Solve $\cot^{-1}x+\tan^{-1}3=\frac{\Pi}{2}$.)

----x----

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Code No. : B-208(B)
Annual Examination - 2017
B.Sc.-I
MATHEMATICS
Paper - I
ALGEBRA AND TRIGONOMETRY

Time : 3 Hrs. Max.Marks : 50
Min Marks : 17

¹¡âq ß h½»¡'¡' t¡ Ày ¡âmvi¡ÙàÊã ZàÎÀà Ñ¡, âkÁÑ¡ Ñv §ýÊÀàà ¡âÀàwàu¡ Ñ¡ ñ h½»¡'r' t¡ vi¡ÙàÊã ZàÎÀà mnà h½»¡'y' t¡ Àãi¡ £ÙàÊãu ZàÎÀà Ñ¡ ñ h½»¡'¡' §ýà yry¡ qÑv¡ Ñv §ýÊ¡ ñ

Note : Section 'A' is objective type, containing 10 questions, is compulsory. Section 'B' consists of short answer type questions and Section 'C' consists of long answer type questions. Section 'A' has to be solved first.

h½»¡-'¡'(Section-'A')

âÂàÈÀàà¡â§ým ¡âm vi¡£ÙàÊãu ZàÎÀàà¡ §ý £ÙàÊ Àãâk¥ ñ (Answer the following very short-answer-type questions.) (1x10=10)

ZàÎÀà-1. ¡àÍuÑ §ýL kàâm y¡ ¡àq ¨uà yt¡m¡ Ñ¡ ?

What do you mean by the rank of matrix?

ZàÎÀà-2. À§ýàm¡ âwâo y¡ âÀàÈÀàâvâhm yt¡â§ýÊ½à §ý t¡và¡ §ýà Zà§ýàÊ rmà¢¥ ñ

By Descarte's method, find the types of roots of given equation.

$$x^9-x^5+x^4+x^2+1=0$$

ZàÎÀà-3. Ñv §ýLâk¥ (Solve) ß $x\equiv 3\pmod 7$

ZàÎÀà-4. â§ýyã ¡àÍuÑ §ý ¥Îàvàà Úq §ýL qÑjàÀà rmà¢¥ ñ

What is the identification of Echelon form of any matrix.

ZàÎÀà-5. â§ýyã j§ýLu yt¡Ñ §ý §ýt y¡ §ýt â§ýmÂà¡ kÂà§ý Ñàm¡ Ñ¡?

How many minimum generators are there in any cyclic group?

ZàÎÀà-6. â§ýyã yt¡Ñ §ýý¡wuw §ýL §ýàà¹¡ §ýà qáÊsàâxm §ýLâk¥ ñ

Define order of an element of a group.

ZàÎÀà-7. Íu¡§ýt âÂà§ýàâv¥ (Find inverse of) ß

(5 3 2 4)

ZàÎÀà-8. yt à§ýàáÊmà §ý Zànt Zàtu §ýà §ýnÀà âvâh¥ ñ

Write the statement of first theorem of homomorphism.

P.T.O.

ZàÎÀà-9. tàÂà rmà¢¥ (Evaluate)ß $\dfrac{1}{(\sin\theta + i\cos\theta)^5}$

ZàÎÀà-10. tàÂà rmà¢¥ (Evaluate) ß $\log i$

h½»¦-'r'(Section-'B')

âÂàÈÂàà§ým vi¦ £ÙàÊãu ZàÎÀàà¦ §ý £ÙàÊ ÀãâK¥ ñ (Answer the following short-answer type questions) (3x5=15)

ZàÎÀà-1. $(2,-1,3,2)$, $(1,3,4,2)$, $(3,-5,2,2)$ §ýL Êâh§ý Ðwm¦Øàmà §ýL kà¦j §ýLâK¥ ñ

Test the linear dependency of vectors

$(2,-1,3,2)$, $(1,3,4,2)$, $(3,-5,2,2)$.

OR

âÀhà¢¥ â§ý A^{-1} §ý ¡à¢ªàÂà tàÂà A §ý ¡à¢ªàÂà tàÂà¦ §ý Íu¼§ýt Ñàm¦ Ñ¦ ñ

Show that eigen values of A^{-1} are inverse of eigen values of A.

ZàÎÀà-2. wÑ Î¦àm¦ Öàà¦m §ýLâK¥ âkyy¦ âÀ¥ ªà¥ ytã§ýÊ½à §ý tv ÑÊâ¼t§ý ó½àã t¦ Ña Ña¦ :

Find the condition that the roots of the given equation are in harmonic progression:

$$x^3 + px^2 + qx + r = 0$$

OR

wÑ ytã§ýÊ½à rmà¢¥ âky§ý tv âÀ¥ Ñ¥ ytã§ýÊ½à §ý tv¦à y¦ 2 §ýt Ñ¦ ß

Find the equation whose roots are 2 less than that of the given equation :

$$x^3 - 9x^2 + 28x - 27 = 0$$

ZàÎÀà-3. uâÀ H_1 ¡àÊ H_2 â§ýyã ytÑ §ý Àà£qytÑ Ña¦ mà¦ ây÷ §ýLâK¥ â§ý $H_1 \cap H_2$ sã £y ytÑ §ýà £qytÑ Ña¦ªàà ñ

If H_1 and H_2 are two subgroups of any group then show that $H_1 \cap H_2$ is also subgroup of that group.

OR

uâÀ $a * b = a + b + 2,\ \forall\ a, b \in I$ mà¦ m¼ytã§ý ¡wuw ¡àÊ a §ýà Íu¼§ýt Öàà¦m §ýLâK¥ ñ

If $a * b = a + b + 2,\ \forall\ a, b \in I$, then find identity element and inverse of a.

ZàÎÀà-4. âÀhà¢¥ â§ý $f(e)$, G' §ýà m¼ytã§ý ¡wuw Ña¦ªàà ¡àÊ $f(a^{-1}) = [f(a)]^{-1}$ uâÀ $f : G \to G'$ ytà§ýàáÊmà mnà e, G §ýà m¼ytã§ý ¡wuw Ñ¦ ñ

Show that $f(e)$ is identity element of G' and $f(a^{-1}) = [f(a)]^{-1}$ if $f : G \to G'$ is homomorphism and e is the identity of G.

OR

ây÷ §ýLâK¥ â§ý Za¼u§ý Öà¦Øà q½àà§ýLu Zàà¦m Ña¦mà Ñ¦ ñ

Prove that every field is an integral domain.

ZàÎÀà-5. uâÀ $x_n = \cos\left(\dfrac{\Pi}{2^n}\right) + i\sin\left(\dfrac{\Pi}{2^n}\right)$ mà¦ ây÷ §ýLâK¥ $x_1\ x_2 \cdot x_3 - - - \infty = -1$.

If $x_n = \cos\left(\dfrac{\Pi}{2^n}\right) + i\sin\left(\dfrac{\Pi}{2^n}\right)$, then show that $x_1\ x_2 \cdot x_3 - - - \infty = -1$.

OR

$i \log \dfrac{x-i}{x+i}$ §ýà tàÂà Öàà¦m §ýLâK¥ ñ (Evaluate $i \log \dfrac{x-i}{x+i}$.)

h½»¦-'y'(Section-'C')

âÂàÈÂàà§ým Àã¦i £ÙàÊãu ZàÎÀàà¦ §ý £ÙàÊ ÀãâK¥ ñ (Answer the following long-answer type questions) (5x5=25)

ZàÎÀà-1. âÂàÈÂàâvâhm ¡àÍuÑ §ýà Zàyà tÂãu Úq t¦ rÀv§ýÊ kàâm Öàà¦m §ýLâK¥ :

Change the following matrix into normal form and find its rank :

$$\begin{bmatrix} 6 & 1 & 8 & 3 \\ 2 & 1 & 0 & 2 \\ 4 & -1 & -8 & -3 \end{bmatrix}$$

OR

âÂàÈÂàâvâhm ¡àÍuÑ §ýà Íu¼§ýt §ýv¦-Ñât¹¦Âà Zàtu §ýL yÑàumà y¦ Öàà¦m §ýLâK¥ ß

Find inverse of following matrix by Caley-Hamilton theorem.

$$\begin{bmatrix} 2 & 0 & 1 \\ 0 & 2 & -3 \\ -1 & 1 & 1 \end{bmatrix}$$

P.T.O.