(6)   **Code No. : B-210(B)**

Find the equation of cylinder with generator parallel to

and guiding curve $x^2 + 2y^2 = 1, \ z = 3$.

ÌaÎÅ–5. ÀÎäÉuçâŞý ytmv   qÊwvuk   Şÿ;ÐqÎäê
ŞÿÊmàÑè¡æÉ ÐqÎäêrÀÅäÖäàm ŞÅàk¥ ñ

Show that the plane $x + 2y - 2z = 4$ touches the paraboloid

. Also find the point of contact.

OR

ytãŞÊ½à $2x^2 + 2y^2 + z^2 + 2yz - 2zx - 4xy + x + y = 0$ Şÿ;Ìätä½Şý Úq
tÞytåàulÅ ŞÅàk¥ mnà ¢yŞý Îäxê Şÿ àÅàÎäŞý ¥wÞ¡ Öäà Şÿ ytãŞÊ½à Öàm
ŞÅàk¥ ñ

Reduce the equation   to
the standard form and find the coordinates of its vertex and equation of
axes.

----x----

Code No. : B-210(B)

Annual Examination - 2017

B.Sc.-I

MATHEMATICS

Paper - III

VECTOR ANALYSIS AND GEOMETRY

Max.Marks : 50

Time : 3 Hrs.   **Min Marks : 17**

¹à¸ ß h½»Þ'¡ ' tÞÀy¡ âmvi ÌÉÊã ÌaÎÅàÑä, äk¿ÑÑv ŞÿÊàä¡ åàwàueÑèñ h½»Þ'r' tÞviÌÉÊã ÌaÎÅä h½»Þ'y' tÞÀäiêÉÙÉÊàu ÌaÎÅàÞèñ h½»Þ'¡ ' Şÿ;yrycçÑvçÑv ŞÿÊÞñ

Note: Section 'A' , containing 10 very short answer type 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.

$x = \pm 1/2, \ y = \pm 2/3$ ... $+ 2yz - 2zx - 4xy$ h½»Þ-'y'-'(Section-'A')
äÉÊÅàäŞm ¡ âm vi ÉÙÉÊàu ÌaÎÅàÞ Şÿ £ÙÉÊ ¥Şý uà Àä;qÅÐÿuä tÞ À$ñ

**(Answer the following very short-answer-type questions in one
or two lines.)**   **(1x10=10)**

ÌaÎÅà–1.   yàÎÎÅ àäaŞý ªä¾àÅä Şÿ yÿàâvàh¥ ñ
Write formula of vector triple product.

ÌaÎÅà–2.   yàÎÎÅ äky ŞÅàÎÅà ¡ jÊ Ņ̃Şÿ ¨uà Ìäàmrào Ñè?
Write the condition for a vector to be in constant direction.

ÌaÎÅà–3.   Ð¹à̧y ̼àtç¡ âvàh¥ ñ
Write Stoke's theorem.

ÌaÎÅà–4.   ytmv tÞ ²äÅä ̼àtç¡ Şÿ;âvàh¥ ñ
Write Green's theorem in the plane.

ÌaÎÅà–5.   äõi àmàu Íuàq Şý ytãŞÊ½à Şÿr ¥Şý wÑä Şÿ;àÅàÚàqm Şÿ£çàà ?
When will general equation of second degree represents a circle?

ÌaÎÅà–6.   £y ÎäŞÿw Şÿà oñàu ytãŞÊ½à âvàh¥ äky ŞÅ Àäàs oñä Ñèmnà¢yŞÿà ¡ Öà̼äÉÊs Şý
Êçà yçα Şÿ ä½à rÀàmà Ñèñ

P.T.O.

Write polar equation of conic with focus at pole and axis making an angle with initial line.

** प्रश्न–7.** ytmv §ŵ ytã§£½âvẵh¥ kâ¿¡ Öæðyç¡ ℍß hᐧ2, 3, –4 §ŵ¹ᴍâ Ñeñ

Write equation of a plane with intercepts 2, 3, -4 on axes.

प्रश्न–8. rçⱮâ §ᴂçytĪⱮ¥ ñ

Explain the cylinder.

प्रश्न–9. ÀãiⱮⱪã qÊwvuk §ŵ ytã§£½âvẵh¥ ñ

Write the equation of Elliptic paraboloid.

प्रश्न–10. ¥§ý ÀãiⱮ Ḷk §ý yÑẵ ÎⱮ§ywk §ŵ y§ẵâvẵh¥ ñ

Write formula of confocal conicoids of a ellipsoid.

हॎᴍ-'ख'(Section-'B')

ⱮⱮ ZⱮᴍⱪ§ý £ÙⱮÀⱮk¥ñ (**Answer the following questions.**

(3x5=15)

प्रश्न–1. uâA   mâⱮ ¡ytmvâu yâÀĪâ Ñæ mâç ÀĪⱮuç â§ý

For three non-coplanar vectors   show that
$$\left[\overline{a}\times\overline{b} \;\; \overline{b}\times\overline{c} \;\; \overline{c}\times\overline{a}\right]=\left[\overline{a}\;\overline{b}\;\overline{c}\right]^2$$

OR

uâA   mr ârⱮⱮä$(1,-1, 1)$ qÊ Öæâm §Ḷk¥ ñ

If   then find i) $div\,\overline{f}$ ii)   on point

i) $div\,\overline{f}$ ii)   .

प्रश्न–2. $\int_{C}\overline{F}.d\overline{r}$ §Ɱ tâⱪuⱮ§ýâ §ỵⱮk¥, kÑⱮY $\overline{F}=x^2\,y^2\,i+y\,j$ ¡ æÊ

$C, y^2=4x$, xy ytmv tᐃ$(0,0)$ yç   m§ý Ñeñ

Evaluate   where $\overline{F}=x^2\,y^2\,i+y\,j$ and C is

plane from $(0,0)$ to   .

प्रश्न–2. Đ¹ꜟç¡y Zâtçu §Ɱ yᴘⱪâqⱮⱪâ §ỵⱮk¥, kr   mnâ qⱮᴘ S ᵃⱮⱪyç

§Ɱ   ytmv §ý¤yqÊ §Ɱ sⱮⱪ Ñeñ

Verify Stoke's theorem for   and surface S is upper part

of   plane of the sphere   .

OR

tâⱪuⱮ§ýâ §ỵⱮk¥   kÑⱮY $\overline{F}=4zxi-y^2\,j+yzk$ mnâ

$S, x=0,\ x=a,\ y=a,\ y=0,\ z=0,\ z=a$ yçqⱮÊr÷ iⱮâ §Ɱ qⱮᴘÑeñ

Evaluate   where $\overline{F}=4zxi-y^2\,j+yzk$ and S is a cube

bounded by $x=a,\ x=0,\ y=a,\ y=0,\ z=0,\ z=a$.

प्रश्न–3. â§ýýâ ÎⱮ§ýw tⱮây÷ §ỵⱮk¥ â§ý vÈrÚq ḶⱮⱪⱪâ kâⱱⱪᵃm kⱮⱪ¡Ɱ âⱪ§ý ĺuⱮ§ýtⱮ§Ɱ uⱮ§â¡ jÊ ÑⱮᴍâ Ñeñ

In a conic, prove that the sum of reciprocal of perpendicular focal chord is constant.

$9x^2+6xy+y^2+18x+21y+26z-17=0$

OR

ÎⱮ§ýw   §Ɱ ¡ Ḷâⱪᴹⱪ½ⱪ §ỵⱮk¥ ñ

Trace the conic   .

प्रश्न–4. ây÷ §ỵⱮk¥ â§ý ytã§£½   ¥§ý Îâ§ý §Ɱç

âⱪÜâqm §ýⱮmâ Ñeñ ¢y§ý Îâⱪⱪêᴘ§â âⱪⱪⱮⱪⱪâ§ý rmⱮ¢¥ ñ

Prove that the equation

represents a cone. Find co-ordinate of its vertex.

OR

£y rçⱮⱪ§Ɱ ytã§£½âⱪÖâⱪ §ỵⱮk¥ â§ýy§ýkⱮⱪ§ý yÊvÊ(hⱪâ   §ý

ytⱮⱪâmÊ Ñemnâ âⱪâÀĪⱮ§ý w§ý ÀãiⱮ Ḷⱪ $x^2+2y^2=1,\ z=3$ Ñeñ

OR

ÀÎà¢uç̧Ş̌ý $\iint_s (axi+byj+czk).ndS = \dfrac{4}{3}\pi(a+b+c)$ kÑàÍ̈ S ªàçç §ŷâ yÌq½êqâÞhÑèñ

Show that   , where S is whole surface of sphere of $x^2 + y^2 + z^2 = 1$.

ŻâÎÂà–3.   ây÷Ş̧Åâk¥âŞ̌ýytâŞ̌Ê½à   mnà $\dfrac{l}{r} = -1 - e\cos\theta$ ¥Ş̌ýÑâÎâŞ̌w Ş̌âçâÅàÚâqm Ş̌ŷÊmçÑÅñ

Prove that equations $\dfrac{l}{r} = 1 - e\cos\theta$ and $\dfrac{l}{r} = -1 - e\cos\theta$ represent the same conic.

OR

ÎâŞ̌ýw $x^2 + 2y^2 = 2$ yçŷÄàâàs ÎâŞ̌ýw Ş̌âytâŞ̌Ê½àÖàâm Ş̌ŷÂk¥kâçâÎÂä(1,1) yçÑâŞ̌Ê kâmàÑèñ

Find equation of confocal conic of conic   passes through (1, 1).

ŻâÎÂà–4.   ªàçç   Ş̌ŷ   ârÂÅäqÊ ÐqÎâèmv Ş̌âytâŞ̌Ê½à âÅàŞ̌âÂâv¥ñ

Find tangent plane of sphere   at   .

OR

vÌr wàâèàu rçÅà Ş̌âytâŞ̌Ê½à Öàâm Ş̌ŷÂk¥ âkyŞ̌ý̧1 âÎâ³uà 2 mnà ¡ Öà Êç̧hà Ñèñ

Find equation of right circular cylinder with radius 2 and axis on straight line $\dfrac{x-1}{2} = \dfrac{y-2}{1} = \dfrac{z-3}{2}$.

                               P.T.O.

ZaÎÅà–5. ¡âmqÊwvuk $\dfrac{x^2}{4}+\dfrac{y^2}{9}-\dfrac{z^2}{16}=1$ §ýârÅÄä yçkảảÉ;wàvçkẢ§ŵ̀pŚý ytã§ŷÊ½àÒàm §ÿ̧àk¥ñ

Find equation of generators of hyperboloid which

passes through .

OR

ây÷ §ÿ̧àk¥ â§ý Îàả§ŵk §ÿà Îả̂§ảy

§ý ÐqÎàểnv õảÊà Zààm°²Ĥ ¥§ý yt§ŷàả½à§ý

¡âmqÊwvu Ñèñ

Prove that the intersection of tangent plane of cone

$\dfrac{x^2}{b+c}+\dfrac{y^2}{c+a}+\dfrac{z^2}{a+b}=0$ with conicoid $ax^2+by^2+c\,z^2=1$ is a rectangular hyperbola.

h½↓-'y'(Section-'C')

ảÎẢảảả§ým ZàÎÅàảⱷ §ý £Ûảf Ảảảk¥ñ (**Answer the following questions**)   **(5ᵪ5=25)**

ZaÎÅà–1. uảꞪ â§ýyã ârÅÅ䧟à Ðnâm yàÎ̀àÑèmnà £y§ýà tảqả§ý Ñèmạ; §ỳà tả̀àÒàm §ÿ̧àk¥ kr qÊÅàảv§ẏu Ñèñ

If is position vector of any point with modulus then find the value of

when is solenoidal.

OR

ây÷ §ÿ̧àk¥ â§ý §ÿà Íuả§ÿ̇t Ñèñ

Prove that reciprocal of is .