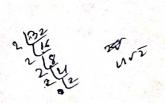
|             | G   | uru Nanak Dev Engine   |  | ша        |               |          |
|-------------|---|--|--|-----------|---------------|----------|
| E Illumina  |   |  | Applied Sciences   | T.        |               |          |
| Program     |   | B.Tech.(ECE,IT,ME)   Semester                                  |  | Ist       |               |          |
| Subject C   |   | BSC-104  | Subject Title  |           | ematics II    |          |
| Mid Sem     | ester Test (MST)  | 2  | Subject Teachers   |           | a Goyal, Dr S |          |
| No.         |   |  |  |           | Dr Gagandee   | ep Kaui  |
| Max. Ma     | rks   | 24   | Time Duration  | 1 hour    | 30 minutes    |          |
| Date of M   |   | 20-12- 2022  | Roll Number  |           |               |          |
| Note: All   | questions are comp  | oulsory.   |  |           |               |          |
| Q. No.      |   | Question   | _  |           | COs,          | Mark     |
|             |   |  |  |           | RBT level     |          |
| 91          | Evaluate $\int_{0}^{2} \int_{1}^{2} \int_{0}^{yz} xy^{z}$ | vz dx dy dz.   |  |           | CO3,L2        | 2        |
| 022         | Sketch the region   | on of integration $\int_{0}^{1} \int_{2}^{\sqrt{2}}$           | $\int_{0}^{x^{2}} f(x,y) dx dy.$   | 111 y     | CO2, L3       | 2        |
| 03          | $\int_0^1 \int_{x^2}^{2-x} xy  dy  dx.$                   |  |  |           | CO3,L3        | 4        |
|             | Find the area ly cardiod $r = a(1 - a)$                   | ing inside the circle $\cos \theta$ ). 9 2 1 - $\frac{\pi}{4}$ | $r = a \sin \theta$ and outside $e^{\gamma} \left( -\frac{79}{4} + 9^2 \right) e^{\gamma}$ | e the     | CO3,L3,<br>L5 | 4        |
| <b>1</b> 95 | Evaluate the following $\sqrt{2\pi r^2}$                  | Howing by changing $dy dx$ .                                   | to polar coordinates   |           | CO3,L5        | 4        |
| 26-         | Find the volum planes $y + z = 4$                         | e bounded by the cyland $z=0$                                  | $\lim_{x \to \infty} x^2 + y^2 = 4 \text{ and}$  | the       | CO3,L5        | : 8      |
|             | utcomes (CO) vill be able to                              |  |  |           | · ·           |          |
| 1           | Understand and ap   | oply concepts of vector of ering problems.                     | calculus, differential equa  | tions and | d calculus of | comple   |
| 2           |   | an, parametric and polar c                                     |  |           | 1             |          |
| 3           | Apply the technique                                       | es of multiple integrals in                                    | engineering problems.  |           | r * .         | -        |
| 4           | Evaluate integrals of                                     | of vector point functions of                                   | ver line, surfaces and volume  | mes.      |               |          |
| 5           | problems.   | pility to integrate knowle                                     |  |           |               | gineerin |
|             |   | decompose the periodic fu                                      |  |           |               |          |

| RBT<br>Classification | Lower Order T | hinking Levels (L | OTS)     | Higher Order Thinking Levels (HOTS) |            |          |  |
|-----------------------|---------------|-------------------|----------|-------------------------------------|------------|----------|--|
| RBT Level<br>Number   | L1 . 62       | L2                | L3       | L4                                  | L5         | L6       |  |
| RBT Level Name        | Remembering   | Understanding     | Applying | Analyzing                           | Evaluating | Creating |  |

| 9. 1   | Gı  | ıru Nanak I  | Dev Enginee   | ring College, Li   | ianiana   |  |                   |        |  |
|--|---|--|---|--|---|--|-------------------|--------|--|
|  |   |  |   | pplied Science   |   | 2nd                                    | 7.                | 2      |  |
| rogram   |   | B.Tech.<br>(EEA,CEA  | )   | emester  |   |  |                   |        |  |
| ubject Code  |   | BSC-104  | S   | Subject Title  | 1   | Mathen                                 | natics-II         | ah     |  |
| lid Semester Tes   | t (MST) No.   | 2  | 17 KINDE  | Course Coordin   | ator(s)   | Prof. Sukhminder Singh                 |                   |        |  |
| 1ax. Marks   |   | 24   |   | Time Duration  |   | 1 hour 30 minutes                      |                   |        |  |
| Date of MST  |   | 22-5-2023  | ]   | Roll Number  |   |  | 75                |        |  |
| Note: Attempt all  | questions.  | W Free   |   | The Arm See  | Ŵ.  |  | CO's, RBT         | Marks  |  |
| Q.No.  |   |  | Question  |  |   |  | level             | * p *= |  |
| Q1 Evaluat   | $e \int_{0}^{1} \int_{0}^{1} e^{x+y+z} dx$  | dxdydz .   | e   | 1,2° xe x  |   |  | CO3,<br>L2,L3,L5  | 2      |  |
| Q2 Find g  | $rad(\phi)$ where   | $\phi = 3x^2y -$   | $y^3z^2$ at the p   | oint $(1,-2,-1)$ .   | , w   |  | CO1,<br>L2,L3,L5  | 2      |  |
|  |   |  |   | $ax$ and $x^2 = 4ay$   |   |  | CO3,<br>L2,L3,L5  | 4      |  |
| Q4 If $u =$  | $\cos^{-1}\left(\frac{x+y}{\sqrt{x}+\sqrt{x}}\right)$   | $(\sqrt{y})$ , show the  | $\int \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial x}$                      | $\frac{\partial u}{\partial y} + \frac{1}{2}\cot u = 0$                                  | · ~ 42  |  | CO1,<br>L2, L3,L5 | 4      |  |
| Q5/ Show irrota  | that the vector   | field defined  | If by $\vec{F} = (y + y)$   | $(z+x)\hat{i} + (z+x)\hat{j} + \vec{F} = \vec{\nabla} \phi.$                             | $(x+y)\hat{k}$                                  | is                                     | CO1,<br>L2,L3,L5  | 4      |  |
|  | la bay o  | non at the to  | n is to have a  | capacity 32 c.c. I<br>for its construction   | Find the  | ************************************** | CO1,<br>L2,L3,L5  | 8      |  |
|  | 740   |  |   |  |   |  |                   |        |  |
| Course Outcom  | nes (CO)  |  |   |  | 1   |  |                   |        |  |
| Course Outcom  | nes (CO)  | . 0  | vactor galaulus   | differential equati  | ons and ca                                      | lculus of                              | complex function  | ons to |  |
| Course Outcom Students will be  Under                                      | able to   | 1  |   | , differential equati  | ons and ca                                      | alculus of                             | complex function  | ons to |  |
| Course Outcom Students will be Under engin Skete                           | nes (CO) able to erstand and apply neering problems th basic Cartesia   | n, parametric  | and polar curve   | es.  |   | alculus of                             | complex function  | ons to |  |
| Course Outcom Students will be Under engin Skete Appl                      | nes (CO) able to erstand and apply neering problems th basic Cartesia by the techniques   | n, parametric of multiple in   | and polar curve<br>tegrals in engir   | es.  | dumes   |  | 1 7/25 20/2 1     |        |  |
| Course Outcom Students will be  Under engin Skete Appl Eval                | nes (CO) able to erstand and apply heering problems th basic Cartesia y the techniques uate integrals of                                      | n, parametric of multiple in vector point for  | and polar curve<br>tegrals in engin<br>unctions over li                                     | es.<br>neering problems.<br>ne, surfaces and vo  | olumes.   | ulus to en                             | 1 7/25 20/2 1     |        |  |
| Course Outcon Students will be  Unde engin Skete Appl 4 Eval               | nes (CO) able to erstand and apply neering problems th basic Cartesia y the techniques uate integrals of stantiate the abili                  | n, parametric<br>of multiple in<br>vector point fi<br>ty to integrate<br>ecompose the  | and polar curve<br>tegrals in engir<br>unctions over li<br>knowledge and<br>periodic functi | es.  neering problems.  ne, surfaces and volume of multi var  ons in series of sin       | olumes. riable calculates and cosi              | ulus to en                             | gineering proble  | ems.   |  |
| Course Outcom Students will be  Unde engin Skete Skete Appl Eval Subs Unde | nes (CO) able to erstand and apply neering problems th basic Cartesia y the techniques uate integrals of stantiate the abili erstand how to d | n, parametric<br>of multiple in<br>vector point fi<br>ty to integrate<br>ecompose the  | and polar curve<br>tegrals in engir<br>unctions over li<br>knowledge and<br>periodic functi | neering problems. Ine, surfaces and void ideas of multi varions in series of sin         | olumes.<br>iable calc<br>e and cosi<br>gher Ord | alus to en<br>ne.<br>er Think          | gineering proble  | ems.   |  |
| Course Outcom Students will be  Under engine Sketce Apple Apple            | nes (CO) able to erstand and apply neering problems th basic Cartesia y the techniques uate integrals of stantiate the abili erstand how to d | n, parametric of multiple in vector point fity to integrate ecompose the prder Thinkin | and polar curve<br>tegrals in engin<br>unctions over li                                     | neering problems. Ine, surfaces and void ideas of multi varions in series of sin  (S) Hi | olumes. riable calculates and cosi              | ulus to en                             | gineering proble  | ems.   |  |

2214



 $\theta(x,y,z) = xy + 2yz + 2zx$   $\phi(x,y,z) = xy.z - 3z$ 

12

|                  |   | Gur          | u Nanak Dev En   | gineering Co  | llege, Ludhia                           | na          |                   |       |  |
|------------------|---|--------------|--|---|---|-------------|-------------------|-------|--|
|                  |   |              | Department   | of Applied  | Science                                 |             |                   |       |  |
| Prograi          |   | 1            | B.Tech. CEA  | Semeste   | r                                       | 2nd         | 3                 |       |  |
| Subject          |   | ]            | 3SC-104  | Subject Title Math                                  |   | Mathe       | Mathematics-II    |       |  |
| Mid Se           | mester Test (MST  | ) No.        |  |   | Coordinator(s                           | ) Prof.     | Sukhminder Si     | ngh,  |  |
|                  |   |              |  |   | ,                                       |             | agandeep Kaur     |       |  |
|                  |   |              |  |   |   |             | indeep Chauha     |       |  |
| Max. N           | 1arks   | 1            | 24   | Time Du   | ration                                  |             | 1 hour 30 minutes |       |  |
| Date of          | MST   | 2            | 24-03-2023   | Roll Nur  | nber                                    |             |                   |       |  |
| Note: A          | Attempt all question  | ıs.          |  |   |   |             |                   |       |  |
| Q.No.            |   |              | Question   | n   | - 1 h                                   |             | CO's, RBT         | Marks |  |
|                  | 1 l-x   |              |  | 32.   | 57g/861 (311) (3)                       |             | CO3,              | 2     |  |
| Q1               | Evaluate $\int_{0}^{1} \int_{0}^{1-x} e^{2x+3y} dy dx.$                         |              |  |   |   |             | L2,L3             | 2     |  |
| Q2_              | Write the Dirichlet's conditions for expansion of a function as Fourier series. |              |  |   |   |             | CO6,<br>L2,L1     | 2     |  |
| Q3               | Find all the asymptotes of the curve $x^2y + xy^2 + xy + y^2 + 3x = 0$ .        |              |  |   |   |             | CO2,<br>L2,L5     | 4     |  |
| Q4               | Find the half rang  | ge sine se   | eries of function $f$                                  | $(x) = \begin{cases} x, 0 < \\ \pi - x \end{cases}$ | $x < \frac{\pi}{2}$ $x < \frac{\pi}{2}$ |             | CO6,<br>L2, L3,L5 | 4     |  |
| Q5               | Trace the curve:  | r = a(1 +    | $-\cos\theta$ )  | i lasari  | - i                                     |             | CO2,<br>L2,L5     | 4     |  |
| Q6               |   |              | the function $f(x)$ $\dots \infty = \frac{\pi^2}{12}.$ | $= x - x^2 . Als$                                   |   |             | CO6,<br>L2,L3,L5  | 8     |  |
|                  | Outcomes (CO)  will be able to  | ,            | ,  |   |   | 4           |                   |       |  |
| 1                |   |              | ots of vector calculu                                  | s, differential                                     | equations and ca                        | lculus of c | omplex function   | s to  |  |
| 2                |   |              | netric and polar curv                                  | es.   |   |             |                   |       |  |
| 3                | Apply the techniqu  | es of mul    | iple integrals in engi                                 | ineering proble                                     |   |             |                   |       |  |
| 4                |   |              | oint functions over                                    |   |   |             |                   |       |  |
| 5                | Substantiate the ab   | ility to int | egrate knowledge an                                    | d ideas of mul                                      | ti variable calcu                       | lus to engi | neering problem   | S.    |  |
| 6                | Understand how to   | decompo      | se the periodic funct                                  | ions in series o                                    | of sine and cosin                       | e.          | SF-1310III        | -     |  |
| RBTCla           | ssification Lower   | Order Tl     | inking Levels (LO                                      | TS)   | Higher Order                            | r Thinkins  | Levels (HOTS      | 0     |  |
| RBT Le<br>Number | vel   | LI           | L2   | L3  | L4                                      | L5          | L                 |       |  |
|                  | vel Remem   | 1            | Understanding  | Applying  | Analyzing                               | Evaluatin   |                   |       |  |

| G   | uru Nanak Dev Engine   | ering College Ludhie   | ) n o          | 1                             |          |
|---|--|--|----------------|-------------------------------|----------|
|   | Department of A  | opplied Sciences   | illa           |                               | 4        |
| Program                                       | D. Tech. (ECE, IT, ME)   | Semester   | Ist            | 1191 - 1 - 1                  | 1        |
| Subject Code                                  | BSC-104  | Subject Title  | Mathematics II |                               |          |
| Mid Semester Test (MST)                       | 1  |  |                |                               |          |
| No.   |  | Subject Teachers   | Kour           | ya Goyal, Dr                  | Sandeep  |
| Max. Marks                                    | 24   | Time Duration  |                | , Dr Gagande<br>Ir 30 minutes | ep Kaur  |
| Date of MST                                   | 14 <sup>th</sup> Nov 2022  | Roll Number  | 1 1100         | ii 30 minutes                 |          |
| Note: All questions are comp                  | oulsory.   | Tton Tumber  |                |                               |          |
| Q. No.  | Question   | 1011   |                | COs,<br>RBT level             | Marks    |
| Write the functi                              | on for square wavefo   |  |                | CO6,L2                        | 2        |
|   | $3 + z^3 - 3xyz$ , then ever   | ,  |                | CO5,L3                        | 2        |
| degree 7+x2                                   | + y) in powers of x ar<br>$y - y^2 + x^2 + x + x^2 = x + x + x + x = x + x + x = x + $ | and y upto terms of the $13 + 3^3 = 10$  | nird           | CO5,L3                        | 04       |
| $If u = x \log(xy) w$                         | where $x^3 + y^3 + 3xy = 1$ ,  | find $\frac{du}{dx}$ .   |                | CO5,L4                        | 4        |
| If $u = \tan^{-1} \frac{x^3 + y}{x - y}$      | $\frac{v^3}{v}$ , then evaluate $x^2 \frac{\partial}{\partial x}$  | $\frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$   | - Silv         | CO5,L5                        | 4        |
| Find Fourier se                               | ries expansion of $f(x)$   | $(x - x^2, -\pi < x < \pi)$  |                | CO6,L5                        | 8        |
|   | $t \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots$  | The state of the s |                | -                             | -        |
| Course Outcomes (CO) Students will be able to |  |  |                | v &                           | 1        |
| 1 Understand and a complex functions          | apply concepts of vectors to engineering problems  | r calculus, differential   | equati         | ons and calc                  | culus of |
| 2 Sketch basic carte                          | sian, parametric and pola  | r curves.  |                | 12 min                        |          |
|   | ues of multiple integrals i  |  |                | 77.                           | 24       |
| 4 Evaluate integrals                          | of vector point functions  | over line, surfaces and  | volume         | es.                           |          |
| 5 Substantiate the engineering proble         | ability to integrate know  | owledge and ideas of   | f multi        | variable calc                 | ulus to  |
| 6 Understand how to                           | decompose the periodic   | functions in series of s   | ine and        | cosine.                       |          |
|   |  |  |                |                               |          |

| RBT<br>Classification | Lower Order | (LOTS)        | Higher Order Thinking Levels (HOTS |           |            |          |
|-----------------------|-------------|---------------|------------------------------------|-----------|------------|----------|
| RBT Level<br>Number   | L1          | L2            | L3                                 | L4        | L5         | 16       |
| RBT Level<br>Name     | Remembering | Understanding | Applying                           | Analyzing | Evaluating | Creating |

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|                   |  | Denartmo   | ngineering College, Ludhian<br>nt of Applied Science   | <u>a</u>          |                  |         |  |
|-------------------|--|--|--|-------------------|------------------|---------|--|
| Program           | 1.   | B.Tech.(CS A, CS   |  |                   |                  |         |  |
|                   |  | B, CS C,IT A, IT   | Semester   |                   | 2 <sup>nd</sup>  |         |  |
|                   |  |  |  |                   |                  |         |  |
| Subject Co        | ode  | B, EC A, EC B)   | G III  |                   |                  |         |  |
|                   | ster Test (MST) No.  | BSC-104  | Subject Title  |                   | ematics 11       | 100     |  |
| viid Seme         | ster rest (MST) No.  | ı  | Course Coordinator(s)  |                   | Rajbir Kaur,     |         |  |
|                   |  | 1  |  | Prof.             | Sukhminder Singl | h,      |  |
| Max. Mar          | die  |  |  | Dr. G             | Gagandeep Kaur   |         |  |
| Date of M         |  | 24   | Time Duration  | 1 hour 30 minutes |                  |         |  |
| Date of W         | 31   | 27th April,2022  | Roll Number  |                   |                  |         |  |
| Notes Atto        | mmt all and  | <u> </u>   |  |                   |                  |         |  |
|                   | empt all questions   |  |  |                   |                  |         |  |
| Q. No.            |  | Quest  | ion  |                   | COs, RBT         | Mark    |  |
|                   |  |  |  |                   | level            |         |  |
| Q1                | Write Euler's form   | ula to calculate hn  | for any function f(x) in int   | erval             | CO5,             | 2       |  |
|                   |  |  |  | Civai             |                  |         |  |
|                   | (-2,2). Also Evaluat   | te $b_n$ for $f(x) = x^2 - x^4$  | in (-2,2).   |                   | L1, _3           |         |  |
|                   |  |  | <u> </u>   |                   |                  |         |  |
| Q2                | If $u = \log \sqrt{x^2 + y^2}$                                       | $z^2+z^2$  |  |                   | CO5, L3          | 2       |  |
|                   |  | /a²1 a²1   | a <sup>2</sup> u)  |                   |                  |         |  |
|                   | Prove that $(x^2 + y)$   | $(z^2 + z^2)(\frac{0}{3} + \frac{0}{3} + $ | $(\frac{a}{2} + \frac{b^2u}{2}) = 1.$  |                   |                  |         |  |
|                   |  | $\langle \partial x^2 - \partial y \rangle$  | 022)   |                   |                  |         |  |
| Q3                | (a) Define Pori  | odic Function Alco   | Find the period of $f(x) = c$  | 2                 | COCLILA          | 2.2     |  |
| 42                |  | 1  |  | .055x .           | CO5,L1,L2        | 2,2     |  |
|                   | (b) If $u=f\left(\frac{x}{a},\frac{y}{a}\right)$                     | $(\frac{z}{2})$ , Prove that x   | $\frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} = 0$  |                   | CO.5,L5          |         |  |
|                   | y z  | x)   | $\partial x$ $\partial y$ $\partial z$   |                   |                  |         |  |
| Q4                | Expand $f(x, y) = 21 +$  | $x-20y-4x^2+xy+6y^2$ in  | n Taylor's series of maximi  | ım                | CO5,             | 4       |  |
| <b>X</b> .        |  | 1.   |  | ulli              |                  | 4       |  |
| The second second | order about the po   | oint (-1,2)  | The second secon |                   | L3,_5_           | 13:10   |  |
| 10 1              |  | 11.  |  | isc of t          |                  |         |  |
| Q5                | Using Lagrange's N   | Nethod , find the  | shortest and the longest of  | listance          | CO5,             | 4       |  |
| -                 | from the point (3,4  |  |  |                   | L2,L3            |         |  |
|                   | monitude point (3)   | i,12) to the spire   | X 14 12 -1:  |                   |                  |         |  |
| Q6                |  |  | 1. /   |                   | COLIC            |         |  |
| Qu                | Find the Fourier se  | eries for $f(x) =  \cos x $  | () in $(-\pi, \pi)$ .  |                   | CO6, L5          | 8       |  |
|                   |  | 3 4  |  |                   |                  | P.      |  |
| Course C          | Outcomes (CO)  |  |  |                   | *1/2             |         |  |
|                   | will be able to  | i  |  |                   |                  |         |  |
| Students          |  | concerts of waster sale  | culus differenti al equations an   | d oplaulus        | of annual C      |         |  |
|                   | Understand and apply   | concedis of vector care  | ands, afficienti ai equations an   | u calculus        | of complex funct | ions to |  |
| Students 1        | Understand and apply   | concepts of vector care  |  |                   | pron rance       | ions to |  |
| 1                 | engineering problems.  |  |  |                   | ———————          |         |  |
| 1                 | Sketch basic cartesian   | , parametric and polar   | curves .   | 7                 |                  |         |  |
| 1 2 3             | Sketch basic cartesian Apply techniques of m                         | , parametric and polar nultiple integrals in eng   | curves .   |                   |                  |         |  |
| 1 2               | Sketch basic cartesian Apply techniques of m Evaluate integrals of v | , parametric and polar<br>nultiple integrals in eng  | curves .   |                   |                  |         |  |

| RBT<br>Classification | Lower Order TI | hinking Levels (LOT | S)       | Higher Order Thinking Leve's (HOTS) |            |          |
|-----------------------|----------------|---------------------|----------|-------------------------------------|------------|----------|
| RBT Level             | L1             | L2                  | L3       | L4                                  | L5         | 16       |
| Number                | 1 270          |                     |          |                                     |            |          |
| RBT Level             | Remembering    | Understanding       | Applying | Analyzing                           | Evaluating | Creating |

Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

[Total No. of Questions: 09]

[Total No. of Pages: .....]

Uni. Roll No.

Program: B.Tech. (Batch 2018 onward)

Semester: 1<sup>st</sup>/2<sup>nd</sup>

Name of Subject: Mathematics II

Subject Code: BSC-104

Paper ID: 15940

中山

Max. Marks: 60

wave form

Time Allowed: 03 Hours

NOTE:

1) Parts A and B are compulsory

2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice

3) Any missing data may be assumed appropriately

Part - A

Ypes

[Marks: 02 each]

Q1.

Write the function for saw toothed wave form and justify its name.

Is there any difference between multiple pints or double points in a curve. Give reasons. Discuss two different types of double points.

If an error of 2% is made while measuring the sides of a square, find the error in calculating its area.

State Gauss's Divergence theorem. you as a

Change the order of integration in the integral  $\int_{0}^{1} \int_{x^2}^{2-x} f(x) dy dyx$ , when it is given

that the points of intersection of the two curves are (1,1) and (-2,4)

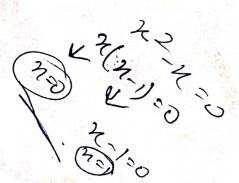
f) Give physical Interpretation of curl.

Part - B

[Marks: 04 each]

Express f(x) = |x|,  $-\pi < x < \pi$ , as a Fourier series.

Q3. Define implicit function and hence find derivative of y w.r.t. x for the implicit function  $x^3 + y^3 = 6xy$  using the method of partial differentiation



Page 1 of 2

P.T.O.

Q4. If 
$$f(x) = \begin{cases} x, 0 < x < \frac{\pi}{2} \\ \pi - x, \frac{\pi}{2} < x < \pi \end{cases}$$
, then find the half range sine series expansion

- Q5. Evaluate  $\iint r^2 dr d\theta$  over the area included between the circles  $r=2\sin\theta$  and  $r=4\sin\theta$
- Q6. If  $z = e^{ax+by} f(ax-by)$ , then find the value of  $b \frac{\partial z}{\partial x} + a \frac{\partial z}{\partial y}$ 
  - **Q7.** Find the value of  $\nabla \cdot \left\{ r \nabla \left( \frac{1}{r^3} \right) \right\}$

[Marks: 12 each]

O8. Trace the curve  $\left(\frac{x}{a}\right)^{2/3} + \left(\frac{y}{b}\right)^{2/3} = 1$  by discussing all its important points like symmetry, Origin, points of intersection with axes, asymptotes, tangents and region etc.

OR

The sum of three positive numbers is constant .Prove that their product is maximum when they are equal

Q9. Evaluate  $\iiint z(x^2 + y^2) dx dy dz$ ; where  $V = \{(x,y,z): x^2 + y^2 \le 1, 2 \le z \le 3\}$ 

OR

Apply Green's theorem to evaluate  $\oint_C [(2x^2 - y^2)dx + (x^2 + y^2)dy]$ , where C is the circle  $x^2 + y^2 = a^2$ 

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