GOVERNMENT DEGREECOLLEGE(MEN)
SRIKAKULAM

(NAAC Accredited with 'B++' Grade (2.98 CGPA)

(Affiliated to Dr. B. R. Ambedkar University, Srikakulam)

DEPARTMENT OF MATHEMATICS

REPORT ON
INVITED LECTURE
"INTEGRAL TRANSFORMATIONS"

UNDER COLLABORATIVE ACTIVITY

BY

RONANKI.RAVISANKAR,

LECTURER IN MATHEMATICS

GOVERNMENT DEGREE COLLEGE, TEKKALI

MODE OF TALK: ONLINE MODE THROUGH GOOGLE MEET.

DATE: 05.12.2020 **TIME: 2.30 PM to 5 PM.**

TOPIC : " INTEGRAL TRANSFORMATIONS "

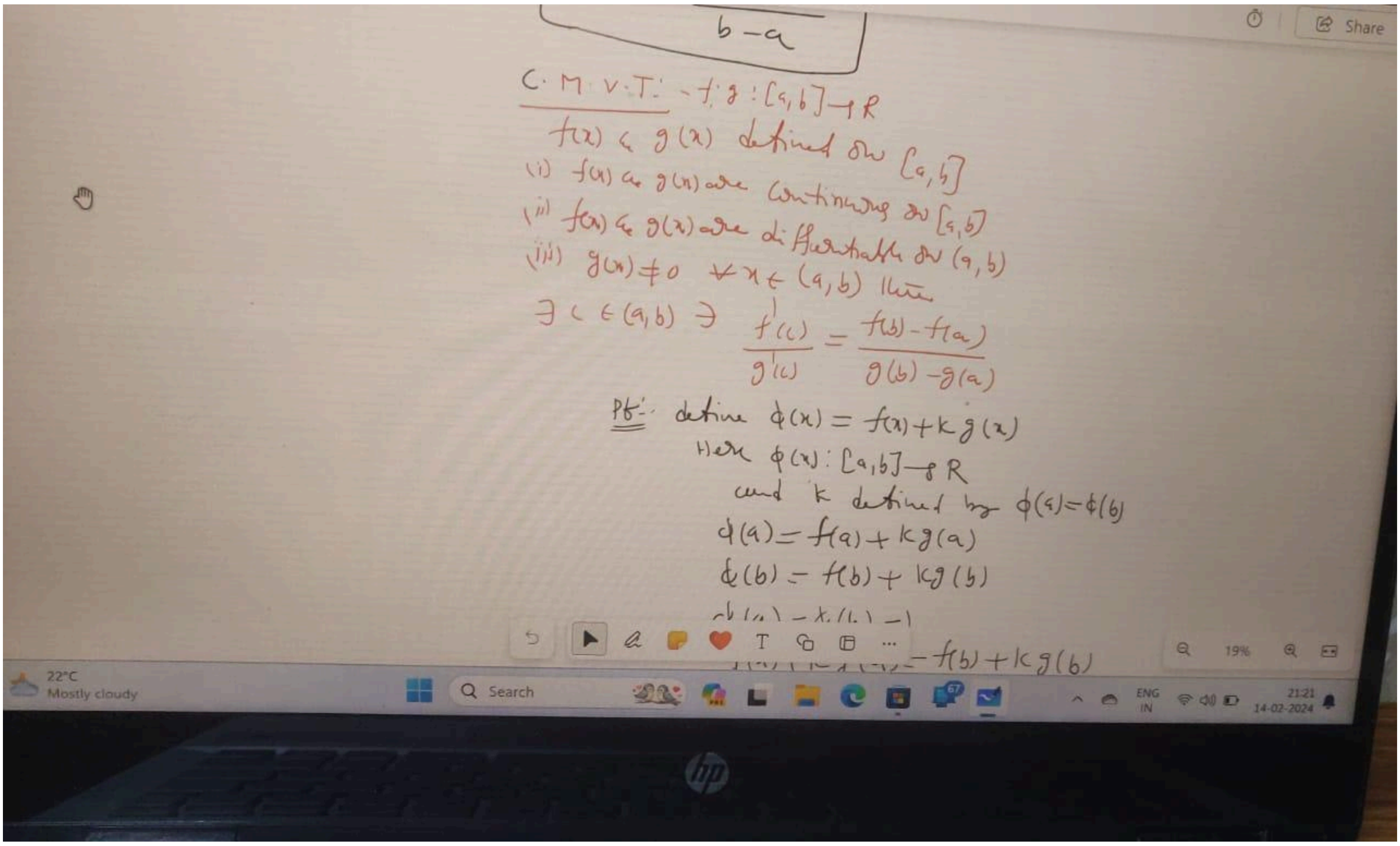
VENUE: GOVERNMENT DEGREE COLLEGE,MEN

No.of Students attended = 30 No.of
Teaching Staff attended = 05

GOOGLE MEET LINK

GUEST LECTURE ON "INTEGRAL TRANSFORMATIONS"

Tuesday, December 5 · 2:30 –
4:30pm Time zone:
Asia/Kolkata Google Meet
joining info
Video call link:
https://meet.google.com/vss-ycpu-kni



$b-a$

C.M.V.T.: $f, g : [a,b] \to R$

$f(x)$ & $g(x)$ defined on $[a,b]$

(i) $f(x)$ & $g(x)$ are continuous on $[a,b]$

(ii) $f(x)$ & $g(x)$ are differentiable on (a,b)

(iii) $g'(x) \neq 0 \;\forall x \in (a,b)$ then

$\exists\, c \in (a,b) \ni \dfrac{f'(c)}{g'(c)} = \dfrac{f(b)-f(a)}{g(b)-g(a)}$

Pf: define $\phi(x) = f(x) + k\, g(x)$

Here $\phi(x) : [a,b] \to R$

and k defined by $\phi(a) = \phi(b)$

$\phi(a) = f(a) + k g(a)$

$\phi(b) = f(b) + k g(b)$

$= f(b) + k g(b)$

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Int	A 32-bit (4-byte) integer value
Short	A 16-bit (2-byte) integer value
Long	A 64-bit (8-byte) integer value
Byte	An 8-bit (1-byte) integer value
Float	A 32-bit (4-byte) floating-point va
Double	A 64-bit (8-byte) floating-point va
Char	A 16-bit character using the U…co
Boolean	A true or false value

(16)

Polaki Praveen Kumar (You)

guna jagadesh

Siva Prasad

Bhagya Sri Uppada

Others in the meeting (12)

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Dupana Poojitha
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Gowtham Jami
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Guntuku Premsai
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Hari Shankar. CH
Prudhvi Polaki
Rahul Rocky
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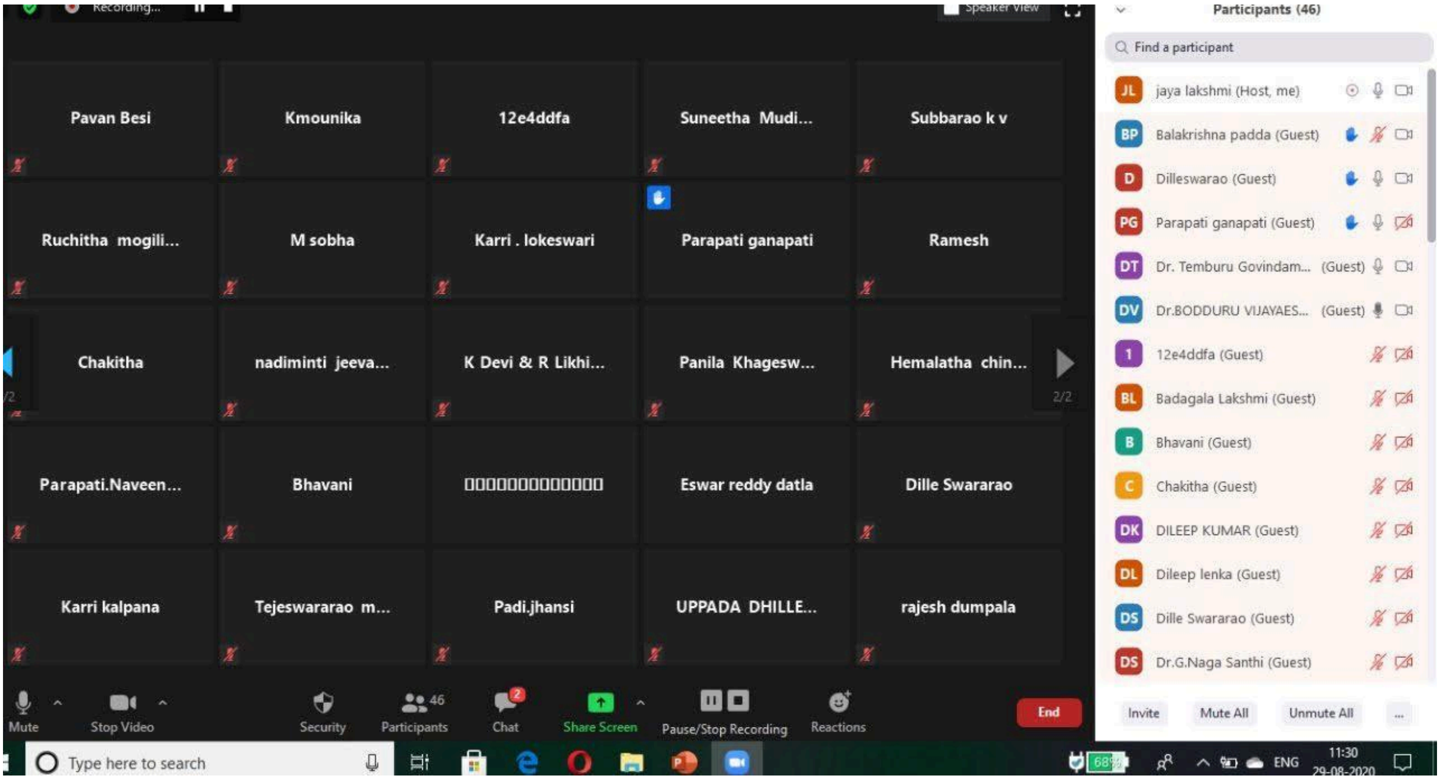
Santhoshi kumari Ponnana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46
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Share Screen
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Balakrishna padda (Guest)
Dilleswarao (Guest)
Parapati ganapati (Guest)
Dr. Temburu Govindam... (Guest)
Dr.BODDURU VIJAYAES... (Guest)
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Badagala Lakshmi (Guest)
Bhavani (Guest)
Chakitha (Guest)
DILEEP KUMAR (Guest)
Dileep lenka (Guest)
Dille Swararao (Guest)
Dr.G.Naga Santhi (Guest)
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29-08-2020


C-5-Student Support Progression

TOPIC SYNOPSIS

INTRODUCTION: When a function $f(x)$ is integrated with respect to x between the limits a and b, we get the double integral $\int_a^b f(x)dx$ .If the integrand is a function $f(x,y)$ and if it is integrated with respect to x and y repeatedly between the limits x_0 and x_1 (for x) and between the limits y_0 and y_1 (for y) we get a double integral that is denoted by the symbol $\int_{y_0}^{y_1}\int_{x_0}^{x_1} f(x,y)dxdy$.Extending the concept of double integral one step further, we get the triple integral, denoted by $\int_{z_0}^{z_1}\int_{y_0}^{y_1}\int_{x_0}^{x_1} f(x,y,z)\, dxdydz$.

EVALUATION OF DOUBLE AND TRIPLE INTEGRALS: To evaluate $\int_{y_0}^{y_1}\int_{x_0}^{x_1} f(x,y)dxdy$ first integrate $f(x,y)$ with respect to x partially, treating y as constant temporarily, between the limits x_0 and x_1. Then integrate the resulting function of y with respect to y between the limits y_0 and y_1 as usual.

In notation $\int_{y_0}^{y_1}\left[\int_{x_0}^{x_1} f(x,y)dx\right] dy$ (for double integral)

$\int_{z_0}^{z_1}\left\{\int_{y_0}^{y_1}\left[\int_{x_0}^{x_1} f(x,y)dx\right] dy\right\} dz$ (for triple integral).

NOTE: Integral with variable limits should be the innermost integral and it should be integrated first and then the constant limits.

REGION OF INTEGRATION: Consider the double integral $\int_c^d \int_{\phi_1}^{\phi_2(y)} f(x,y)dxdy$, x varies from $\phi_1(y)$ *to* $\phi_2(y)$ and y varies from c *to* d. (i.e) $\phi_1(y) \le x \le \phi_2(y)$ and $c \le y \le d$. These inequalities determine a region in the xy–*plane*, which is shown in the following diagram. This region **ABCD** is known as the region of integration

CASE-I : **Double integral** $\iint_S f(x,y)dS = \int_{x=a}^{x=b}\int_{y=g_1(x)}^{y=g_2(x)} f(x,y)dxdy,$

x **varies from a to b and** y **varies from** $g_1(x)$ *to* $g_2(x)$.

CASE-II : **Double integral** $\iint_S f(x,y)dS = \int_{y=c}^{y=d}\int_{x=h_1(y)}^{x=h_2(y)} f(x,y)dxdy,$

x **varies from** $h_1(y)$ *to* $h_2(y)$ **and** y **varies from** c *to* d.

JAMBOARD LINK

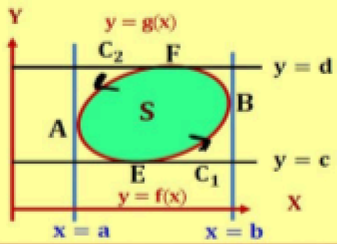
https://jamboard.google.com/d/11t038JYRoWFSmDaM89kYA8D5qHvy90FNAnLO26xMilw/edit?usp=sharing

GREEN'S THEOREM IN A PLANE

Statement: Let S be a closed region in xy − plance enclosed by a curve C. Let P and Q be continuous and differentiable scalar functions in x and y.

Then prove that $\oint_C Pdx + Qdy = \iint_S \left[\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y}\right] dxdy$, the line int egral being taken around C such that S is on the left as one advances along C.

Proof: Let any line parallel to either of coordinate axes cut C in atmost two points.
Let S lies between the lines $x = a, x = b$ and $y = c, y = d$.
Let $y = f(x)$ be the curve C_1 (AEB) and $y = g(x)$ be the be the curve C_2 (AFB), where $f(x) \le g(x)$.



$$\iint_S \frac{\partial P}{\partial y} dxdy = \int_{x=a}^{x=b}\left[\int_{y=f(x)}^{y=g(x)} \frac{\partial P}{\partial y} dy\right] dx = \int_{x=a}^{x=b} [P(x,y)]_{y=f(x)}^{y=g(x)} dx$$

$$= \int_{x=a}^{x=b} [P(x,g(x)) - P(x,f(x))] dx$$

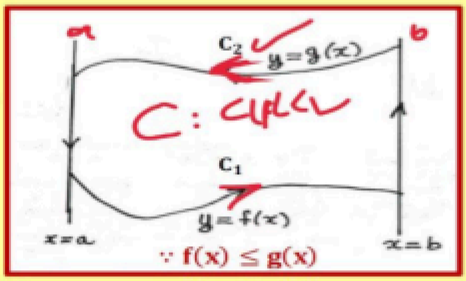
$$= \int_{x=a}^{x=b} P(x,g(x))\,dx - \int_{x=a}^{x=b} P(x,f(x))\,dx$$

$$= -\int_{x=b}^{x=a} P(x,g(x))\,dx - \int_{x=a}^{x=b} P(x,f(x))\,dx$$

$$= -\left[\int_{C_2} P(x,y)\,dx + \int_{C_1} P(x,y)\,dx\right]$$

$$= -\oint_C P(x,y)dx$$

$$\therefore \oint_C P(x,y)dx = -\iint_S \frac{\partial P}{\partial y} dx\,dy \quad \cdots\cdots\cdots (1)$$



$\because f(x) \le g(x)$

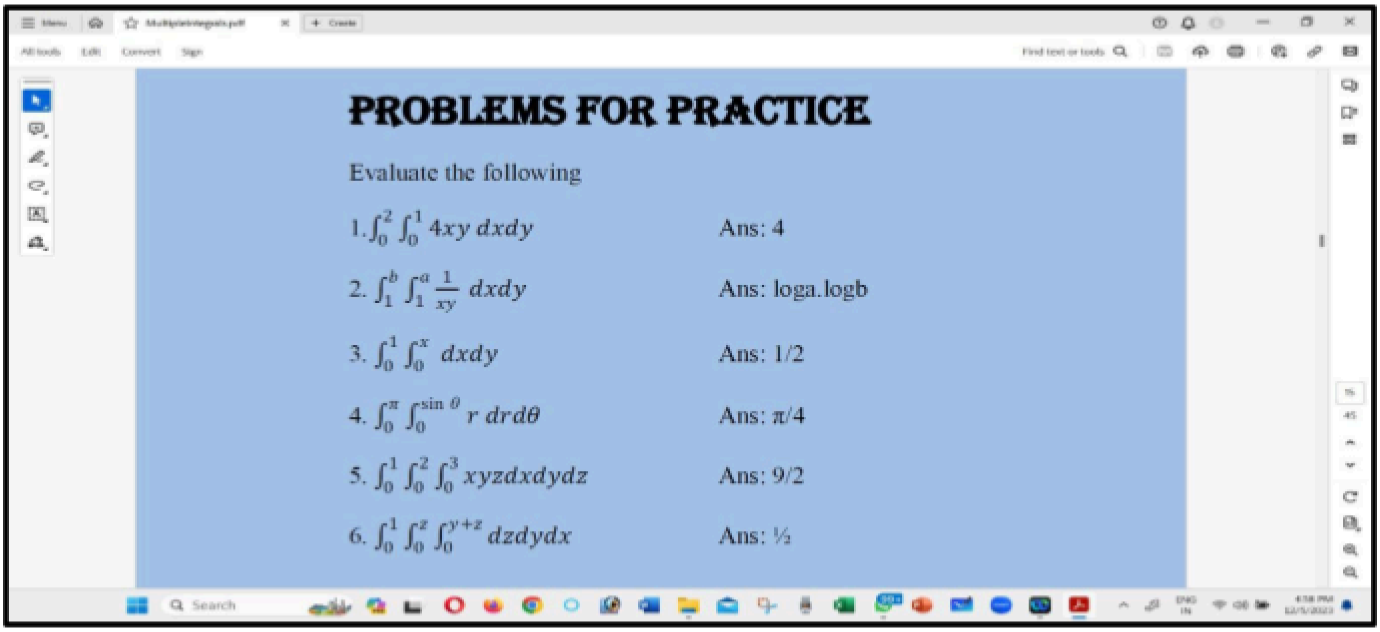
$\because C = C_1 + C_2$

$\because \int_a^b f(x)\,dx = -\int_b^a f(x)\,dx$

y = g(x)
y = f(x)

$\iint_S \left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y}\right)$

roof of Green's Theor


PROBLEMS FOR PRACTICE
Evaluate the following
1. $\int_0^2 \int_0^1 4xy\, dxdy$ Ans: 4
2. $\int_1^b \int_1^a \frac{1}{xy}\, dxdy$ Ans: loga.logb
3. $\int_0^1 \int_0^x\, dxdy$ Ans: 1/2
4. $\int_0^\pi \int_0^{\sin\theta} r\, drd\theta$ Ans: π/4
5. $\int_0^1 \int_0^2 \int_0^3 xyzdxdydz$ Ans: 9/2
6. $\int_0^1 \int_0^z \int_0^{y+z} dzdydx$ Ans: ½
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Ronanki Ravisankar
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