University Institute of Engineering & Technology
(Recognised Under Section 2(f) and 12B of UGC)
Kurukshetra University, Kurukshetra

Roll No. -

THEORY EXAMINATION – MAY 2019

52015

B.TECH – ECE & ME	SEMESTER - II

TIME – 3 Hrs.

M.M. - 75

COURSE NO. – BS-136

COURSE TITLE – CALCULUS AND ORDINARY DIFFERENTIAL EQUATIONS

Note: All questions in Part-A and Part-B are compulsory. Attempt any four questions from Part-C selecting at least one from each unit.

PART-A

Q 1. Answer the following multiple choice questions: (15×1)

1(i). $Mdx+Ndy=0$, is an exact differential equation if.....

1(ii) On putting $x=e^t$, the transformed equation of $x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}+y=x$ is...

1(iii) The integrating factor of $\cos^2 x\frac{dy}{dx}+y=\tan x$ is...

1(iv) Particular integral of $\frac{d^2y}{dx^2}-2\frac{dy}{dx}+y=e^x$ is...

1(v) The order of the differential equation $\left[\left(1+\frac{dy}{dx}\right)^{3/2}\Big/\frac{d^2y}{dx^2}\right]=c$ is.....

1(vi) $\int_3^4\int_1^2 xydydx$ is equal to

1(vii) Draw the region of integration for the problem $\int_0^1\int_x^{\sqrt{2-x^2}} f(x,y)dydx.$

1(viii) On changing Cartesian to Polar coordinates in double integration problem, $dxdy$ will be changed to

1(ix) If $f(x,y,z)$ defines the scalar point function, then $|\nabla f|$ describes...

1(x) The value of $\left[\nabla.(xy\hat{i}+yz\hat{j}+zx\hat{k})\right]_{(1,2,3)}$ is ....

1(xi) The Stoke's theorem gives the relation between surface and volume integral (True/False).

1(xii) In the surface integral, $\int_S \vec{F}.Nds$ what do you mean by symbol N.

1(xiii) Is the function $u = 2x(1-y)$ Harmonic? (Y/N).

1(xiv) The poles of the integral $\oint_C \frac{dz}{z^2+9}$, where C is $|z+3i|=2$, are given by...

1(xv) State Cauchy Integral formula for the derivative of an analytic function.

PART-B (4×5)

Q 2. Solve the differential equation $3\frac{dy}{dx}+3\frac{y}{x}=2x^4y^4$.

Q 3. Evaluate the integral $\int_0^2\int_0^y\int_{x-y}^{x+y}(x+y+z)dxdydz$.

Q 4. Find the unit vector normal to the surfaces $xy^3z^2=4$ at the point (-1,-1, 2).

Q 5. Show that the function $e^x(\cos y + i\sin y)$ is an analytic function, find its derivative.

PART-C (4×10)

Unit-1

Q 6. Solve the differential equation $(y^4+2y)dx+(xy^3+2y^4-4x)dy=0$.

Q 7. By variation of parameter, find the solution of $\frac{d^2y}{dx^2}-3\frac{dy}{dx}+2y=\sin x$.

Unit-2

Q 8. Evaluate $\iint(x^2-y^2)dxdy$ over the triangle with vertices (0,1), (1,1) & (1,2).

Q 9. Change order of integration and solve $\int_0^\infty\int_0^x e^{-xy}ydydx$.

Unit-3

Q 10. Find the directional derivative of $f = x^2yz+4xz^2$ at the point (1, -2, 1) in the direction vector $2\hat{i}-\hat{j}-2\hat{k}$. Find the greatest rate of increase of f.

Q 11. Evaluate by Green's theorem $\int_C(3x^2-8y^2)dx+(4y-6xy)dy$, where C is the boundary of the region bounded by $x=0, y=0, x+y=1$.

Unit-4

Q 12. Determine the analytic function whose real part is $e^{2x}(x\cos 2y - y\sin 2y)$.

Q 13. Evaluate $\int_0^{1+i}(x^2-iy)dz$, along the path $y=x^2$.