# CONTINUOUS INTERNAL EVALUATION- 1

| Dept: BS | Sem / Div: II/A, B, C, D, E, F | Sub: Advanced Calculus and Numerical methods | S Code:18MAT21 |
|---|---|---|---|
| Date:24-06-2021 | Time: 9:30-11:00 am | Max Marks: 50 | Elective: N |
| Note: Answer any 2 full questions, choosing one full question from each part. | | | |

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| QN | | Questions | Marks | RBT | COs |
|---|---|---|---|---|---|
| | | **PART A** | | | |
| 1 | a | Find the angle between the surfaces $x^2+y^2-z^2=4$ and $z=x^2+y^2-13$ at (2,1,2) | 8 | L1 | CO1 |
| | b | Find the directional derivative of $\phi = 3x^2+2y-3z$ at (1,1,1) in the direction 2i+2j-k | 8 | L2 | CO1 |
| | c | Find the value of a, b, c such that $\vec{F}=(axy-z^3)i+(bx^2+z)j+(bxz^2+cy)k$ is a conservative force field. Hence find the scalar potential $\phi$ such that $\vec{F} = \nabla\phi$ | 9 | L3 | CO1 |
| | | **OR** | | | |
| 2 | a | Show that $\vec{F}=(y^2-z^2+3yz-2x)i+(3xz+2xy)j+(3xy-2xz+2z)k$ is both solenoidal and irrotational. | 8 | L3 | CO1 |
| | b | Find the directional derivative of $\phi = xy+yz+zx$ at (1,2,3) in the direction 3i+4j+5k | 8 | L2 | CO1 |
| | c | Show that the vector field $\vec{F}=(2xyz^2)i+(x^2z^2+zcosyz)j+(2x^2yz+ycosyz)k$ is a potential field. Hence find its the scalar potential | 9 | L3 | CO1 |
| | | **PART B** | | | |
| 3 | a | Find work done by the force $\vec{F} = 2xyi-4zj+5xk$ along the curve $x=t^2, y=2t+1, z=t^3$ from the point t=1 to t=2 | 8 | L2 | CO1 |
| | b | Using Stoke's theorem, evaluate $\int_C \vec{F}.d\vec{r}$ where $\vec{F}=yi+zj+xk$ and $C$ is the boundary of upper half of the sphere $x^2+y^2+z^2=1$ | 8 | L3 | CO1 |
| | c | Solve $(D^2+4)y=x^2+\cos 2x+2^{-x}$ | 9 | L2 | CO2 |
| | | **OR** | | | |
| 4 | a | Evaluate using Green's theorem $\int_C yx^2dx-x^2dy$ where C is given as $x^2+y^2=25$ | 8 | L3 | CO1 |
| | b | Using Gauss divergence theorem, evaluate $\int\int_S \vec{F}.\hat{n}dS$ over the entire surface of the region above $xy$-plane bounded by the cone $z^2=x^2+y^2$ and the plane z=4, where $\vec{F}=4xz\,\vec{i}+xyz^2\,\vec{j}+3z\,\vec{k}$ | 8 | L3 | CO1 |
| | c | Solve $(D^2-6D+25)y=e^{2x}$ + sinx + x | 9 | L2 | CO2 |