## University of Mumbai

Examination 2021 under cluster
Examinations Commencing from $1^{\text {st }}$ June to 15 June 2021
Program: SE(EXTC/ETRX)
Curriculum Scheme: Rev2019
Examination: SE-IV
Course Code: _ECC401 and Course Name: Engineering mathematics-IV
Time: 2 hour
Max. Marks: 80

| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
| :---: | :---: |
| 1. | The sum of Residue of $f(z)=\frac{z}{(z-1)\left(z^{2}-1\right)}$ is |
| Option A: | o |
| Option B: | 1 |
| Option C: | 2 |
| Option D: | 3 |
| 2. | $\oint \frac{1-2 z}{z(z-1)(z-2)} \mathrm{dz}$ where c is $\|z\|=1.5$ |
| Option A: | $2 \pi i$ |
| Option B: | $3 \pi i$ |
| Option C: | $\pi i$ |
| Option D: | $4 \pi i$ |
| 3. | The Extremal of $\left(\int_{x_{1}}^{x_{2}} y^{2}-y^{\prime^{2}}-2 y \cosh \cosh x\right) \mathrm{dx}$ is |
| Option A: | $\mathrm{y}=c_{1} \cos \cos x+c_{2} \sin \sin x+\frac{1}{2} \cosh \cosh x$ |
| Option B: | $y=c_{1} \cos \cos x-c_{2} \sin \sin x+\frac{1}{2} \cosh \cosh x$ |
| Option C: | $\mathrm{y}=c_{1} \cos \cos x+c_{2} \sin \sin x-\frac{1}{2} \cosh \cosh x$ |
| Option D: | $\mathrm{y}=c_{1} \cos \cos x-c_{2} \sin \sin x-\frac{1}{2} \cosh \cosh x$ |
| 4. | The Extremal of $\int_{x_{1}}^{x_{2}}\left(x+y^{\prime}\right) y^{\prime} \mathrm{dx}$ is |
| Option A: | $c_{1}+c_{2} \mathrm{x}-\frac{x^{2}}{4}$ |
| Option B: | $c_{1}-c_{2} \mathrm{x}-\frac{x^{2}}{4}$ |
| Option C: | $c_{1}-c_{2} \mathrm{x}-\frac{x^{2}}{4}$ |
| Option D: | $c_{1}+c_{2} \mathrm{x}+\frac{x^{2}}{4}$ |


| 5. | Consider a dice with the property that that probability of a face with n dots showing up is proportional to n . The probability of face showing 4 dots is? |
| :---: | :---: |
| Option A: | 1/7 |
| Option B: | 5/42 |
| Option C: | 1/21 |
| Option D: | 4/21 |
| 6. | What would be the probability of an event ' $G$ ' if H denotes its complement, according to the axioms of probability? |
| Option A: | $\mathrm{P}(\mathrm{G})=1 / \mathrm{P}(\mathrm{H})$ |
| Option B: | $\mathrm{P}(\mathrm{G})=1-\mathrm{P}(\mathrm{H})$ |
| Option C: | $\mathrm{P}(\mathrm{G})=1+\mathrm{P}(\mathrm{H})$ |
| Option D: | $\mathrm{P}(\mathrm{G})=\mathrm{P}(\mathrm{H})$ |
|  |  |
| 7. | If $\mathrm{E}(\mathrm{x})=2$ and $\mathrm{E}(\mathrm{z})=4$, then $\mathrm{E}(\mathrm{z}-\mathrm{x})=$ ? |
| Option A: | 2 |
| Option B: | 6 |
| Option C: | 0 |
| Option D: | -2 |
|  |  |
| 8. | For a Poisson Distribution, if mean $(\mathrm{m})=1$, then $\mathrm{P}(1)$ is? |
| Option A: | e |
| Option B: | 1/e |
| Option C: | $\mathrm{e} / 2$ |
| Option D: | 0 |
|  |  |
| 9. | For a standard normal variate, the value of Standard Deviation is |
| Option A: | 0 |
| Option B: | 1 |
| Option C: | $\infty$ |
| Option D: | 1.5 |
|  |  |
| 10. | The shortest distance between two points in a plane is |
| Option A: | straight line |
| Option B: | a curve |
| Option C: | parabola |
| Option D: | circle |
|  |  |
| 11. | Find the population proportion p for an IPL team having total 30 players with 10 overseas players. |
| Option A: | 1/2 |
| Option B: | 1/3 |
| Option C: | 2/3 |
| Option D: | 1/4 |
|  |  |
| 12. | If $40 \%$ of boys opted for maths and $60 \%$ of girls opted for maths, then what is the probability that maths is chosen if half of the class's population is girls? |
| Option A: | 0.5 |
| Option B: | 0.6 |



| 19. | The subset $\left\{(1,-2),(2,9),(-4,3\}\right.$ of $R^{2}$ is |
| :---: | :--- |
| Option A: | Linearly independent |
| Option B: | Basis |
| Option C: | Linearly dependent |
| Option D: | Conditional Basis |
|  |  |
| 20. | The dimension of subspace $\mathrm{W}=\{(\mathrm{x}, \mathrm{y}, \mathrm{z}) / \mathrm{x}+\mathrm{y}+\mathrm{z}=0\}$ of $R^{3}$ is |
| Option A: | 1 |
| Option B: | 3 |
| Option C: | 2 |
| Option D: | 0 |



| Q3. | Solve any Four out of Six |
| :---: | :--- |
| A | Using Rayleigh-Ritz method, solve $I=\int_{0}^{1}\left(x y+\frac{1}{2} \cdot y^{\prime}\right) d x$ Given that $y(0)=$ <br> $0, y(1)=0$. |
| B | Defined by $\left[\begin{array}{lll}a & 0 & b \\ \text { vector space. }\end{array}\right.$$.$with usual addition and scalar multiplication is $a$ |


| C | Evaluate $\int \frac{z}{\left(z-\frac{\pi}{6}\right)^{3}} d z$ where $c$ is $\|z\|=1$ |
| :---: | :--- |


| $D$ | Find an orthonormal basis for the subspace of $R^{3}$ by appling <br> Gram-Schmidt process where $\boldsymbol{S}=\{(\mathbf{1 , 2 , 0}(\mathbf{0 , 3 , 1 )}\}$ |
| :---: | :---: |
| E | Obtain Laurent and Taylors series for $\frac{z-1}{z^{2}-2 z-3}$ |
| F | Using Residue Theorem evaluate $\int_{0}^{\frac{\pi}{2}} \frac{d \theta}{(2+\cos \cos \theta)^{2}}$ |

