University of Mumbai

Examination 2020 under cluster ___ (Lead College Short name)

Program: First Year Engineering
Curriculum Scheme: Rev2016
Examination: First Year Semester I
Course Code: FEC101 and Course Name: Applied Mathematics-I

Time: 1 hour Max. Marks: 50

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NOTE to the Question Paper Setter: (To be deleted before submitting the paper to Semester Coordinator)

1. The question bank consists of 25 MCQ questions with each question carrying a maximum of 2 marks. It should cover all the modules with appropriate weightages.
2. You need to check the questions and their answers for their correctness. There should not be any ambiguity in the questions and the options. Only one option should be the Correct Answer.
3. You must ensure that the same question is not repeated again in this question paper.
4. Among 25 questions, 13 questions can be under the 'Simple' category, 7 questions can be under the 'Moderate' category, and the remaining 5 questions can be under the 'Difficult' category.
5. Please do not reveal answer on this Question Paper.
6. Use another template provided to enter the correct answers.
7. Please save this file with file name as per the sample format given below:

File Name: "Date of Examination_Scheme_Program_Semester_Subject Code_QP Set Number"

For example:

QP set number 1 of first core course of Mechanical Engineering Semester V for Rev2016 scheme and scheduled on 2/12/2020 has to have the file name as

0212_R16_Mech_V_MEC501_QP1

QP set number 3 of Department Level Optional Course of Computer Engineering Semester VI for Rev2012 scheme and scheduled on 12/12/2020 has to have the file name as

1212_R12_Comp_VI_CSDLO6021_QP3

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For the students:- All the Questions are compulsory and carry equal marks .

Q1.	Argument of $\frac{-1}{2} + i\frac{\sqrt{3}}{2}$ is , ---------
Option A:	$\frac{\pi}{3}$
Option B:	$\frac{-2\pi}{3}$
Option C:	$\frac{2\pi}{3}$
Option D:	$\frac{-\pi}{3}$
Q2.	$17coshx + 18sinhx = 1$ then what is the real value of x ?
Option A:	log 5
Option B:	log (-5)
Option C:	-log 5
Option D:	-log (1/5)
Q3.	If $\alpha + i\beta = \tanh\left(x + \frac{i\pi}{4}\right)$, then $\alpha^2 + \beta^2 = ?$

Option A:	1
Option B:	-1
Option C:	0
Option D:	None of above
Q4.	How many roots exist for the equation $(x+1)^n = (x-1)^n$
Option A:	n
Option B:	n-1
Option C:	n+1
Option D:	None of above
Q5.	$i^{174} = ?$
Option A:	i
Option B:	$-i$
Option C:	1
Option D:	-1
Q6.	$cosh^{-1}\left(\sqrt{1+x^2}\right) = ?$
Option A:	$\sinh^{-1}(1+x^2)$
Option B:	$\sinh^{-1} x$
Option C:	$\cosh^{-1} x$
Option D:	All of Above
Q7.	If $i^{(P+iQ)} = P + iQ$ then, $P^2 + Q^2 = ?$
Option A:	$e^{-(4k+1)\pi Q}$
Option B:	$e^{-(2k+1)\pi P}$
Option C:	$e^{-(4k+1)\pi P}$
Option D:	$e^{-(2k+1)\pi Q}$
Q8.	For which value of X will be the matrix $\begin{bmatrix} 8 & x & 0 \\ 4 & 0 & 2 \\ 12 & 6 & 0 \end{bmatrix}$ become singular.
Option A:	6
Option B:	4
Option C:	10
Option D:	8
Q9.	Decode the message 22, 15, 4, 0, 29, 24, 28, 19, 39, 19. Using the key $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$
Option A:	WORK HARD
Option B:	HELP OTHERS
Option C:	GOD EXISTS
Option D:	BE HONEST

Q10.	The rank of the matrix $\begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$ is
Option A:	3
Option B:	1
Option C:	2
Option D:	4
Q11.	The system of linear equations $4x+2y=7, 2x+y=6$ has
Option A:	Unique solution
Option B:	No solution
Option C:	Infinitely many solutions
Option D:	Exactly two solutions
Q12.	For what values of k following system of equations possesses a non-trivial solution ? $3x+y-kz=0$, $4x-2y-3z=0$, $2kx+4y+kz=0$
Option A:	$k=-1 \; or \; k=9$
Option B:	$k=1 \; or \; k=-9$
Option C:	$k=1 \; or \; k=9$
Option D:	$k=-1 \; or \; k=-9$
Q13.	If $u=log\left(\frac{x}{y}\right)$ $then$ $u_{x+}u_y=?$
Option A:	$\frac{1}{x}-\frac{1}{y}$
Option B:	$\frac{1}{y}-\frac{1}{x}$
Option C:	$\frac{1}{x}+\frac{1}{y}$
Option D:	$\frac{1}{y}+\frac{1}{x}$
Q14.	$u=logx^2-2logy$ is homogeneous of degree ------
Option A:	Not homogeneous
Option B:	2
Option C:	1
Option D:	0
Q15.	If $u=x^y$ then find $\frac{\partial u}{\partial x}=?$
Option A:	$x^y logy$
Option B:	$x^{y-1}.x$
Option C:	yx^{y-1}
Option D:	$x^y logx$

Q16.	What are the stationary points for the function $f(x,y) = kx + ky - x^2 - y^2 - xy$
Option A:	$\frac{3}{k}, \frac{3}{k}$
Option B:	$\frac{-3}{k}, \frac{-3}{k}$
Option C:	$\frac{-k}{3}, \frac{-k}{3}$
Option D:	$\frac{k}{3}, \frac{k}{3}$
Q17.	The stationary points $(-\sqrt{2}, \sqrt{2})$ & $(\sqrt{2}, -\sqrt{2})$ for the function $f(x,y) = x^4 + y^4 - 2x^2 + 4xy - 2y^2$, are
Option A:	Points of minima
Option B:	Points of maxima
Option C:	Saddle Points
Option D:	None of above
Q18.	If $y = \sin 2x \sin 3x \cos 4x$, then $y_n = ?$
Option A:	$\frac{1}{4}\left[5^n cos\left(5x + \frac{n\pi}{2}\right) + 3^n cos\left(3x + \frac{n\pi}{2}\right) - 9^n cos\left(9x + \frac{n\pi}{2}\right) - cos\left(x + \frac{n\pi}{2}\right)\right]$
Option B:	$\frac{1}{4}\left[5^n cos(5x + 2n\pi) + 3^n cos(3x + 2n\pi) + 9^n cos\left(9x + \frac{n\pi}{2}\right) - cos\left(x + \frac{n\pi}{2}\right)\right]$
Option C:	$\frac{1}{4}\left[5^n cos\left(5x + \frac{n\pi}{2}\right) + 3^n cos\left(3x + \frac{n\pi}{2}\right) - 9^n cos(9x + 2n\pi) + cos(x + 2n\pi)\right]$
Option D:	None of above
Q19.	Using Newton Raphson method, find approximate root of the equation $3x = 1 + \cos x$.
Option A:	-0.6071
Option B:	0.6071
Option C:	0.6701
Option D:	-0.6701
Q20.	Solve the following equations by Gauss-Seidel method. $10x_1 + x_2 + x_3 = 12$, $2x_1 + 10x_2 + x_3 = 13$, $2x_1 + 2x_2 + 10x_3 = 14$
Option A:	x=-1, y=0, z=-1
Option B:	x=1, y=0, z=0
Option C:	x=1, y=1, z=1
Option D:	x=0, y=1, z=0
Q21.	If $x = \frac{u^2 - v^2}{2}$, $y = uv, z = w$, Find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$.
Option A:	$\frac{-1}{u^2 + v^2}$

Option B:	$\frac{1}{u^2+v^2}$
Option C:	$\frac{u^2+v^2}{u^2}$
Option D:	1
Q22.	$\lim_{x\to 0} x^{sinx}$ is ,
Option A:	$(-1)^n$
Option B:	-1
Option C:	0
Option D:	1
Q23.	Which of the following is expansion of $log(1+sinx)$?
Option A:	$1-\frac{x}{2}+\frac{x^2}{4}-\cdots\ldots\ldots..$
Option B:	$x-\frac{x^2}{2}+\frac{x^4}{4}-\cdots\ldots\ldots..$
Option C:	$1+\frac{x^2}{2}+\frac{x^3}{6}+\cdots\ldots\ldots..$
Option D:	$x-\frac{x^2}{2}+\frac{x^3}{6}-\cdots\ldots\ldots..$
Q24.	What is the coefficient of x^8 in the expansion of $log(1+x+x^2+x^3)$.
Option A:	$\frac{3}{8}$
Option B:	$-\frac{3}{8}$
Option C:	$\frac{1}{8}$
Option D:	$\frac{-1}{8}$
Q25.	For which value of k , the matrix A has rank 1 ? $A = \begin{bmatrix} k & k & 2 \\ 2 & k & k \\ k & 2 & k \end{bmatrix}$
Option A:	2
Option B:	0
Option C:	-1
Option D:	-2