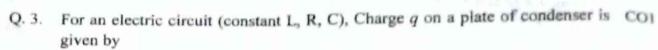
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SHAHEED BHAGAT SINGH STATE TECHNICAL CAMPU	S, FEROZEPUR
POLL NO:	d no. of pages:[2]
Total number of questions:06	
ENGINEERING MATHEMATICS-I	
Subject Code :BTAM-1024(Regular)	(OCIGP)
Time allowed: 3 Hrs	do
Time allowed: 3 Hrs	Max Marks: 60
Important Instructions:	
All questions are compulsory     PART A (10x 2marks)	
TARLA (194 Zimar no)	
Q. 1. Short-Answer Questions:	
(a) Write Cauchy's homogeneous linear differential equation. H	ow it can be reduced
to linear differential equation with constant coefficient.  (b) Find the rank of matrix of following matrix by reducing it into	o normal form.
(b) I find the falls of matrix of following matrix of	
(3-12)	
$\begin{pmatrix} 3 & -1 & 2 \\ -6 & 2 & 4 \\ -3 & 1 & 2 \end{pmatrix}$	
$\begin{pmatrix} -3 & 1 & 2 \end{pmatrix}$	
(c) Solve $x^2ydx - (x^3 + y^3)dy = 0$	
(d) Solve $p = \sin(y - px)$	
(e) Solve $(xy^2 + 2x^2y^3)dx + (x^2y - x^3y^2)dy = 0$	the equations
(f) For what values of $k$ , do $x+y+z=1$ ; $2x+y+4z=k$ ; $4x+y+10z=k^2$ ; have a second	
x + y + z = 1; $2x + y + 4z = k$ ; $4x + y + 10z = k$ , have a s x = y = z = 0.	
(g) Test for the convergent of following series using Leibnitz tes	t year
$1 - \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} - \frac{1}{\sqrt{4}} \dots $ to $\infty$	
V2 V3 V.	
(h) Test the convergence of the infinite series $\sum_{n=0}^{\infty} 1/\left(1+\frac{1}{n}\right)^{n^2}$	
(ii) Test the convergence of the	Julius and arguments
(i) Separate $i^{(1+i)}$ into real and imaginary parts. Also find its mod	Iulus and arguments.
(j) Using De-Moivre theorem, solve $x^4 + x^3 + x^2 + x + 1 = 0$	
PART B (8×5)	
Q. 2. a. Solve differential equation	COI
$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 4y = e^x \cos x$	
$dx^2$ $dx$ b. Solve the differential equation	
$\frac{d^2y}{dx^2} + 4y = \tan 2x$ , by method of variation of parameter	
OR Find non-singular matrices P and Q such that PAQ is in norm	nal form CO2
Find non-singular matrices P and Q such that 174	
$A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 2 \end{bmatrix}$	
$A = \begin{pmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \end{pmatrix}$	



 $L\frac{d^2q}{dt^2} + R\frac{dq}{dt} + \frac{q}{c} = E \sin \omega t$ , where L, R and E are constants and the

current  $i = \frac{dq}{dt}$ , the circuit is tuned to resonance so that  $\omega^2 = \frac{1}{LC}$ .

If  $R^2 < \frac{4L}{C}$  and if q = i = 0 at t=0, Show that

$$q = \frac{E}{\omega R} \left\{ -\cos \omega t + e^{\frac{-Rt}{2L}} (\cos pt + \frac{R}{2Lp} sinpt) \right\}$$

$$i = \frac{E}{R} \left\{ sin\omega t - \frac{1}{p\sqrt{LC}} e^{\frac{-Rt}{2L}} sinpt) \right\} \text{ where } p^2 = \frac{1}{LC} - \frac{R^2}{4L^2}$$

OR

a. Solve

$$x^{2} \frac{d^{2} y}{dx^{2}} + 2x \frac{dy}{dx} - 12y = x^{3} \log x$$

b. Solve  $y = 2px + p^{2}y$ 

Q. 4. a. Find Eigen values and Eigen vector of matrix

 $\begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & 1 & 2 \end{bmatrix}$ 

OR

Verify Cayley Hamilton Theorem for

ayley Hamilton Theorem for 
$$\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \end{bmatrix}$$
, Hence obtain  $A^{-1}$ 

Q. 5. a. Discuss the convergence of infinite series

$$\frac{x}{1.3} + \frac{x^2}{3.5} + \frac{x^3}{5.7} + \cdots \infty$$

b. Discuss the convergence of  $\sum \frac{1}{1+n^2}$ , by applying Cauchy Integeral test OR

Discuss the convergence of infinite series

$$\frac{1^2}{4^2} + \frac{1^2.5^2}{4^2.8^2} + \frac{1^2.5^2.9^2}{4^2.8^2.12^2} + \cdots \infty$$

Q. 6. Prove that

CO<sub>3</sub>

CO<sub>3</sub>

$$(1+\sin\theta+i\cos\theta)^n+(1+\sin\theta-i\cos\theta)^n=2^{n+1}\cos^n\left(\frac{\pi}{4}-\frac{\theta}{2}\right)\cos\left(\frac{n\pi}{4}-\frac{n\theta}{2}\right)$$

OK

Sum the series

$$\cos \alpha - \frac{\cos(\alpha + 2\beta)}{3!} + \frac{\cos(\alpha + 4\beta)}{5!} - \dots \quad \infty$$