AR18

CODE: 18BST103 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Regular Examinations, April, 2019

DIFFERENTIAL EQUATIONS

(Common to CE, ME, CSE, IT Branches)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Solve $x(4y-8y^{-3})dx+dy=0$ 6M

   b) Show that the family of parabolas $y^2=2cx+c^2$ is self-orthogonal 6M

(OR)

2. a) Solve $(xy^3+y)dx+2(x^2y^2+x+y^4)dy=0$ 6M

   b) The rate at which a body cools is proportional to the difference between the temperature of the body and that of the surrounding air. If a body in air at 25°C will cool from 100° to 75° in one minute, find its temperature at the end of three minutes. 6M

UNIT-II

3. a) $(D^2+4D+5)y=e^{2x}+sin3x$ 12M

(OR)

4. a) Solve the differential equation $\frac{d^2x}{dt^2}+\frac{g}{l}x=\frac{g}{l}L,$ where g, l, L are constants subject to the conditions $x=a, \frac{dx}{dt}=0 \ at \ t=0$ 9M

   b) $(D^2-4D+4)y=e^{2x}$ 3M

UNIT-III

5. a) Prove that 12 M

$$\int_{-1}^{1} P_m(x)P_n(x)dx = \begin{cases} 0 & m \neq n \\ \dfrac{2}{2n+1} & m = n \end{cases}$$

(OR)

6. a) Express $f(x) = 4x^3 + 6x^2 + 7x + 2$ in terms of Legendre's Polynomial 6M

b) $P^1_{n+1} - P^1_{n-1} = (2n+1)P_n$ 6M

UNIT-IV

7. a) Form a partial differential equation from $f(x+y+z) = xyz$ 6M

b) Solve 6M

$$\frac{dx}{x(y-z)} = \frac{dy}{y(z-x)} = \frac{dz}{z(x-y)}$$

(OR)

8. a) Solve $p^2 + q^2 = z^2(x+y)$ 6M

b) Solve $y^2 p - xyq = x(z-2y)$ 6M

UNIT-V

9. a) Solve $\frac{\partial^3 z}{\partial x^3} - 4\frac{\partial^3 z}{\partial x^2 \partial y} + 4\frac{\partial^3 z}{\partial x \partial y^2} = 2\sin(3x+2y)$ 6M

b) Solve $\left[D^3 - 3D^2D^1 + 4(D^1)^3\right]z = e^{2x+3y}$ 6M

(OR)

10. a) Solve r +2s + t + 2p + 2q + z = 0 3M

b) Solve $\left[D^2 - (D^1)^2 + D + 3D^1 - 2\right]z = x^2 y$ 9M

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AR18

CODE: 18BST102 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Regular Examinations, April-2019

DIFFERENTIAL EQUATIONS AND TRANSFORM THEORY

(Common to EEE, ECE Branches)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Solve $\frac{dy}{dx} - \frac{\tan y}{1+x} = (1+x)e^x \sec y$ 6M

   b) Solve $(D^3 - D)y = e^x + 1 + 2x$ 6M

(OR)

2. a) Solve $(D^2+1)y = \sec x$ by method of variation of parameters 6M

   b) Solve $(D^2-4)y = x\, sinhx$ 6M

UNIT-II

3. Expand $f(x) = x\ Cosx$ as a Fourier series in $0 < x < 2\pi$ 12 M

(OR)

4. Obtain the Fourier series expansion of $f(x) = |x|$ in $(-\pi, \pi)$ and hence deduce $\sum_{n=1}^{\infty} \frac{1}{(2n-1)^2}$ 12 M

UNIT-III

5. Find the Fourier transform of 12 M

$$f(x) = \begin{cases} a^2 - x^2, & |x| \le a \\ 0, & |x| > a \end{cases}$$

Hence evaluate $\int_0^{\infty} \frac{S\text{int} - t\ Cost}{t^3} dt$

(OR)

6. Find the finite Fourier sine and cosine transforms of $f(x) = x^2$ in $(0, \pi)$ 12 M

UNIT-IV

7. a) Find the Laplace transform of $f(t) = \frac{e^{-t}\sin t}{t}$ 6 M

   b) Using convolution theorem, evaluate $L^{-1}\left\{\frac{s}{(s^2+a^2)^2}\right\}$ 6M

(OR)

8. Solve $(D^2+4D+3)y = e^{-t}$ given that $y(0) = y'(0) = 1$ at $t = 0$ by using Laplace transform. 12 M

UNIT-V

9. a) Find $Z\left[(n-1)^2\right]$ 6M

   b) Find the Z-transform of $\frac{1}{(n+1)!}$ using shifting theorem 6M

(OR)

10. a) Find $Z^{-1}\left[\frac{z+1}{z^2+3z+2}\right]$ 6M

    b) Evaluate $Z^{-1}\left[\frac{z^2}{(z-4)(z-5)}\right]$,using convolution theorem 6M

AR16

CODE: 16BS1002 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, April-2019

ENGINEERING MATHEMATICS – II

(Common to all branches)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1\. a Determine $f(1.6)$ using Newton's forward difference formula, from the following data **7M**

x	1	1.4	1.8	2.2
$f(x)$	3.49	4.82	5.96	6.5

b Compute $f(10)$ such that $f(1)=168, f(7)=192, f(15)=336$ using Lagrange's interpolation formula. **7M**

(OR)

2\. a Compute a real root of $x^4-32=0$ correct to 4 decimal places by Regula Falsi method **7M**

b Compute a real root of the equation $3x=\cos x+1$ by Newton Raphson method **7M**

UNIT-II

3\. a Evaluate $\int_1^2 \frac{dx}{x}$ by using Simpson's $\frac{1}{3}$ rule with $n=10$ **7M**

b Determine $f'(25)$ using Newton's backward difference formula, from the following data **7M**

x	15	17	19	21	23	25
$f(x)$	3.873	4.123	4.359	4.583	4.796	5.8

(OR)

4\. a Solve $\frac{dy}{dx}=x(1+y)$ with $y(1)=1$ at $x=1.1$ by Modified Euler's method taking $h=0.05$ **7M**

b Using Runge-Kutta method of fourth order, solve $\frac{dy}{dx}=\frac{y^2-x^2}{y^2+x^2}$ with $y(0)=1$ at $x=0.2, 0.4$ **7M**

UNIT-III

5. a Find the Laplace transform of $\sinh 3t \cos^2 t$ **7M**

b Find $L^{-1}\left\{\frac{s}{(s+3)^2+4}\right\}$ **7M**

(OR)

6. a Evaluate $\int_0^\infty \frac{e^{-\sqrt{2}t}\sinh t \sin t}{t} dt$ by using Laplace transform **7M**

b Solve $(D^2+\omega^2)y = \cos \omega t$ given that $y = Dy = 0$ at $t = 0$ by using Laplace transform method. **7M**

UNIT-IV

7. a Determine the Fourier series for $f(x) = |x|$ in $(-\pi, \pi)$ **7M**

b Determine the half range sine series $f(x) = e^x$ in $(0,1)$ **7M**

(OR)

8. a Obtain the Fourier series for $f(x) = \begin{cases} -\pi & for\ -\pi < x < 0 \\ x & for\ 0 < x < \pi \end{cases}$ in $(-\pi, \pi)$ **7M**

b Express $f(x) = \begin{cases} x, & for\ 0 < x < \frac{\pi}{2} \\ \pi - x & for\ \frac{\pi}{2} < x < \pi \end{cases}$ as Fourier cosine series in $(0, \pi)$ **7M**

UNIT-V

9. a Solve the partial differential equation $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$ **7M**

b Solve $4\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 3u$ and $u = e^{-5y}$ when $x = 0$ for all values of y **7M**

(OR)

10. Solve the one dimensional wave equation $\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}$ subject to $y(0,t) = 0,\ y(\pi,t) = 0, y(x,0) = \sin 2x$ and $\frac{\partial y}{\partial t}(x,0) = 0,$ where $0 \le x \le \pi$ and $t \ge 0$ **14M**

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RA / AR16

CODE: 16CE1001 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, April-2019

BUILDING MATERIALS AND CONSTRUCTION

(Civil Engineering)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

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UNIT-I

1.	a)	What are the characteristics of good Brick	8M
	b)	Explain briefly about the types of tiles	6M
		(OR)	
2.	a)	Differentiate OPC and PPC with examples.	6M
	b)	Draw the structure of wood & explain its parts	8M

UNIT-II

3.	a)	What is a Mortar? Explain its significance in building construction	8M
	b)	Explain any two grades of concrete	6M
		(OR)	
4.	a)	Explain the suitability of glass as an alternate material in building construction.	7M
	b)	Explain fibre reinforced plastics.	7M

UNIT-III

5.	a)	Discuss various functions served by foundations	8M
	b)	Explain the classification of stone masonry.	6M
		(OR)	
6.	a)	Explain the classification of Foundations.	8M
	b)	Explain any two types of water proofing methods that can be adopted for a RCC wall	6M

UNIT-IV

7.	a)	List out the types of stairs. Explain any two of them	8M
	b)	Explain in detail about types of floors.	6M
		(OR)	
8.	a)	What is ferro cement ? Explain its applications.	8M
	b)	Compare flat & pitched roofs.	6M

UNIT-V

9.	a)	Explain the purpose of form work & write its importance in Civil Engineering Applications.	8M
	b)	Explain the types of scaffolding .	6M
		(OR)	
10.	a)	Explain different constituents of paints.	8M
	b)	Briefly explain white washing & distempering	6M

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RA / AR16

CODE: 16ME1003 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, April-2019

ENGINEERING MECHANICS (STATICS)

(Mechanical Engineering Branch)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a i. Explain parallelogram law — 6
   ii. Explain free body diagram with example

   b Determine the magnitude and direction of resultant of the following force system as shown in figure-1b. — 8

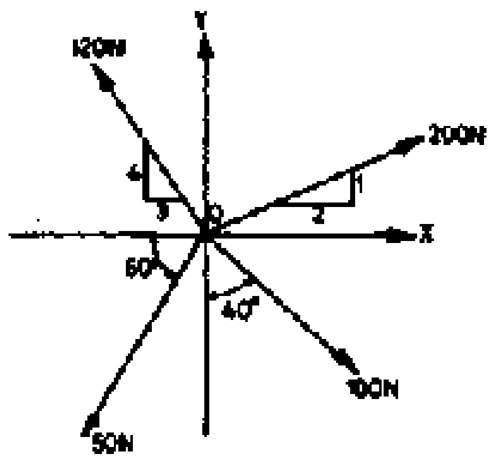

figure-1b.

(OR)

2. a Two smooth spheres each of radius 100 mm and weight 200 N, rest in a horizontal channel having vertical walls, the distance between which is 360 mm. Find the reactions at contact points of A, B, C and D as shown in figure 2a. — 10

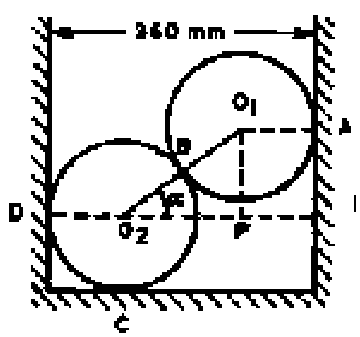

figure 2a.

   b Write the Equilibrium equations for concurrent force system in space. — 4

UNIT-II

3. A block of weight W_1 =1000N rests on a horizontal surface and supports on top of it another block of weight W_2 =250N as shown in figure3. The block W2 is attached to a vertical wall by the inclined string AB. Find the magnitude of the horizontal force 'P' applied to the lower block as shown, that will be necessary to cause slipping to impend. The coefficient of static friction for all contact surfaces is μ=0.3. 14

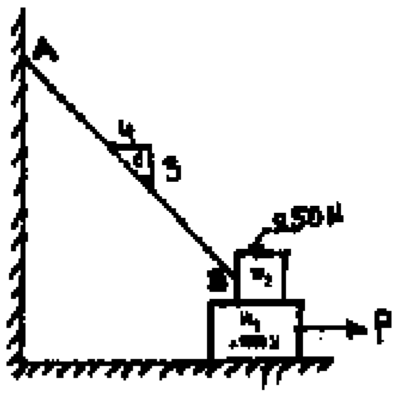

Figure-3

(OR)

4. a Find analytically the reactions at A and B for the beam loaded as shown in Figure 4a. 8

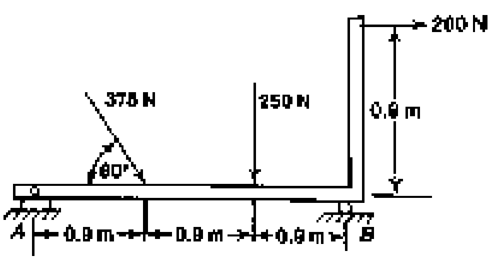

Figure 4a.

b Define the following i) Coefficient of friction ii) Angle of friction iii) Angle of repose 6

UNIT-III

5. a Find the centroid of the 'Z' section shown in Figure-5a 7

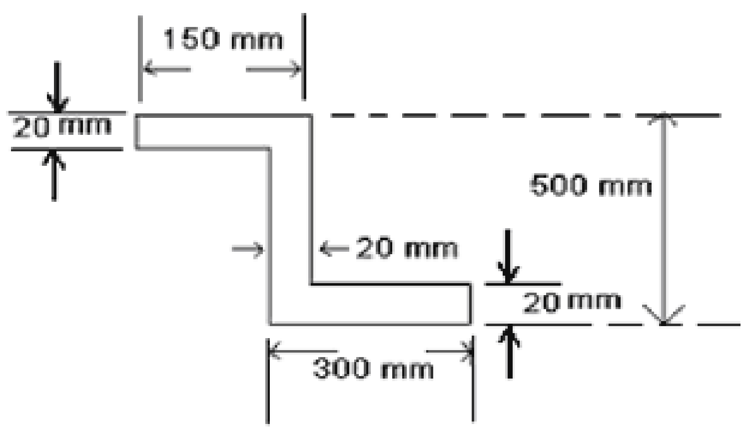

Figure-5a

b Find the moment of inertia about the horizontal centroidal axis. shown in Figure — 7

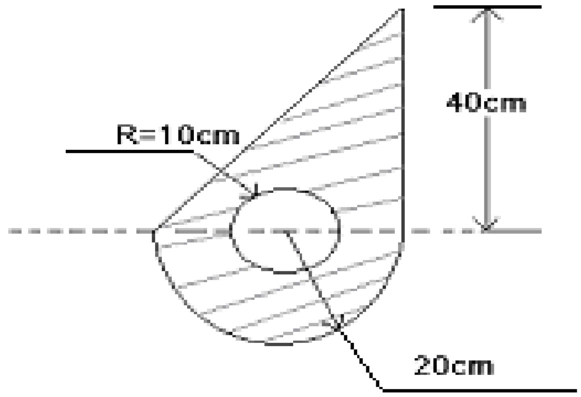

Figure-5b

(OR)

6. a State and prove parallel axis theorem. — 6

b Find the moment of inertia of the shaded area, as shown in figure 6 about its centroidal axes parallel to x-axis. — 8

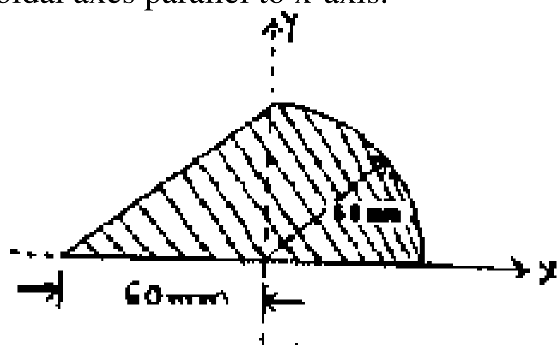

Figure-6

UNIT-IV

7. a Illustrate the types of trusses with the help of sketches. — 6

b Find the forces in all the members of the cantilever truss loaded as shown in figure 7. by the method of sections. — 8

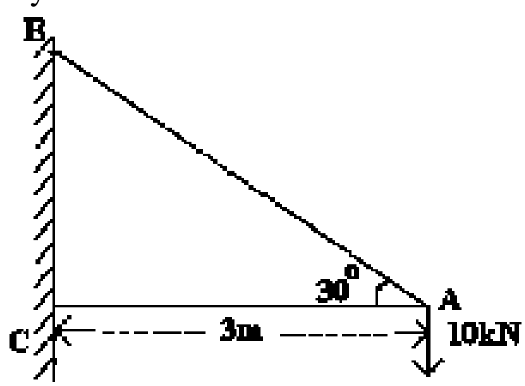

Figure-7

(OR)

8. Find the forces in all the members of the cantilever type, plane, pin-jointed truss loaded as shown in figure 8. Using the method of sections. — 14

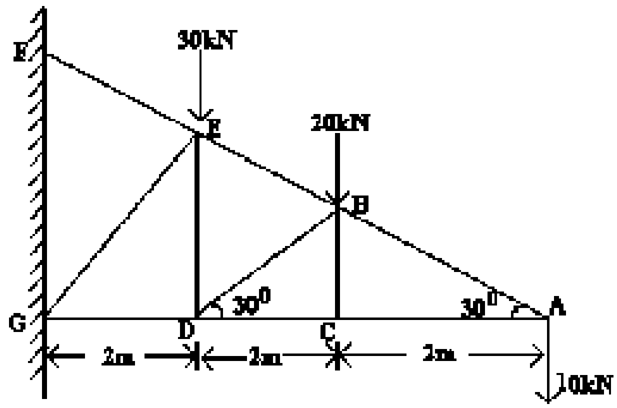

Figure-8

UNIT-V

9. The arrangement as shown in Figure-9 is required to remain in state of equilibrium. Derive an expression for tension in the cable in terms of θ and W. Use method of virtual work. 14

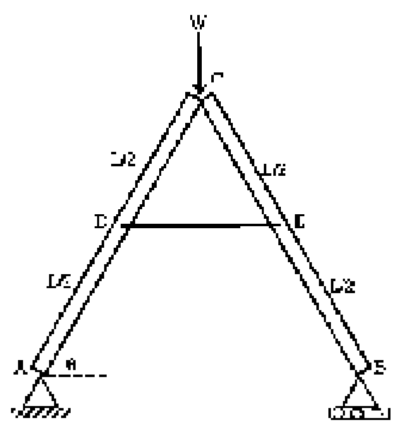

Figure-9

(OR)

10. a Explain the terms virtual displacement with an example 4

b How can you apply principle of virtual work for investigating the configuration of equilibrium of body? 10

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AR13

CODE: 13BS1003 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech II Semester Supplementary Examinations, April-2019

ENGINEERING MATHEMATICS -III
(Common to all Branches)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Define Consistency of a system of equations.
   b) Define Normal form of a matrix.
   c) Find the canonical form of the matrix $A = \begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$
   d) Define Eigen value and Eigen vector.
   e) Define Fourier series expansion of a function f(x) in the interval (0, 2c).
   f) Define Fourier cosine integral of f(x).
   g) State Damping rule.
   h) Define Difference equation.
   i) State the relation between the Beta and Gamma functions.
   j) Evaluate $\beta\left(\frac{9}{2}, \frac{7}{2}\right)$.

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2. a). Find the rank of the matrix $A = \begin{bmatrix} 1 & 2 & -1 & 4 \\ 2 & 4 & 3 & 4 \\ 1 & 2 & 3 & 4 \\ -1 & -2 & 6 & -7 \end{bmatrix}$ 6 M

   b). Using Gauss elimination method ,solve the following system of equations 6 M

   $2x + 2y + z = 12,\ 3x + 2y + 2z = 8,\ 5x + 10y - 8z = 10$.

(OR)

3. a). Using Gauss Seidel iteration method , solve the following system of equations $2x + y + 6z = 9,\ 8x + 3y + 2z = 13,\ x + 5y + z = 7$. 6 M

   b). Test for consistency and solve the following system of equations 6 M
   $2x - 3y + 7z = 5,\ 3x + y - 3z = 13,\ 2x + 19y - 47z = 32$.

UNIT-II

4. a). State Cayley Hamilton theorem. Verify the Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ and hence find its inverse. 6 M

   b). Prove that, if λ is an eigen value of a matrix A then $\frac{1}{\lambda}$ is the eigen value of A^{-1} . 6 M

(OR)

5. a). Reduce the Quadratic form 2 x y + 2 y z + 2 z x into canonical form. 6 M

b). Find eigen values and eigen vectors to the matrix $A=\begin{bmatrix} 2 & 1 & -1 \\ 1 & 1 & -2 \\ -1 & -2 & 1 \end{bmatrix}$ 6 M

UNIT-III

6. a). Find the Fourier series of $f(x)=x^2$ in the interval $-\pi<x<\pi$ and deduce that $\sum_{n=1}^{\infty}\frac{1}{n^2}=\frac{\pi^2}{6}$. 6 M

b). Find the Fourier transform of $f(x)=\begin{cases} 1 & if\ |x|<1 \\ 0 & if\ |x|>1 \end{cases}$ and hence evaluate $\int_0^{\infty}\frac{\sin x}{x}dx$. 3 + 3 M

(OR)

7. a). Find the Half range Fourier sine series of $f(x)=x(\pi-x)$ in the interval $0<x<\pi$. 6 M

b). Using Fourier integral , show that $\int_0^{\infty}\frac{\cos ax}{1+a^2}dx=\frac{\pi}{2}e^{-x}\ ,x\geq 0$. 6 M

UNIT-IV

8. a). Find the Z-transform of $n^2 e^{n\theta}$. 6 M

b). Solve the Difference equation $y_{n+2}-5y_{n+1}+6y_n=36$ given that $y_0=y_1=0$ using Z-transform. 6 M

(OR)

9. a). Using Convolution theorem, find $Z^{-1}\left(\frac{z^2}{(z-1)(z-3)}\right)$. 6 M

b). If $U(z)=\frac{2z^2+3z+12}{(z-1)^4}$, find $u_2\ \& u_3$. 6 M

UNIT-V

10. a). Prove that $\int_0^1\frac{x^2}{\sqrt{1-x^4}}\,dx\times\int_0^1\frac{1}{\sqrt{1+x^4}}\,dx=\frac{\pi}{4\sqrt{2}}$. 6 M

b). Express $\int_0^1 x^m\ (1-x^n)^p\,dx$ in terms of gamma functions. 6 M

(OR)

11. a). Evaluate $\int_0^{\infty}\frac{x^{10}-x^{18}}{(1+x)^{30}}\,dx$. 6 M

b). Prove that i) $\Gamma\left(\frac{1}{2}\right)=\sqrt{\pi}$ ii) $\Gamma(n)=\int_0^1\left(\log\left(\frac{1}{y}\right)\right)^{n-1}dy\ \ (n>0)$ 6 M