AR16

CODE: 16BS1002 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, August-2017

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 in one place only

UNIT-I

1. a) Using Regula – Falsi method, compute the real root of the equation $2x - \log x = 7$ correct up to three decimal places. 6 M

   b) Construct Newton's forward interpolation polynomial for the following data 8 M

x:	4	6	8	10
f(x):	1	3	8	16

   Hence , find f(5)

(OR)

2. a) If y(1) = -3 , y(3) = 9 , y (4) = 30 , y (6) = 132 , then find the Lagrange's Interpolation polynomial and also find y (5) 6 M

   b) Prove the following 8 M

   i). $\Delta = E\nabla = \nabla E$

   ii). $E = e^{hD}$

UNIT-II

3. a) Find the value of the First and Second Derivative of the function f(x) at x = 8 from the following table 7 M

x:	6	7	9	12
f(x):	1.556	1.690	1.908	2.158

   b) Using Simpson's 3/8 rule , Evaluate the integral 7 M

   $\int_0^9 \frac{1}{1+x^3}\,dx$ by taking $h = 1$

(OR)

4. Apply Runge-Kutta fouth order method to find an approximate value of y when x = 0.2 , given that $\frac{dy}{dx} = x + y$ and y (0) = 1, taking h=0.1 14 M

UNIT-III

5. a) Find i) $L\{e^{-3t}\sin 3t\}$. ii). $L^{-1}\{\frac{s+3}{s^2+4s+5}\}$ 6 M

b) Evaluate i $\int_0^{\infty} e^{-3t}\sin t$ ii). $L\{\frac{\sin 3t \sin t}{t}\}$ 8 M

(OR)

6. a) Using Convolution theorem, find $L^{-1}\left(\frac{s^2}{(s^2+4)(s^2+9)}\right)$ 6M

b) Find *i*). $L\left\{\frac{e^{-at}-e^{-bt}}{t}\right\}$ *ii*). $L^{-1}\left\{\log\left(\frac{1+s}{s}\right)\right\}$ 8M

UNIT-IV

7. a) Prove that , $x^2 = \frac{\pi^2}{3} + 4\sum_{n=1}^{\infty}(-1)^n \frac{\cos nx}{n^2}$, $where\ -\pi \le x \le \pi$ 7M

b) Find Fourier Sine series of $f(x)=\begin{cases} x & if\ 0<x<\pi/2 \\ \pi - x & if\ \pi/2<x<\pi \end{cases}$ 7 M

(OR)

8. a) Obtain Fourier series for the function $f(x)=\begin{cases} \pi x & if\ 0 \le x \le 1 \\ 2\pi - 2x & if\ 1 \le x \le 2 \end{cases}$ 7 M

b) Find the Fourier Cosine series for the function $f(x) = x^2$ in $(0,2)$ 7 M

UNIT-V

9. a) Form the Partial Differential equation by eliminating the arbitrary functions $z = y f(x) + x g(y)$ 4M

b) 10 M

i). Solve $\frac{y^2 z}{x} p + x z q = y^2$

ii). Solve the Partial Differential Equation $\frac{\partial u}{\partial x} = 4\frac{\partial u}{\partial y}$, given that $u(0, y) = 8e^{-3y}$ by using method of separation of variables

(OR)

10. a) i). Solve $r - 4s + 4t = e^{2x+y}$ 8 M

ii). Form the Partial Differential Equation by eliminating arbitrary constants a, b from z = a x + b y + a^2 + b^2 .

b) Solve the equation $u_{tt} = u_{xx}$ with boundary conditions 6 M
$u(x,0) = 3\sin n\pi x$, $u(0,t) = 0$ and $u(1,t) = 0$ where 0 < x < 1 , t > 0 .

RA/AR16

CODE: 16CE1001 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, August-2017

Building Materials and Construction

(Civil Engineering)

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

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT-I

1.	a)	Explain in briefly about usage of timber in construction field	8 M
	b)	Discuss the geological classification of rocks	6 M
		(OR)	
2.	a)	Explain the composition of ordinary cement	6 M
	b)	Discuss the operation of preparation of clay for the manufacture of bricks	8 M

UNIT-II

3.	a)	Describe the process of manufacturing of glass	7 M
	b)	Write the mechanical and physical properties of reinforcing steel	7 M
		(OR)	
4.	a)	What is polymerization? Describe its methods	6 M
	b)	What are the classifications of mortars? Explain them briefly	8 M

UNIT-III

5.	a)	Explain about the Random Rubble masonry construction	8 M
	b)	Explain about the method of laying bricks	6 M
		(OR)	
6.	a)	Explain briefly about load bearing walls	6 M
	b)	Explain in detail about shallow foundations and deep foundations	8 M

UNIT-IV

7.	a)	What are the main components of floor? Explain the factors governing the selection for suitable type of floor	7 M
	b)	What are the general requirements of a good stair case and give different types of stairs indicating their applications?	7 M
		(OR)	
8.	a)	What are different types of doors? Give brief use of each door	7 M
	b)	With neat sketches explain various types of windows based on their method of operation?	7 M

UNIT-V

9.	a)	Briefly discuss about various types of scaffolding	7 M
	b)	Explain about the White washing, Painting and Distempering	7 M
		(OR)	
10.	a)	What is underpinning? List the circumstance under which underpinning is adopted? Explain any one method with a neat sketch	8 M
	b)	What is Plastering? What is the importance of plastering?	6 M

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RA/AR16

CODE: 16ME1003 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, August-2017

ENGINEERING MECHANICS (STATICS)

(Mechanical Engineering Branch)

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

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT-I

1.	a	State and explain the parallelogram law of forces	4M
	b	The following forces act at a point : (i) 20 N inclined at 30° towards North of East. (ii) 25 N towards North. (iii) 30 N towards North West and (iv) 35 N inclined at 40° towards South of West. Find the magnitude and direction of the resultant force.	10M

(OR)

2.	a	A uniform plank ABC of weight 30 N and 2 m long is supported at one end A and at a point B 1.4 m from A as shown in Fig.1. Find the maximum weight W, that can be placed at C, so that the plank does not topple.	4M

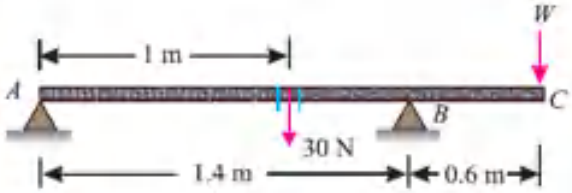

Fig. 1

	b	A machine component of length 2.5 metres and height 1 metre is carried upstairs by two men, who hold it by the front and back edges of its lower face. If the machine component is inclined at 30° to the horizontal and weighs 100N, find how much of the weight each man supports ?	10M

UNIT-II

3.	a	State and prove Varignon's theorem.	4M
	b.	A beam 3 m long weighing 400 N is suspended in a horizontal position by two vertical strings, (as shown in Fig.2). How far a body of 200 N weight be placed on the beam, so that it will be in equilibrium?	10M

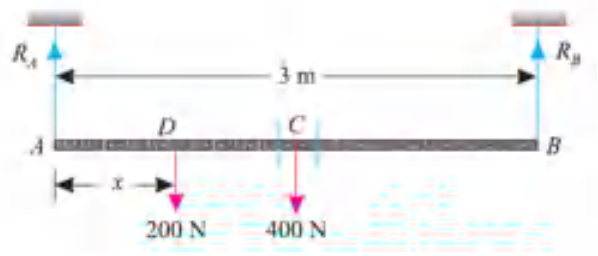

Fig. 2

(OR)

4. a Write down the laws of dry friction? 5M

b Explain the following 9M

i) Angle of friction ii) Cone of friction iii) Angle of repose

UNIT-III

5. a Derive an expression for the centroid of a semi-circle 5M

b A uniform lamina shown in Fig. 3 consists of a rectangle, a circle and a triangle. Determine the centre of gravity of the lamina. All dimensions are in mm. 9M

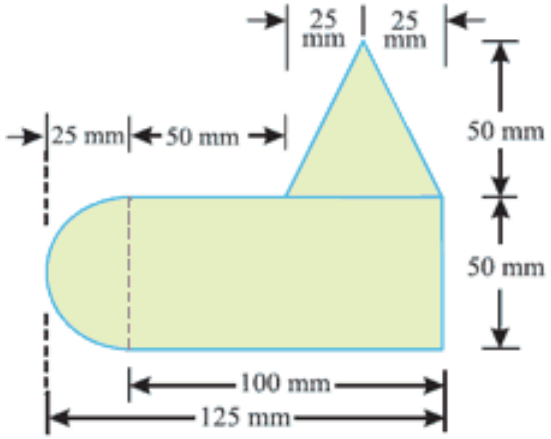

Fig. 3

(OR)

6. a State and Prove perpendicular axis theorem 5M

b Compute the moment of inertia of the area about axis K-K as shown in Fig.4. 9M

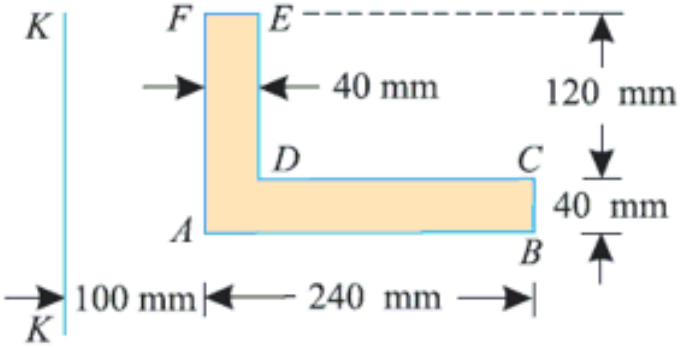

Fig. 4

UNIT-IV

7. a A king post truss of 8 m span is loaded as shown in Fig.5. Find the forces in each member of the truss and tabulate the results. 14M

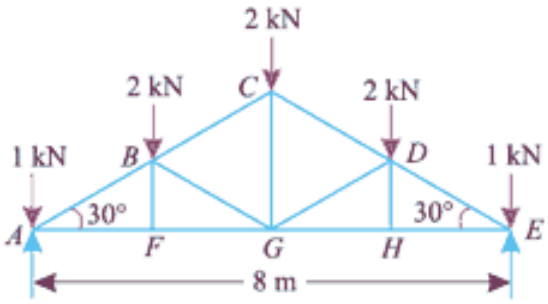

Fig.5

(OR)

8. Determine the nature and magnitude of the forces in the members 1,2 and 3 as shown in Fig.6. 14M

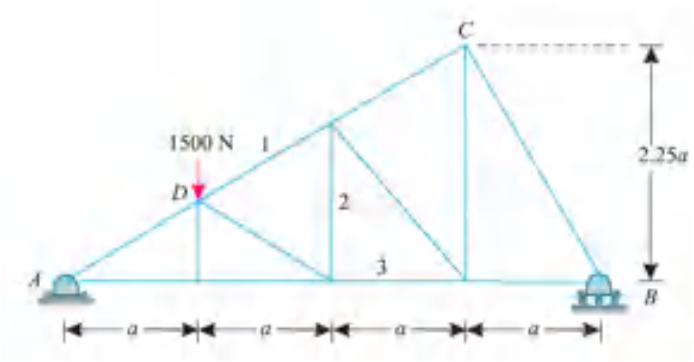

Fig.6

UNIT-V

9. a Two beams AE and BD are supported on rollers at B and C as shown in Fig.7. Determine the reactions at the rollers B and C, using the method of virtual work. 7M

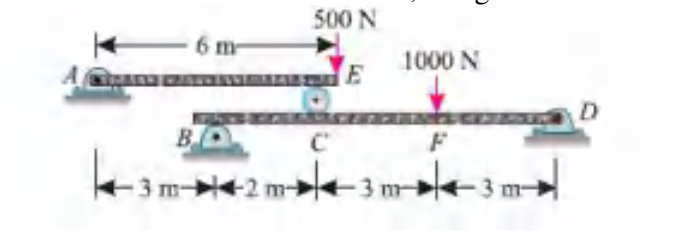

Fig. 7

b A simply supported beam AB of span 5 m is loaded as shown in Fig.8. Using the principle of virtual work, find the reactions at A and B. 7M

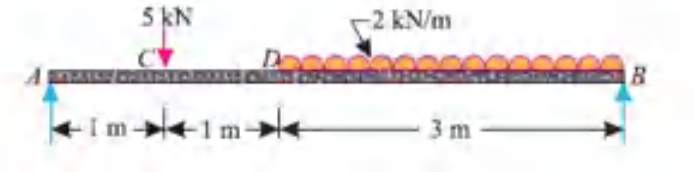

Fig. 8

(OR)

10. a A uniform ladder, 5 metres long and weighing 200 N, rests on a smooth floor at A and against a smooth wall at B as shown in Fig.9. A horizontal rope PQ prevents the ladder from slipping. Using the method of virtual work, determine the tension in the rope. 7M

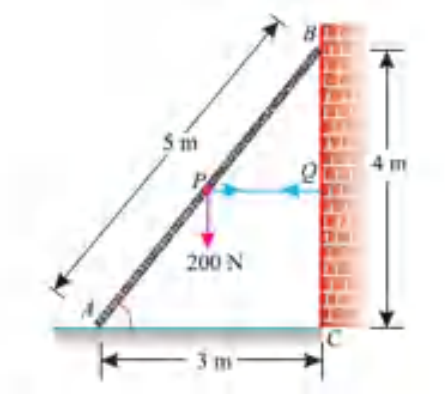

Fig. 9

b A weight (W) of 5 kN is raised by a system of pulleys as shown in Fig.10. Using the method of virtual work, find the force P, which can hold the weight in equilibrium. 7M

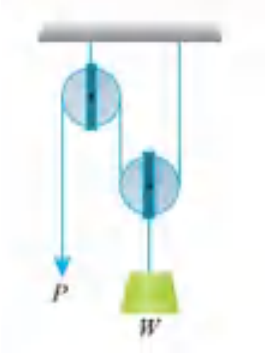

Fig. 10

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