~	R-19	
20	bde: 19B111T	
	M.Tech. I Semester Regular Examinations February 2020 Advanced Structural Analysis	
	( Structural Engineering )	
	Max. Marks: 60 Time: 3 Hours Answer all five units by choosing one question from each unit ( $5 \times 12 = 60$ Marks)	
	******	
	UNIT–I	
•	Deduce the force displacement relationships for a beam element of length "I"	
	fixed at one end and free at other end , the other end being subjected to different	10
	displacements.	12
	OR	
	List out the similarities and dissimilarities in stiffness and flexibility matrix methods.	12
	Also enlist the advantages of both methods.	
	UNIT–II	
	Analyse using flexibility method, the continuous beam ABC with ends A and B	
	simply supported and end C fixed. Span AB= 3m and carries a central point load of	
	100 KN. Span BC=4m and it carries a udl of 60KN/m. Assume uniform EI and sketch the BMD.	12
	OR	12
	Analyse the continuous beam ABC if the downward settlements of supports B and C are 1500/EI and 500/EI. Span AB= 8m and span BC= 6m. Two midpoint loads of	
	200KN and 100KN are acting on the beam. Use displacement method.	12
5.	Analyse the portal frame ABCD whose both ends A and D are fixed. AB=4m,	
	BC=4m and CD=2m. BC is loaded with a udl of 30KN/m and at B a horizontal load	
	of 50KN acts towards C. Use displacement method.	12
	OR	
ò.	Analyse the L bent ABC with vertical member AB=5m and a horizontal member	
	BC= 4m. The horizontal member BC carries a point load of 8 KN at the center. End	
	A is fixed. Use force method of analysis.	12
	UNIT–IV	
	Explain a) Banded matrix and semi band width.	6
	b) Sub-structuring	6
	OR	
3.	Explain a) Transformation of matrices from local to global coordinates.	6
	b) Static condensation.	6
	UNIT–V	
).	Determine the solution of equations by Gauss elimination method	
	$4x_1+2.5x_2+3x_3=37$	
	$4x_1 + 10x_2 + 3x_3 = 35$	
	$2x_1 + 4x_2 + 5x_3 = 19$	12
	OR	
		12

 $16x_1+4x_2+4x_3-4x_4=32$   $4x_1+10x_2+4x_3+2x_4=26$   $14x_1+4x_2+6x_3-2x_4=20$  $-4x_1+2x_2-2x_3+4x_4=-6$ 

\*\*\*\*

Hall Tick	et Number :	
Code: 19	R-19	
	M.Tech. I Semester Regular Examinations February 2020	
Struc	tural Health Monitoring, Repair and Rehabilitation of Structures	5
Max	( Structural Engineering ) Marks: 60 Time: 3 Hours	
	ver all five units by choosing one question from each unit ( 5 x 12 = 60 Marks )	
	UNIT–I	
1. a)	Elaborate various components of quality control for concrete construction.	6M
b)	Discuss about the design and construction errors leading to deterioration of a structure.	6M
2.	<b>OR</b> How do climate, temperature, chemicals, wear and erosion cause deterioration	
Ζ.	on concrete? Explain.	12M
	UNIT-II	
3.	What do you understand by physical Inspection of damaged structures,	
	Structural and Economic appraisal? Discuss the necessity of them.	12M
4.	<b>OR</b> Elaborate the applications of special concretes, mortar and concrete chemicals	
4.	as a repair material.	12M
	UNIT–III	
5. a)	Illustrate the steps involved in the repair of rebars in the constructed facilities.	6M
b)	Briefly explain the techniques of repair using foamed concrete and vacuum concrete.	6M
	OR	
6.	Discuss in detail about the repair techniques for i) Dry pack and ii) shot Crete. Also recommend under what circumstances they are selected as techniques to be used.	12M
7.	<b>UNIT-IV</b> Explain briefly about advanced techniques available for strengthening with	
7.	suitable sketches.	12M
	OR	
8.	Explain the various strengthening techniques to overcome low member strength	12M
	UNIT-V	
9. a)	"Maintenance of constructed facilities is mandatory". Justify the statement by mentioning the importance of the same.	6M
b)		OW
~)	building. What would be your role and responsibilities?	6M
10.	Structural Health monitoring is tool maintenance of structures" Justify the	
	statement.	12M

Hall Ti	cket Number :								
Code:	19BE11T R-19								
M.Tech. I Semester Regular Examinations February 2020 Research Methodology and IPR									
	<b>Research Methodology and IPR</b> ( Common to All Branches )								
-	x. Marks: 60 Time: 3 Hours								
Ar	nswer all five units by choosing one question from each unit ( 5 x 12 = 60 Marks )								
	UNIT–I								
1.	Explain the characteristics of a good research problem?								
	OR								
2.	Elucidate the different types of Data collection process.								
	UNIT–II								
3.	Explain the various types of research reports.								
	OR								
4.	Elucidate the format of writing a good research report.								
	UNIT–III								
5.	Elucidate the Patent Process.								
	OR								
6.	Explain the procedure for grants of Patents.								
_									
7.	Elucidate the patent information and databases.								
_	OR								
8.	Elucidate the scope of patent rights.								
9.	<b>UNIT-V</b> Elucidate the IPR of Biological systems and Computer software.								
э.									
10									
10.	How to administrating patent system.								

\*\*\*\*

Code: 19B11AT       R-19         M.Tech. I Semester Regular Examinations February 2020       Theory and Analysis of Plates (Structural Engineering)         Max. Marks: 60       Time: 3 Hours Answer all five units by choosing one question from each unit (5 x 12 = 60 Marks)         Marks CO         UNIT-I       1.         1.       Derive the expression for deflection of a uniformly loaded rectangular plate with fixed edges subjected to cylindrical bending.       12M       1         0R       0R       1       1       0R       1         2. a)       List the assumptions made in the analysis of plates?       3M       1       1         b)       Derive the differential equation for cylindrical bending of rectangular plate with fixed edges.       12M       2         0R       1       0R       1       2       2       2         0R       1       0       1       2       1       2       2       1         3.       Derive the differential equation for circular plate with a circular hole at its centre subjected to shearing force Qo at its centre.       12M       2       2       2       2       2       2       2       3       3       3       3       3       3       3       3       3       3       3       3       3												ber :	et Num	II Tick	Hal	
M.Tech. I Semester Regular Examinations February 2020 Theory and Analysis of Plates (Structural Engineering) Max. Marks: 60 Answer all five units by choosing one question from each unit (5 x 12 = 60 Marks) ********* Marks CO UNIT-1 1. Derive the expression for deflection of a uniformly loaded rectangular plate with fixed edges subjected to cylindrical bending. 12M 1 0R 2. a) List the assumptions made in the analysis of plates? 3M 1 b) Derive the differential equation for cylindrical bending of rectangular plates. 12M 2 0R 4. Derive the differential equation for circular plate with fixed edges. 12M 2 0R 4. Derive the differential equation for circular plate with a circular hole at its centre subjected to shearing force Q oat its centre. 12M 2 0R 4. Derive the differential equation of the deflection surface of the plates subjected to combined action of lateral loads and forces in the middle plane of the plate. 12M 3 0R 6. Derive the expression for deflection of a rectangular plate with simply supported edges under the combined action of a rectangular plate with simply supported edges under the combined action of a rectangular plate with simply supported edges under the combined action of bending and stretching. 12M 3 0R 8. Calculate the rigidities for the following cases, assuming suitable data? a. Reinforced concrete slabs			R-19	Code: 19B11AT										L		
UNIT-I       Marks       CO         Image: Ima			ne: 3 Hours	Plates g) Tir	<b>sis of Plo</b> heering )	<b>alys</b> Engin	<b>d Ar</b> ural E	<b>r and</b> tructu	<b>eory</b> (St	The		ech. 60	M.T Marks:	Max.		
UNIT-I         1. Derive the expression for deflection of a uniformly loaded rectangular plate with fixed edges subjected to cylindrical bending.       12M       1         0R       0R       1         2. a) List the assumptions made in the analysis of plates?       3M       1         b) Derive the differential equation for cylindrical bending of rectangular plates.       9M       1         Image: Comparison of the expression for deflection of a uniformly loaded circular plate with fixed edges.       12M       2         Image: Comparison of the differential equation for circular plate with a circular hole at its centre subjected to shearing force Qo at its centre.       12M       2         Image: Comparison of lateral loads and forces in the middle plane of the plate.       12M       3         OR       0R       12M       3         6. Derive the expression for deflection of a rectangular plate with simply supported edges under the combined action of bending and stretching.       12M       3         OR       0R       12M       3       3         For the expression for deflection of a rectangular plate with simply supported edges under the combined action of bending and stretching.       12M       3         Image: Comparison for deflection of or thotropic plates in the calculation of grid works.       12M       4         Image: Comparison for deflection of orthotropic plates in the calculation of grid works.																
1.       Derive the expression for deflection of a uniformly loaded rectangular plate with fixed edges subjected to cylindrical bending.       12M       1         OR         2. a)       List the assumptions made in the analysis of plates?       3M       1         b)       Derive the differential equation for cylindrical bending of rectangular plates.       9M       1         UNIT-II         3.       Derive the expression for deflection of a uniformly loaded circular plate with fixed edges.       12M       2         OR         4.       Derive the differential equation for circular plate with a circular hole at its centre subjected to shearing force Qo at its centre.       12M       2         UNIT-II         5.       Derive the differential equation of the deflection surface of the plates subjected to combined action of lateral loads and forces in the middle plane of the plate.       12M       3         OR         6.       Derive the expression for deflection of a rectangular plate with simply supported edges under the combined action of bending and stretching.       12M       3         OR         OR         OR         OR         OR         OR         OR	BL	со	Marks		_											
with fixed edges subjected to cylindrical bending.       12M       1         OR       3M       1         b) Derive the differential equation for cylindrical bending of rectangular plates.       9M       1         UNIT-II       3.       Derive the expression for deflection of a uniformly loaded circular plate with fixed edges.       12M       2         OR       0R       12M       2         Image: Control of the differential equation for circular plate with a circular hole at its centre subjected to shearing force Qo at its centre.       12M       2         Image: Control of a lateral loads and forces in the middle plane of the plates.       12M       3         OR       0R       12M       3         Control of a terctangular plate with simply supported edges under the combined action of a rectangular plate with simply supported edges under the combined action of bending and stretching.       12M       3         Image: Control of the terce of the plates in the calculation of grid works.       12M       3         Image: Control of a publication of orthotropic plates in the calculation of grid works.       12M       4         Image: Control of the rigidities for the following cases, assuming suitable data?       12M       4			ploto	looded restangular				ootion	dofl	for	oion	Noroc	ia tha i	Doris		4
2. a) List the assumptions made in the analysis of plates?       3M       1         b) Derive the differential equation for cylindrical bending of rectangular plates.       9M       1         JUNIT-II       IUNIT-II       12M       2         3. Derive the expression for deflection of a uniformly loaded circular plate with fixed edges.       12M       2         4. Derive the differential equation for circular plate with a circular hole at its centre subjected to shearing force Qo at its centre.       12M       2         5. Derive the differential equation of the deflection surface of the plates subjected to combined action of lateral loads and forces in the middle plane of the plate.       12M       3         6. Derive the expression for deflection of a rectangular plate with simply supported edges under the combined action of bending and stretching.       12M       3         7. Explain the theory of application of orthotropic plates in the calculation of grid works.       12M       4         OR         8. Calculate the rigidities for the following cases, assuming suitable data?       12M       4	6	1	•		•							•				1.
<ul> <li>b) Derive the differential equation for cylindrical bending of rectangular plates.</li> <li>M 1</li> <li>UNIT-II</li> <li>3. Derive the expression for deflection of a uniformly loaded circular plate with fixed edges.</li> <li>12M 2</li> <li>OR</li> <li>4. Derive the differential equation for circular plate with a circular hole at its centre subjected to shearing force Qo at its centre.</li> <li>12M 2</li> <li>UNIT-III</li> <li>5. Derive the differential equation of the deflection surface of the plates subjected to combined action of lateral loads and forces in the middle plane of the plate.</li> <li>6. Derive the expression for deflection of a rectangular plate with simply supported edges under the combined action of bending and stretching.</li> <li>12M 3</li> <li>UNIT-IV</li> <li>7. Explain the theory of application of orthotropic plates in the calculation of grid works.</li> <li>OR</li> <li>8. Calculate the rigidities for the following cases, assuming suitable data? <ul> <li>a. Reinforced concrete slabs</li> </ul> </li> </ul>						R	C									
UNIT-II         3. Derive the expression for deflection of a uniformly loaded circular plate with fixed edges.       12M       2         OR       12M       2         4. Derive the differential equation for circular plate with a circular hole at its centre subjected to shearing force Qo at its centre.       12M       2         UNIT-II       12M       2         5. Derive the differential equation of the deflection surface of the plates subjected to combined action of lateral loads and forces in the middle plane of the plate.       12M       3         OR       0R       12M       3         OR       0R       12M       3         OR       0R       12M       3         OR       0R       12M       3         OR       12M       3       0         6. Derive the expression for deflection of a rectangular plate with simply supported edges under the combined action of bending and stretching.       12M       3         UNIT-IV       7. Explain the theory of application of orthotropic plates in the calculation of grid works.       12M       4         OR       0R       12M       4         R       Calculate the rigidities for the following cases, assuming suitable data?       a. Reinforced concrete slabs	1	1	3M		ates?	of pla	alysis	ie ana	in th	nade	ns m	Imptio	he assu	List t	a)	2.
<ul> <li>3. Derive the expression for deflection of a uniformly loaded circular plate with fixed edges.</li> <li>12M 2</li> <li>OR</li> <li>4. Derive the differential equation for circular plate with a circular hole at its centre subjected to shearing force Qo at its centre.</li> <li>12M 2</li> <li>UNIT-III</li> <li>5. Derive the differential equation of the deflection surface of the plates subjected to combined action of lateral loads and forces in the middle plane of the plate.</li> <li>12M 3</li> <li>OR</li> <li>6. Derive the expression for deflection of a rectangular plate with simply supported edges under the combined action of bending and stretching.</li> <li>12M 3</li> <li>UNIT-IV</li> <li>7. Explain the theory of application of orthotropic plates in the calculation of grid works.</li> <li>OR</li> <li>8. Calculate the rigidities for the following cases, assuming suitable data? <ul> <li>a. Reinforced concrete slabs</li> </ul> </li> </ul>	6	1	s. 9M	of rectangular plates	ending of r	cal be	lindri	for cy	tion f	equat	tial e	ifferen	/e the d	Deriv	b)	
fixed edges.       12M       2         OR       0R       12M       2         4.       Derive the differential equation for circular plate with a circular hole at its centre subjected to shearing force Qo at its centre.       12M       2         5.       Derive the differential equation of the deflection surface of the plates subjected to combined action of lateral loads and forces in the middle plane of the plate.       12M       3         0R       0R       12M       3         6.       Derive the expression for deflection of a rectangular plate with simply supported edges under the combined action of bending and stretching.       12M       3         0INIT-IV       7.       Explain the theory of application of orthotropic plates in the calculation of grid works.       12M       4         0R       0R       12M       4         0R       12M       4       12M       4																
<ul> <li>4. Derive the differential equation for circular plate with a circular hole at its centre subjected to shearing force Qo at its centre.</li> <li>I2M 2</li> <li>UNIT-III</li> <li>5. Derive the differential equation of the deflection surface of the plates subjected to combined action of lateral loads and forces in the middle plane of the plate.</li> <li>OR</li> <li>6. Derive the expression for deflection of a rectangular plate with simply supported edges under the combined action of bending and stretching.</li> <li>12M 3</li> <li>UNIT-IV</li> <li>7. Explain the theory of application of orthotropic plates in the calculation of grid works.</li> <li>OR</li> <li>8. Calculate the rigidities for the following cases, assuming suitable data? <ul> <li>a. Reinforced concrete slabs</li> </ul> </li> </ul>	6	2		baded circular plate	ormly load	unifo	of a	ection	defle	for	sion	expres				3.
centre subjected to shearing force Qo at its centre.       12M       2         UNIT-III       INIT-III       12M       3         5.       Derive the differential equation of the deflection surface of the plates subjected to combined action of lateral loads and forces in the middle plane of the plate.       12M       3         OR       0R       12M       3         6.       Derive the expression for deflection of a rectangular plate with simply supported edges under the combined action of bending and stretching.       12M       3         UNIT-IV       7.       Explain the theory of application of orthotropic plates in the calculation of grid works.       12M       4         OR       0R       12M       4         R       Calculate the rigidities for the following cases, assuming suitable data?       a. Reinforced concrete slabs						R	C									
<ul> <li>5. Derive the differential equation of the deflection surface of the plates subjected to combined action of lateral loads and forces in the middle plane of the plate. 12M 3</li> <li>OR</li> <li>6. Derive the expression for deflection of a rectangular plate with simply supported edges under the combined action of bending and stretching. 12M 3</li> <li>UNIT-IV</li> <li>7. Explain the theory of application of orthotropic plates in the calculation of grid works. 12M 4</li> <li>OR</li> <li>8. Calculate the rigidities for the following cases, assuming suitable data? a. Reinforced concrete slabs</li> </ul>	6	2		th a circular hole		s cen	o at it	ce Qo		•						4.
<ul> <li>6. Derive the expression for deflection of a rectangular plate with simply supported edges under the combined action of bending and stretching.</li> <li>7. Explain the theory of application of orthotropic plates in the calculation of grid works.</li> <li>8. Calculate the rigidities for the following cases, assuming suitable data?</li> <li>a. Reinforced concrete slabs</li> </ul>	6	3				ection ces ir	e defle nd for	of the		•						5.
<ul> <li>supported edges under the combined action of bending and stretching.</li> <li>12M 3</li> <li>UNIT-IV</li> <li>7. Explain the theory of application of orthotropic plates in the calculation of grid works.</li> <li>12M 4</li> <li>OR</li> <li>8. Calculate the rigidities for the following cases, assuming suitable data?         <ul> <li>a. Reinforced concrete slabs</li> </ul> </li> </ul>									_							_
<ul> <li>7. Explain the theory of application of orthotropic plates in the calculation of grid works. 12M 4</li> <li>8. Calculate the rigidities for the following cases, assuming suitable data?         <ul> <li>a. Reinforced concrete slabs</li> </ul> </li> </ul>	6	3	1.5	0 1	0							•				6.
<ul> <li>works. 12M 4</li> <li>OR</li> <li>8. Calculate the rigidities for the following cases, assuming suitable data?</li> <li>a. Reinforced concrete slabs</li> </ul>																_
<ol> <li>Calculate the rigidities for the following cases, assuming suitable data?</li> <li>a. Reinforced concrete slabs</li> </ol>	2	4	0	in the calculation c	plates in	ropic	orthol	n of c	catio	applic	of a	theory		•		7.
a. Reinforced concrete slabs						R	C									
				ng suitable data?	assuming	ses, a	ng ca				oncr	rced c	. Reinfo	a		8.
c. corrugated sheet 12M 4	3	4	12M			V				I			•			
<ul> <li>9. Explain the basic steps involved in the finite element method of analysis for plate problems.</li> <li>12M 5</li> </ul>	2	5		it method of analys	element n			ed in	volve	os inv	step					9.
OR						R	C									
10.Derive the expression for deflection of a simply supported rectangular plate subjected to concentrated load 'P'.12M5****	6	5		ported rectangular	ply suppo											10.

Hall	Ticke	et Number :	
Code	e: 19	PB112T R-19	
May		M.Tech. I Semester Regular Examinations February 2020 <b>Theory of Elasticity and Plasticity</b> ( Structural Engineering ) arks: 60 Time: 3 Hou	irc
-		Ill five units by choosing one question from each unit ( 5 x 12 = 60 Marks )	-
1.	a)	<b>UNIT–I</b> Prove that stress tensor is a symmetric second order tensor.	6M
	b)	Find out the normal and shear stresses on a on plane having two of the direction cosines are 0.3 and 0.4 when the state of stress is given by $\begin{bmatrix} 50 & 70 & 100 \\ 70 & 100 & 30 \\ 100 & 30 & 150 \end{bmatrix}$ MPa	6M
		OR	-
2.		What are stress invariants? Derive the expression for principal stresses in 3-dimensional space.	12M
3.		For the following beam loaded by its own weight, find the expression for displacement components in X and Y directions. Length and thickness of the beams are 'L' and '2C' respectively	
		× v	
			12M
		OR	
4.	a)	State and explain the Saint Venant's principle.	6M
	b)	Find out what problem of plane stress is solved by the following stress function.	
		$\emptyset = \frac{3F}{C} \left( xy - \frac{xy^3}{3C^2} \right) + \frac{P}{2}y^2$	6M
5.		UNIT–III Prove that the general equation in polar coordinates as	
		$\left(\frac{\partial^2}{\partial r^2} + \frac{1}{r}\frac{\partial}{\partial r} + \frac{1}{r^2}\frac{\partial^2}{\partial \theta^2}\right)\left(\frac{\partial^2\phi}{\partial r^2} + \frac{1}{r}\frac{\partial\phi}{\partial r} + \frac{1}{r^2}\frac{\partial^2\phi}{\partial \theta^2}\right) = 0$	

Where is the stress function of 'r' and

12M

2M

6. Prove the stress distribution in a curved bar with a constant narrow rectangular cross section and circular axis bent In the plane of curvature by a couple 'M'.

$$\sigma_r = \frac{4M}{N} \left( \frac{a^2 b^2}{r^2} \log\left(\frac{b}{a}\right) + b^2 \log\left(\frac{r}{a}\right) + a^2 \log\left(\frac{a}{r}\right) \right)$$
  
$$\sigma_\theta = \frac{-4M}{N} \left( \frac{a^2 b^2}{r^2} \log\left(\frac{b}{a}\right) + b^2 \log\left(\frac{r}{a}\right) + a^2 \log\left(\frac{a}{r}\right) + b^2 - a^2 \right)$$
  
Where  $N = (b^2 - a^2) - 4a^2 b^2 \left(\log\left(\frac{b}{a}\right)\right)^2$ 

Where a and b are inner and outer radii of the boundary and 'r' is any radius varying from a to b. 12M

7. State and explain about the principle of superposition					
	OR				

- 8. a) What is homogeneous deformation?
  - b) Derive the differential equations of equilibrium for a 2-demensional state of stress and state the same of for three dimensional state of stress
     10M

9. Show that for the same twist, the elliptical section has a greater shearing stress than he inscribed circular section (radius equal to the minor axis 'b' of the ellipse). Find out which of the above takes greater torque for the same allowable stress
12M

## OR

10. Explain about Prandtle's membrane analogy for torsional problems taking a suitable case. 12M

\*\*\*