VivekanandaCollegeofEngineering&Technology,Puttur [AUnitofVivekanandaVidyavardhakaSanghaPuttur ®] AffiliatedtoVTU,Belagavi&ApprovedbyAICTENewDelhi			
CRM08	Rev1.10	Civil	04/01/22

CONTINUOUSINTERNALEVALUATION-2

Dept:Civil	Sem /Div:3sem	Sub:Strength of Materials	SCode:18CV32
Date:11-01-2022	Time:3.00-4.30PM	MaxMarks:50	Elective:N

Note:Answer any2fullquestions,choosingonefull questionfrom eachpart.

QN		Questions	Marks	RBT	COs
		PARTA			
1	a	Derive the torsion equation for a circular shaft $\frac{T}{I_P}=\frac{\tau}{R}=\frac{C\theta}{l}$ with usual notations.	10	L3	CO3
	b	T-section of flange120 mm x 12 mm and overall depth 200 mm with 12mm web thickness is loaded such that at a section it has a bending moment of 20 kN-m and shear force of 120 kN. Sketch the bending and shear stress distribution diagrams marking the salient values.	15	L3	CO5
		OR			
2	a	A simply supported beam 100mm x 200mm in cross section carries a central concentrated load 'W'. The permissible stress in bending and shearing are 15 MPa and 1.2 MPa respectively. Determine the safe load W, if the span for the beam is 3m	10	L3	CO3
	b	A solid circular shaft has to transmit power of 1000 kW at 120 rpm. Find the diameter of the shaft if the shear stress of the material is not to exceed 80 N/mm^2. The maximum torque is 1.25 times the mean torque. What percentage saving in material could be obtained if the shaft is replaced by a hollow one whose internal diameter is 0.6 times the external diameter? The length of the shaft, material and maximum shear stress being same.	15	L3	CO5
		PARTB			
3	a	Analyse the limitation of Euler's formula	5	L2	CO5
	b	Derive Euler's crippling load when both ends of column are hinged	10	L3	CO5
	c	Find Euler's crippling load for a hollow cylindrical cast iron column, 150mm external diameter and 20mm thick. It is 6m long and hinged at both ends. Compare the load with that obtained by the Rankine's formula using constants 550 N/mm^2 and $\frac{1}{1600}$. For what length of the column would these two formulae give the same crippling load? E=80 kN/mm^2	10	L3	CO5
4	a	Define i) Buckling load ii) Effective length iii) Slenderness ratio	5	L2	CO5
	b	Derive Rankine-Gordon formula for an axially loaded column.	10	L3	CO5
	c	Compute the crippling loads using Euler's and Rankine's formula for a circular column 200 mm external diameter and 25 mm thick. The length of the column is 4m with both ends hinged. Assume E = 200 GPa, Rankine's constant $\alpha=\frac{1}{7500}$ and $\sigma_c = 320MPa$	10	L3	CO5

Prepared by: **Prof. Shivarama M S**

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