

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

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Course Code

2 1 C I V 1 4 / 2 4

First/Second Semester B.E. Degree Examinations, September/October 2022

ELEMENTS OF CIVIL ENGINEERING

(Common to all Branches)

Duration: 3 hrs

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.**2. Missing data, if any, may be suitably assumed*

Q. No	Question	Marks	(RBTL:CO:PI)
	<u>Module - 1</u>		
1	a Briefly explain the scopes of civil engineering. i. Structural Engineering ii. Environmental Engineering	10	(2:1 : 1.4.1)
	b What is meant by infrastructure? What are the different types of infrastructure provided for the development of nation?	05	(1:1 : 1.4.1)
	c What are the roles of a civil engineer in the infrastructural development of a country?	05	(1:1 : 1.4.1)
	(OR)		
2	a With a neat sketch explain the different components of the road and different types of roads according to Nagpur Road plan.	08	(2:1 : 1.4.1)
	b What are the differences between flexible and rigid pavement with advantages and disadvantages?	06	(1:1 : 1.4.1)
	c Define dam, mention the components of dam and classify the different types of dams based on the uses.	06	(1:1 : 1.4.1)
	<u>Module - 2</u>		
3	a What are the qualities of good bricks and explain classifications of bricks?	08	(2:2 : 1.4.1)
	b What are the properties of building stones and uses of good building stones?	06	(1:2 : 1.4.1)
	c What are the different construction materials and explain the properties of bituminous material and coarse aggregates?	06	(1:2 : 1.4.1)
	(OR)		
4	a What are the different types of fine aggregates based on mode of origin?	06	(1:2 : 1.4.1)
	b Define timber and briefly explain the qualities of good timber.	06	(1:2 : 1.4.1)
	c List the different classifications of surveying based on nature of the field and explain the classifications of land surveying?	08	(2:2 : 1.4.1)
	<u>Module-3</u>		
5	a What is force and different force system with neat sketch?	06	(2:3 : 1.3.1)

- b Two cables attached at the top of tower carries a gay cable AB as shown in the Fig.Q5 (b). Determine the tension in gay cable such that the resultant of the forces in all three cables acts vertical down. Also find the resultant force.

08

(2:3 : 1.3.1)

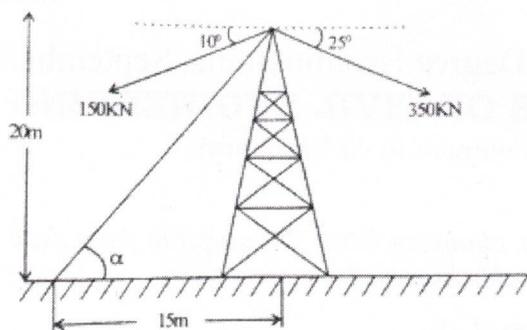


Fig.Q5 (b)

- c Two locomotives on opposite banks of a canal pull a vessel moving parallel to the banks by means of ropes as shown in the Fig.Q5 (c). The tensions in the ropes are 20 kN and 24 kN while the angle between them is 60° . Find the resultant pull on the vessel along centre line and the angle α and β .

06

(2:3 : 1.3.1)

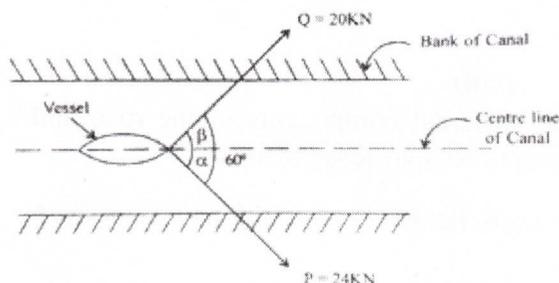


Fig.Q5 (c)

(OR)

- 6 a State and prove Principle of moments.
- b Find the magnitude, direction and X-intercept of the resultant of the system of forces shown in the Fig.Q6 (b). S is the midpoint of RT.

06

(2:3 : 1.3.1)

08

(2:3 : 1.3.1)

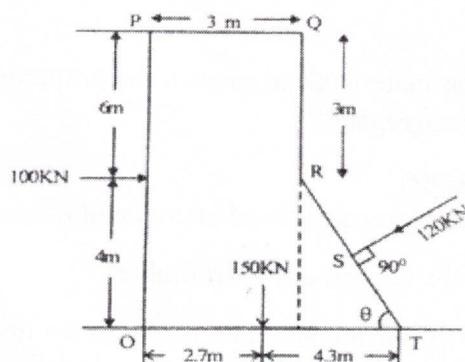


Fig.Q6 (b)

- c Determine the resultant of the force system shown in the Fig.Q6 (c).

06

(2:3 : 1.3.1)

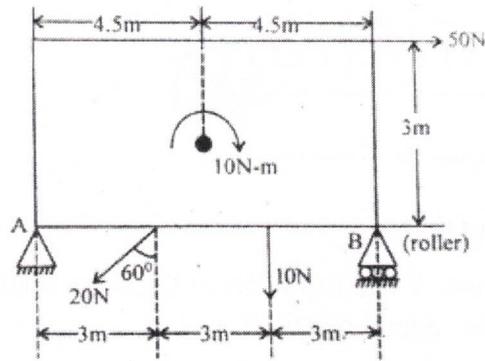


Fig.Q6 (c)

Module-4

- 7 a State and prove Lami's theorem. 06 (2:4 : 1.3.1)
- b A sphere of weight 1000 N rest in a V-groove whose sides are inclined at angles 30° and 45° to the horizontal. Another identical sphere of same weight 1000 N rests on the first sphere and in contact with the side inclined at 30° as shown in the Fig.Q7 (b). Find the reactions at point A, B and D.

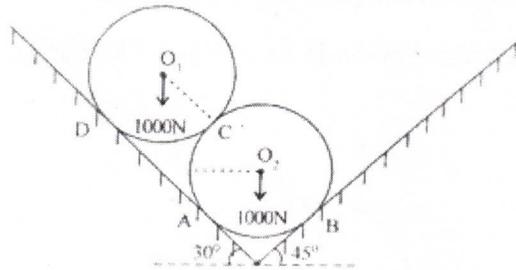


Fig.Q7 (b)

- c A slender rod BC of length 5 m and weight 100 N is held in equilibrium portion as shown in Fig.Q7 (c). Determine the angle ' θ ' and tension in each cable AB and CD.

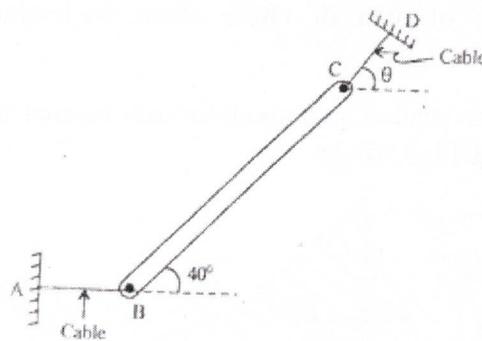


Fig.Q7 (c)

- (OR)
- 8 a What is support reaction and explain the different types of supports and support reactions in the analysis of beams? 08 (2:4 : 1.4.1)
- b For the beam shown in Fig.Q8 (b). Determine the support reaction. 04 (2:4 : 1.4.1)

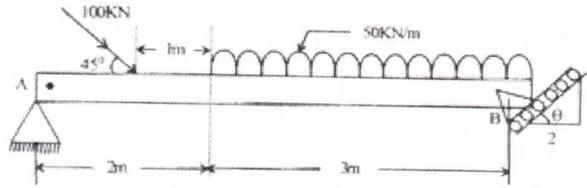


Fig.Q8 (b)

- c A beam ABCD is hinged at support A and has roller at C carries load shown in Fig.Q8 (c). Determine the support reactions. **08** (2:4 : 1.4.1)

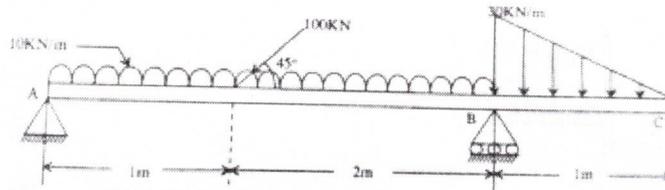


Fig.Q8 (c)

Module-5

- 9 a Locate the centroid of the triangle about the base 'AB' and height 'H'. **06** (2:5 : 1.3.1)
 b State and prove polar moment of inertia and parallel axis theorem. **06** (2:5 : 1.3.1)
 c Locate the centroid for the shaded area shown in Fig.Q9 (c). The radius of the quarter circle is 20 mm. **08** (2:5 : 1.3.1)

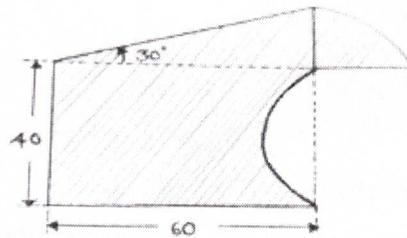


Fig.Q9 (c)

(OR)

- 10 a Determine the second moment of area of circle about horizontal centroidal axis. **06** (2:5 : 1.3.1)
 b Find the radius of gyration of the shaded area about an axis normal to the symmetrical axis shown in the Fig.Q10 (b). **10** (2:5 : 1.3.1)

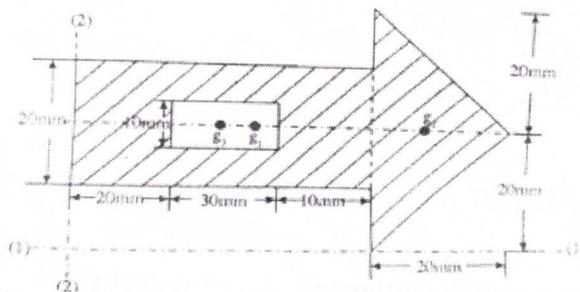


Fig.Q10 (b)

- c Define i) Radius of gyration ii) Polar moment of inertia iii) Product of inertia iv) Centre of gravity **04** (2:5 : 1.3.1)
