Code No. 5212

FACULTY OF ENGINEERING

B.E. 4/4 (Civil) I – Semester (Main) Examination, December 2015

Subject: Concrete Technology

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1	List various types of vibrators and their applications.	3
2	Draw stress-strain curve for high and low strength concrete.	2
3	Differentiate between a nominal mix and design mix.	3
4	How are durability aspects considered in various methods of designs?	2
5	List out few important properties of fly ash concrete.	2
6	Give three examples for chemical and mineral admixture.	3
7	Explain in brief high strength concrete.	3
8	What is meant by blended cement? State its significance.	2
9	Write applications of FRC and ferrocement.	3
10	Explain what is roller compacted concrete.	2

PART – B (50 Marks)

11	a)	Explain the following in detail with regard to fresh concrete: a) Mixing b) Transporting c) Compacting d) Curing	5
	b)	Write the relationship between various types of mechanical strengths of concrete.	5
12	a)	Design a concrete mix for M_{25} having below particulars using IS method Specific gravity of cement = 3.15; specific gravity of FA = 2.58; specific gravity of C.A = 2.6; Water absorption of FA & CA = 1.00%; percentage of sand = 35%. Assume any required data suitably.	7
	b)	Explain about types of mix.	3
13	a)	What are construction materials used for water proofing?	5
	b)	Discuss in detail the various properties of chemical and mineral admixtures to be used.	5
14	a)	Explain the preparation of high density concrete with its application.	5
	b)	Discuss the effect of density and moisture content on thermal conductivity of light weight concrete.	5
15	a)	Describe the effects of incorporating fibres in concrete also discuss the uses of glass fibre reinforced concrete.	5
	b)	Explain briefly the quality control aspect of self compacting concrete.	5
16	a)	Explain maturity concept and factors effecting it.	5
	b)	Explain workability test and the factors effecting it.	5
17		Write short notes on: a) Recycled aggregate concrete b) Ready mixed concrete c) Methods of mix design.	10

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Code No. 5230

FACULTY OF ENGINEERING

B.E. 4/4 (Inst.) I – Semester (Main) Examination, December 2015

Subject: Analytical Instrumentation

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1	What are the various regions of the electro magnetic spectrum?	3
2	What is the difference between photovoltaic cell and photo emissive cell?	2
3	Describe global and nernst filament.	3
4	Justify why glass and quartz cannot be used as window material for IR spectroscopy.	2
5	Draw and explain Michelson's interferometer.	3
6	What are the methods of measurement of peak areas?	2
7	What does the term HETP mean in GC?	2
8	Describe dropping mercury electrode.	3
9	What are bio sensors?	3
10	Write about magnetic wind instruments.	2

PART – B (50 Marks)

11 With the help of the mathematical equation explain Beer Lamberts law and give its limitations. 10

12 With the help of a diagram explain NMR in detail. 10

13 What are the essential components of an infra red spectrophotometer, explain each one of them in detail. 10

14 Write short notes on: 10
   a) Conductivity meters
   b) Selective ion electrode
   c) pH meters

15 a) What are the different types of air pollution monitoring instruments. 5
   b) With a neat diagram explain paragnetic oxygen analyzer. 5

16 Draw and explain any three detectors used in gas chromatography. 10

17 Draw and explain any two types of mass spectrometers. 10

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Code No. 5247

FACULTY OF ENGINEERING

B.E. 4/4 (Mech./Prod.) I – Semester (Main) Examination, December 2015

Subject: Finite Element Analysis

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1 What are the properties of stiffness matrix?

2 Define potential energy and properties of shape function.

3 Write the stiffness matrix of frame element.

4 A triangular acting on beam element as shown in Figure 1. Determine the equivalent load vector.

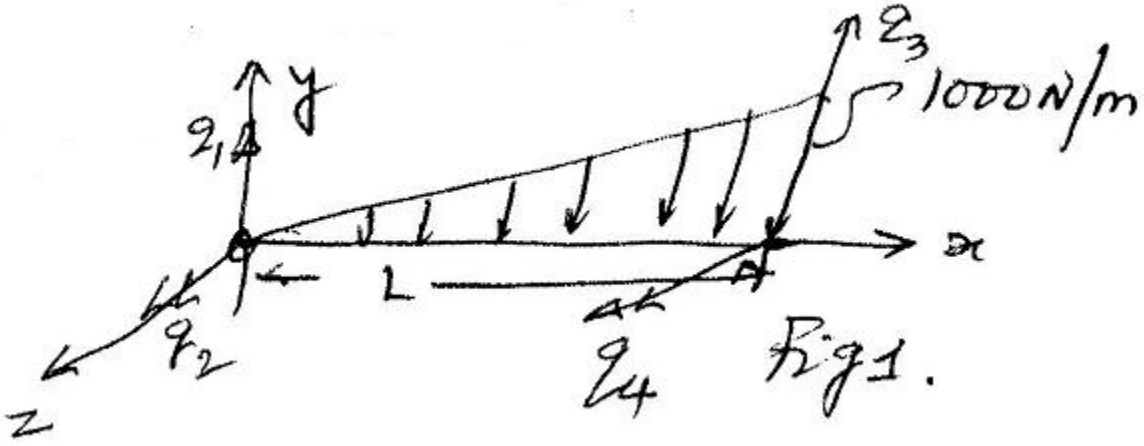

Fig 1.

5 What are strain-stress relations for plane strain and plane stress element?

6 Write the strains and stresses in axisymmetric elements.

7 Write the Jacobian matrix for 4-noded quadrilateral element.

8 Integrate numerically $I_3 = \int_{-1}^{1} (5\P^2 - 2\P + 3) d\P$ and compare the solution by Gaussian quadrate if $w_1 = 1$, $\P_1 = 0.0$ for n=1, for n=2, $w_1 = w_2 = 1.0$; $\P_1 = \P_2 \mp 0.577$.

9 Write the consistant mass for beam element.

10 Evaluate consistant, capacitance matrix for one dimensional rod subjected to a heat flux.

…2.

PART – B (50 Marks)

11 For the tapered bar shown in Fig. 2, if area of C/S at AA = 3000 mm^2, at BB=2000 mm^2, at CC = 1000 mm^2, determine
   a) The deflection at BB and CC
   b) The strains and stresses in each element
   c) The reaction forces if E = 200 GPa.

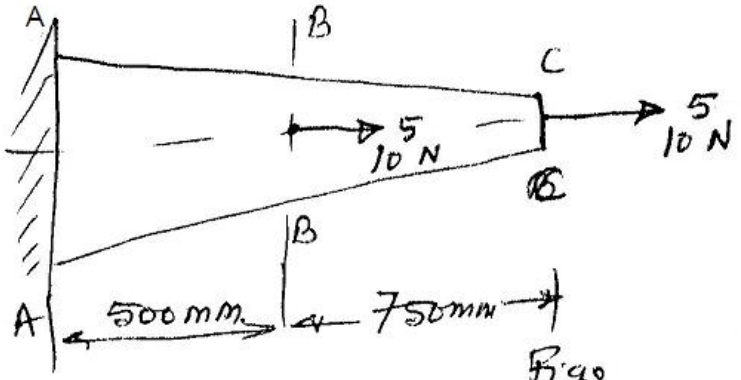

Fig 2.

12 Determine the
   i) The displacement at the node 2
   ii) The strains and stresses in each element and
   iii) The reaction forces for the plane truss shown in Fig. 3. Take A=10^{-6} m^2, E=100 GPa.

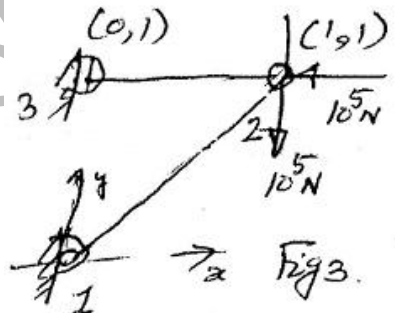

Fig 3.

13 For the beam shown in Fig. 4, determine the
   a) Global stiffness
   b) Global load vector if E = 2x10^{11} N/m^2.

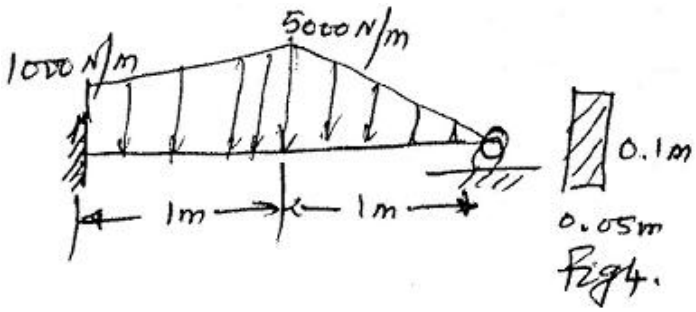

Fig 4.

14 For the axisymmetric triangular element shown in Fig. 5, determine the strain at P(3.5, 2.5) if the nodal displacement are $\{0.05, 0.02, 0.01, 0.03, 0.01, 0.02\}^T$.

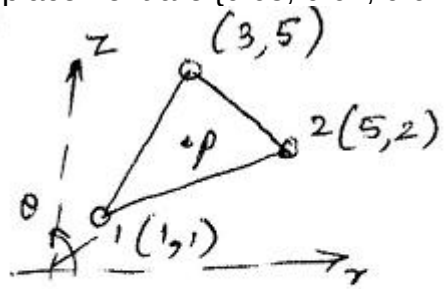

Fig5. All dimension are in m.

15 For the steady state fin shown in Fig. 6, determine the temperature distribution if diameter of fin = 0.05 m, k = 50 W/m ^oC, h = 200 W/m^2 ^oC, T_∞ = 800 ^oC.

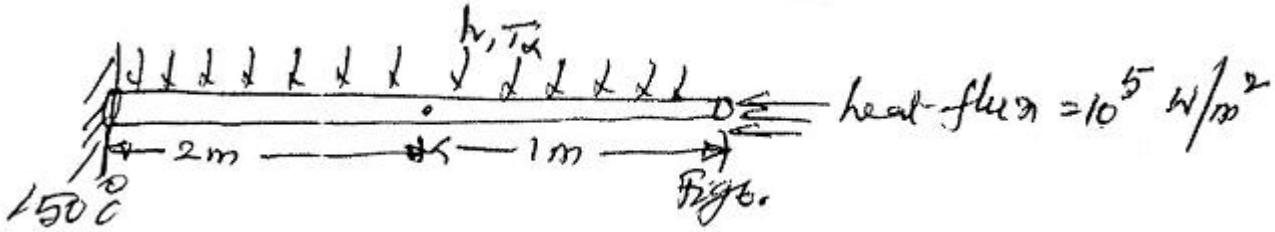

Fig6.

16 For the beam element shown in Fig. 7, determine the eigen values and eigen vector of the cantilever beam shown in Fig. 7 using lumped mass, E = 200 GPa, ϱ = density = 3000 kg/m^3.

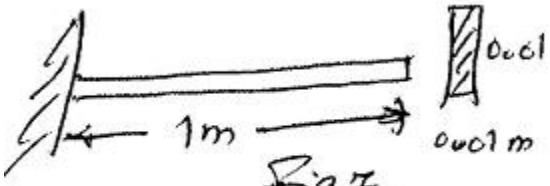

Fig7.

17 Write the following:
   a) Derive the quadratic shape function
   b) Two dimensional analysis of thin plate
   c) Formulation of 3D finite elements.

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