Code : 1GC31

R11

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations June/July 2014

Mathematics-II

(Common to CE & ME)

Time: 3 hours **Max Marks: 70**

Answer any FIVE Questions from the following

All questions carry equal marks (14 Marks each)

* * * * *

1. a) Find the eigen values and the corresponding eigen vectors of the matrix 10M

$$A = \begin{bmatrix} 0 & 0 & -2 \\ 1 & 2 & 3 \\ 1 & 0 & 3 \end{bmatrix}.$$ Is A diagonalizable.

b) Prove that a matrix A is singular iff at least one of the Eigen value of A is 0. 4M

2. a) Find the Fourier series expansion for 7M

$$f(x) = -\pi, \ -\pi < x < 0$$
$$= x, \ 0 < x < \pi.$$

b) Expand the function $f(x) = x\sin x$ as a Fourier series in the $-\pi \le x \le \pi$. 7M

3. a) Form the partial differential equation by eliminating the arbitrary function from $F(xyz,\ x+y+z) = 0$. 7M

b) Solve: $x^2 \dfrac{\partial z}{\partial x} + y^2 \dfrac{\partial z}{\partial y} = 0$ by the method of separation of variables 7M

4. a) Using Newton's backward interpolation formula, estimate the value $f(42)$ from the following data: 7M

x:	20	25	30	35	40	45
$f(x)$:	354	332	291	260	231	204

b) Find by Newton Raphson method, a root of the equation $x^3 - 3x + 1 = 0$ correct to 3 decimal places. 7M

5. a) Evaluate $\int_4^{5.2} \log x\, dx$ using simpson's 1/3rd rule. 7M

b) Find the value of $\cos(1.747)$ using the values given in the table below 7M

x:	1.70	1.74	1.78	1.82	1.86
$\sin x$:	0.9916	0.9857	0.9781	0.9691	0.9584

6. a) Use Runge – Kutta method of order 4, find y for x=0.1, 0.2, 0.3 given that 7M

$$\frac{dy}{dx} = xy + y^2,\ y(0) = 1\ .$$

b) Given $\dfrac{dy}{dx} = \dfrac{y-x}{y+x}$ with initial condition y=1 at x=0. Find y for x=0.1 by Euler's method. 7M

7. a) Derive the Cauchy–Riemann equations in polar form. Hence deduce that 7M

$$\frac{\partial^2 u}{\partial r^2} + \frac{1}{r}\frac{\partial u}{\partial r} + \frac{1}{r^2}\frac{\partial^2 u}{\partial \theta^2} = 0.$$

b) Determine the analytic function $f(z) = u + iv$, if $u - v = \dfrac{\cos x + \sin x - e^{-y}}{2(\cos x - \cosh y)}$ and $f(\frac{\pi}{2}) = 0$. 7M

8. a) If $\phi(a) = \oint_C \dfrac{3z^2 + 7z + 1}{z-a} dz$, where C is the circle $x^2 + y^2 = 4$, find the values of 7M

i) $\phi(3)$ ii) $\phi'(1-i)$ iii) $\phi''(1-i)$.

b) Expand $f(z) = \dfrac{1}{(z-1)(z-2)}$ in the region i) $|z| < 1$ ii) $1 < |z| < 2$ iii) $|z| > 2$. 7M

***

R11

Code : 1G631

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations June/July 2014

Strength of Materials-I

(Civil Engineering)

Time: 3 hours **Max Marks: 70**

Answer any FIVE Questions from the following

All questions carry equal marks (14 Marks each)

*****

1. a) Define Factor of safety and Poisson's ratio 4M

   b) A steel rod of 2 cm diameter is enclosed centrally in a hallow copper tube of external diameter 4 cm and internal diameter of 3.5cm. The composite bar is then subjected to an axial pull of 50 KN. If the length of each bar is equal to 20cm, determine 10M

   i) Stress in rod and tube, and

   ii) Load carried by each bar

   Take E for steel = $2x10^5$ N/mm^2 and for copper = $1x10^5$ N/mm^2

2. A simply supported beam of 9m length carries a point load of 10kN at the right end and a udl of 30kN/m for a distance of 3m starting from the left end. The supports of the beam are 6m apart, the left end support being at the left end. Draw the Shear force and Bending diagrams. 14M

3. a) Define moment of resistance 4M

   b) The tension flange of a cast iron I section beam is 240mm wide and 50mm deep, the compression flange is 100mm wide and 20 mm deep whereas the web is 300mm x 30mm. Find the load per m run which can be carried over a 4m span by a simply supported beam if the maximum permissible stresses are 90 MPa in compression and 24 MPa in tension. 10M

4. The shear force acting on a section of a beam is 100kN. The section of the beam is of T- shaped of dimensions 200mm x 250mm x 50mm. The flange thickness and web thickness are 50mm. Moment of inertia about the horizontal neutral axis 1.134 x 10^8 mm^4. Find the shear stress at the neutral axis and at the junction of the web and the flange. 14M

5. A beam of length 6m is simply supported at its ends and carries two point loads of 48kN and 40kN at a distance of 1m and 3m respectively from the left support. Find 14M

   i) Deflection under each load

   ii) Maximum deflection

   iii) Point at which maximum deflection occurs by double integration method

   Take E = $2X10^5$ N/mm^2 and I = $85x10^6$ mm^4

6. a) What is a cantilever beam? 4M

   b) Find the expression for the slope and deflection of a cantilever of length L which carries a uniformly distributed load over a length "a" from the fixed end by Moment area method. 10M

7. A piece of material is subjected to two perpendicular tensile stresses of 100 MPa and 60Mpa. Determine the plane on which the resultant stress has maximum obliquity with the normal. Also find the resultant stress on this plane. 14M

8. Principal stresses at a point in an elastic material are 100 MPa tensile, 50 MPa tensile and 25Mpa compressive. Determine the factor of safety against failure based on Maximum shear stress theory and Maximum strain energy theory. 14M

   Elastic limit in simple tension is 220 MPa and Poisson's ratio is 0.30.

***

Code : 1G632 **R11**

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations June/July 2014

Surveying

(Civil Engineering)

Time: 3 hours **Max Marks: 70**

Answer any FIVE Questions from the following

All questions carry equal marks (14 Marks each)

* * * * *

1. a) Explain in detail the various tape corrections and the effect on measurement of a line. 7M

   b) Explain the different possible errors and mistakes in chaining. What are the precautions to be taken against errors and mistakes? 7M

2. a) What are the advantages and disadvantages of plane table surveying? 6M

   b) The following bearing were observed in a compass traverse 8M

Line	Fore bearing	Back bearing
PQ	75°30’	254°30’
QR	115°30’	297°00’
RS	165°30’	345°30’
ST	225°00’	44°00’
TP	305°00’	125°30’

At which of these stations would local attraction be suspected? Find the corrected bearings of the lines. If the magnetic declination is 3°30’ W, find the time bearings of the lines.

3. a) What are the different methods of contouring? Describe briefly. 6M

   b) The following consecutive readings were taken with a leveling instrument at 20 m intervals. 8M

   0.465, 0.870, 1.545, 2.450, 1.760, 0.665, 1.325 and 2.215.

   Instrument was shifted after the fourth and seventh readings. Make the entries in a level book and calculate the RL of various points and apply the usual checks.

4. a) Explain briefly the determination of the capacity of reservoir. 6M

   b) The following perpendicular offsets were taken from a chain line to hedge: 8M

Distance (m)	0	10	20	30	40	50	60	70	80
Offset (m)	3.2	4.8	3.9	5.4	4.2	3.6	2.8	2.4	1.8

Calculate the area enclosed between the chain line and the offsets by Simpson’s rule.

5. a) Explain briefly the temporary and permanent adjustment of theodolite. 6M

b) The lengths and bearings of a closed traverse ABCD is shown below: 8M

Line	Length (m)	Bearing
AB	80	140°30’
BC	60	220°00’
CD	?	310°30’
DA	100	?

Calculate the length of CD and bearing of DA.

6. a) Explain the principle of tachometry. What are the characteristics of a tachometer? 6M

b) The following observations were taken using a tachometer fitted with analytic lens, the staff being held vertically. 8M

Instrument station	**Height of axis**	**Staff Station**	**Vertical angle**	**Hair readings.**
A	1.40	BM	-5°00’	0.980, 1.540, 2.100
A	1.40	B	+6°30’	0.830, 1.360, 1.890
B	1.55	C	+10°30’	1.890, 2.480, 3.070

The RL of the Bench mark is 100.00 m. Calculate the reduced RL’s of A, B and C and the horizontal distances AB and BC.

7. a) What are the different type of curves? Describe the properties of simple curve. 6M

b) Two tangents AB and BC intersect at point B at a chain age of 10.0 m. Calculate the necessary data for setting out a circular curve of radius 120 m and deflection angle 30° by the method of offset from long chord. 8M

8. a) What is a total station? Briefly explain it various components. 7M

b) Explain briefly abort Global Positioning System (GPS) 7M

***

R11

Code : 1G633

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations June/July 2014

Fluid Mechanics

(Civil Engineering)

Time: 3 hours **Max Marks: 70**

Answer any FIVE Questions from the following
All questions carry equal marks (14 Marks each)

*****

1. a) State Newton's law of viscosity and briefly explain its importance in the analysis of fluid flow.
   b) A U-tube has two limbs of internal diameter 6mm and 16mm respectively and contains some water. Calculate the difference in water levels in the two limbs. Surface tension of water =0.073 N/m.
2. a) Derive the expression for hydrostatic force on inclined immersed surface and also determine the position of center of pressure.
   b) A vertical isosceles triangular gate with its vertex up has a base width of 2m and a height of 1.5m. If the vertex of the gate is 1m below the free water surface, find the total pressure force and the position of the center of pressure.
3. a) Distinguish between (i) steady and unsteady flow (ii) Uniform and non-uniform (iii) Laminar and turbulent flow (iv) Rotational and irrotational flow (iv) Compressible and incompressible flow.
   b) Obtain the general three-dimensional continuity equation in differential form. Simplify the equation for a steady incompressible flow.
4. a) State and explain the impulse-momentum theorem. How will you apply it for determining the force exerted by a flowing fluid on a pipe bend?
   b) A 200mm diameter to 150mm diameter reducing bend having included angle of 120^o is connected to a horizontal pipe carrying $0.3m^3/s$ of water. The pressure at inlet to the bend is 300 kPa. Determine the magnitude and direction of the force exerted by the bend, if 10% of the exit kinetic energy is lost in the bend.
5. a) Derive expressions for calculating loss of energy in a pipe flow during sudden expansion in the pipe and sudden contraction in the pipe.
   b) A pipeline carrying water has a diameter of 0.5m and is 2.0km long. To increase the delivery another pipeline of the same diameter is introduced parallel to the first pipe in the second half of its length. Find the increase in discharge if the total head loss in both the cases is 15m. Assume f=0.02 for all the pipes.
6. a) Distinguish between notch and weir and derive the expression for discharge through rectangular notch.
   b) An oil of relative density 0.90 flows through a vertical pipe of diameter 10cm. the flow is measured by a 20cmX10cm venturimeter. The throat is 10cm above the inlet section. A differential U-tube manometer containing mercury is connected to the throat and the inlet. If C_d=0.99, what is (a) the flow for a manometer reading of 9cm and (b) the manometer reading for a flow of 50 L/s?
7. a) What are the characteristics of turbulent flow? How does the head loss vary with mean velocity in turbulent flow?
   b) An 8cm diameter pipe, 300m long conveys oil of kinematic viscosity 1.5 stokes and mass density 900 kg/m^3. Assuming laminar flow, (a) find the rate of flow if it takes 5.0kW of power input to a pump set of overall efficiency 60% to drive the flow, (b) verify whether the assumption of laminar flow is correct.
8. a) Explain the meaning of geometric, kinematic and dynamic similarities.
   b) A 1/50 model of spillway was made and test was conducted with a water flow rate of $3m^3/s$. The water velocity was found to be 2m/s. Estimate the water flow rate and velocity of the prototype.

***

R11

Code : 1G538

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations June/July 2014

Electrical and Mechanical Technology

(Civil Engineering)

Time: 3 hours **Max Marks: 70**

Answer any five questions

(Minimum of two questions from each part should be chosen for answering five questions)

(Use separate booklets for PART-A & PART-B)

All Questions carry equal marks (14 Marks each)

* * * * *

PART-A

1. a) Derive emf equation of DC Machine 7M

   b) A 4 pole wave wound connected armature has 51 slots with 12 conductors per slot and is driven at 900 rev./min. if the useful flux per pole is 25mwb, calculate the value of the generated emf. 7M

2. a) Define regulation and efficiency of a transformer 6M

   b) A 500kVA, 11000V/415V, 50Hz single phase transformer has 120 turns on the secondary, calculate (i) the approximate values of the primary and secondary currents. (ii) the approximate number of primary turns. (iii) the maximum value of the flux. 8M

3. a) Draw and explain slip – torque characteristics of an induction motor 7M

   b) A 3 phase induction motor is wound for four poles and is supplied from a 50Hz system. Calculate (i) the synchronous speed (ii) the speed of the rotor when the slip is 4% (c) the rotor frequency when the speed of the rotor is 600r/min. 7M

4. Explain the types of damping devices used in the measuring instruments in detail with neat diagrams. 14M

PART-B

5. a) Explain the basic principle of arc welding with the help of a neat sketch. 7M

   b) Briefly explain soldering and brazing processes and state their differences? 7M

6. a) What are the merits and demerits of four stroke engines over two stroke engines? 7M

   b) Why should I.C. engines be lubricated? Explain any one type of lubrication system. 7M

7. a) Explain the working of vapour compression refrigeration system and state its advantages and disadvantages? 7M

   b) State the factors which affect comfort air conditioning and explain the working of comfort air conditioning system? 7M

8. a) What are the advantages of multi stage compression over single stage in reciprocating air compressor? 7M

   b) What are the factors to be taken into consideration in the selection of equipment and machinery for civil engineering construction? Describe briefly with a simple sketch the constructional details of a bulldozer. 7M

***