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Roll No.

B.Tech.-IV Sem.

TU-109

B.Tech. Examination, May 2014

EC/ME/EI
Mathematics-III

[BT-405(N)]

Time : Three Hours / [Maximum Marks : 100]

Note: Attempt any **five** questions. **All** questions carry equal marks.

1. (a) Test the analyticity of the function
 $w = \sin z$ and hence derive that

$$\frac{d}{dz} (\sin z) = \cos z \quad 10$$

- (b) Find the value of the integral

$$\int_c \frac{3z^2 + 7z + 1}{z + 1} \text{ where } c \text{ is the circle}$$

$$|z| = \frac{1}{2} \quad 10$$

2. (a) Expand $\cos z$ about the point $z = \left(\frac{\pi}{2}\right)$

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by Taylor's series.

10

- (b) Use the complex variable technique to find the value of the integral

$$\int_0^{2\pi} \frac{d\theta}{5 + 3 \cos \theta}$$

10

3. (a) Calculate the first four moments of the following distribution about the mean.

10

x	0	1	2	3	4	5	6	7	8
f	1	8	28	56	70	56	28	8	1

- (b) Find a straight line that can be fitted to the following data:

10

x	1	2	3	4	5	6
y	1200	900	600	200	110	50

4. (a) Establish the formula

$$\sigma_{x-y}^2 = \sigma_x^2 + \sigma_y^2 - 2r\sigma_x\sigma_y. \text{ Where } r \text{ is the correlation coefficient between } x \text{ and } y.$$

10

- (b) Ten percent of screws produced in a certain factory turn out to be defective. Find the probability that in a sample of 10 screws chosen at random; exactly two will be defective.

10

5. (a) Find the probability that in ten tosses of a fair coin, a head appears

(i) at no time (ii) once
(iii) twice (iv) thrice

- (b) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution. 10

6. (a) Using bisection method, find the negative root of $x^3 - x + 11 = 0$ 10

- (b) Find the double root of $f(x) = x^3 - x^2 - x + 1 = 0$ by Newton - Raphson method. 10

7. (a) Find the value of $\nabla^2 y_5$, given: 10
 $y_1 = 2, y_2 = 5, y_3 = 10, y_4 = 17, y_5 = 26$

- (b) Find the number of men getting the wages Rs. 10 and Rs. 15 from the following table: 10

Wages	0-10	10-20	20-30	30-40
Frequency	9	30	35	42

8. (a) Solve the system
 $2x + y + 4z = 12, 8x + 3y + 2z = 20,$
 $4x + 11y + z = 33$ by Crout's method. 10

- (b) Explain Gauss-Seidel's method for the following system of equation. 10

$$a_{11}x + a_{12}y = b_1$$

$$a_{21}x + a_{22}y = b_2$$

9. (a) Find $\frac{dy}{dx}$ at $x = 4$ by using the following table: 10

x	0	2	5	1
y	0	8	125	1

- (b) Use Picard's method to approximate the value of y when $x=0.1$ given $y=1$ at

$$x=0 \text{ and } \frac{dy}{dx} = \frac{y-x}{y+x} \quad 10$$

10. (a) Using Runge's Kutta's method, find y at $x=1.1$

$$\text{given } \frac{dy}{dx} = 3x + y^2, \quad y(1) = 1.2 \quad 10$$

- (b) Write a short notes on any **two** of the following: 10

(i) Convergence of Newton-Raphson method

(ii) Binomial distribution

(iii) Simpson's one third rule

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Roll No.

B.Tech. IV Sem.

TU-110

B.Tech. Examination, May 2014

EC/EI/ME BRANCH

TRANSDUCERS AND SENSORS

[BT-406(N)]

Time : Three Hours]

[Maximum Marks : 100

Note: Attempt any **five** questions. **All** questions carry equal marks.

1. (a) Define the following terms:

(i) Resolution

(ii) Span

(iii) Dead zone

(iv) Sensitivity

(v) Threshold

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- (b) An 820Ω resistance with an accuracy of $\pm 10\%$ carries a current of 10 mA. The current was measured by an analog meter on 25 mA range with an accuracy of $\pm 2\%$ of full scale. Calculate the power dissipated 'P' in the resistor and % error in 'P'.
2. (a) Explain the difference between deflection and null type instruments giving suitable examples.
- (b) Explain how the effects of Modifying and Interfering inputs are minimized in measurement systems.
3. (a) Describe the constructional details of a resistive potential divider and derive the expression for its output voltage when connected across a meter of finite impedance.

(b) Write a short note on velocity sensory.

4. A parallel plate capacitive transducer uses plates of area 500 mm^2 which are separated by a distance of 0.2 mm . Calculate the value of capacitance when the dielectric is air having a permittivity of $8.85 \times 10^{-12} \text{ F/m}$.

(i) Calculate the change in capacitance if a linear displacement reduces the distance between the plates to 0.18 mm . Also calculate the ratio of per unit change of capacitance to per unit change of displacement.

(ii) Suppose a mica sheet 0.01 mm thick is inserted in the gap. Calculate value of original capacitance and change in capacitance for the same displacement. Also calculate the ratio of per unit change

in capacitance to per unit change in displacement. Dielectric constant of mica is 8.

5. (a) Explain the construction and working of U-tube Manometer. Also list the errors that can occur in manometers along with their advantages and disadvantages.
(b) Write the basic principle, construction and working of Pirani gauge. What are its advantages, disadvantages and rang?
6. (a) Discuss briefly about dynamometers.
(b) What are Elastic type pressure transducers? What are the different types of primary sensing elements used in them? Explain their construction with a neat and clean diagram.

7. (a) A Venturimeter has an area ratio of 9 to 1, the larger diameter being 30cm. During the flow, the recorded pressure head in the larger section is 6.5m and at the throat 4.25m. If meter coefficient is 0.99, compute the discharge through the meter in litres per second.
- (b) What is meant by inferential flow meters? Name its few types.

8. (a) Discuss vortex shedding flowmeter along with its advantages and disadvantages.
- (b) With proper diagram, explain the working of Rotameter also explain the reason for variable area used in Rotameter. What effect will appear on the readings if the Rotameter is placed horizontally?

9. (a) What is meant by pyrometry? Explain the working principle of optical pyrometer. Also explain the three conditions of filament. Write its range, advantages and disadvantages.
- (b) What are thermocouples? Explain their working principle with a neat diagram. What are the materials normally used in making thermocouples? What are their major advantages? Give their range.
10. (a) What are the sources of errors in Filled-system thermometers? Explain liquid in glass thermometer with the help of a neat and well labeled diagram.
- (b) A thermistor has resistance of $3980\ \Omega$ at ice point and $794\ \Omega$ at 50°C . The

resistance temperature relationship is given by $R_T = aR_0 \exp\left(\frac{b}{T}\right)$. Calculate the constants a and b . Also calculate the range of resistance to be measured in case the temperature varies from 40°C to 100°C .

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Roll No.

B.Tech. IV Sem.

TU-123

B.Tech. Examination, May 2014

M.E.

Applied Thermodynamics

[BT-416(N)]

Time : Three Hours]

[Maximum Marks : 100

Note : (i) Attempt any **five** questions.

(ii) Assume suitable data if missing any.

(iii) Steam table and calculator is permitted.

1. (a) Discuss the Joule-Thompson coefficient and inversion curve. 10

(b) An ice skate is able to slide over the ice because Skate blade exerts sufficient pressure on ice that a thin layer of ice is

P.T.O.

melted in water layer. Determine the Pressure an ice skate blade must exert to allow smooth ice skate at -10°C . Take Latent Heat of fusion of ice $= 334\text{kJ/Kg}$ Specific volume of water $= 1 \times 10^{-3}\text{m}^3/\text{Kg}$ Specific volume of ice $= 1.01 \times 10^{-3}\text{m}^3/\text{Kg}$

10

2. (a) Explain the working of a Jet Propulsion system. Also compare the working of Ram Jet and Pulse jet Engines? 10
- (b) Explain the difference between a turbo-jet and turbopropeller unit by drawing sketches. 10
3. (a) Draw the flow, T-S diagrams of open and closed gas turbine cycle. Discuss the relative merit and demerits of closed cycle over open cycle? 10

(b) In an open-cycle-constant-pressure gas turbine, Air enters the compressor at a Pressure of 1 bar and temperature of 25°C , and is compressed upto Pressure at 4.2 bar. The isentropic efficiencies of compressor and turbine are 80% and 85% respectively. The peak cycle temperature is 1045°K . Assuming $\gamma=1.4$, both air & gasses and $C_p=1.005\text{KJ/Kg-K}$.

Determine (i) The power developed

(ii) The Thermal Efficiency. 10

4. (a) What is the Governing of Steam Turbines? Explain the various methods used for governing of steam turbines in brief?

10

(b) Explain the difference between impulse and reaction turbines? Define degree of reaction.

10

5. (a) Discuss the effect of inlet pressure and temperature of Steam of Rankine cycle. Write the advantages of reheating of the steam and at what pressure (interims of initial pressure) reheating is generally done to obtain best results.

10

- (b) On a Steam Power Plant boiler pressure is 60 bar and condenser pressure is 0.07 bar. The steam temperature at boiler outlet is 550°C .

Determine :

- (i) Turbine work/kg
- (ii) Heat transfer in condenser per kg
- (iii) Cycle Efficiency
- (iv) Mass flow rate of steam to produces 5 MW.

10

6. (a) Explain the function of Steam Nozzles, state its types and derive the expression for the calculation of Steam Velocity at the exit of nozzle with the help of steady flow energy equation. 10

(b) Dry saturated steam enters a nozzle at 12 bar and leaves at 1.5 bar with a dryness fraction of 0.95. Neglecting approach velocity calculate the exit velocity. If 12% of the heat drop is lost due to friction, find the percentage reduction in exit velocity. 10

7. (a) Why is Rankine cycle considered as a standard cycle for Steam Power Plants? Describe a Rankine cycle with the help of P-V and T-S diagrams. 10

(b) A steam turbine working on Rankine cycle is supplied with dry saturated

steam at 25 bar and the exhaust takes place at 0.2 bar. For a steam flow rate of 10 Kg/sec. Determine for a theoretical cycle :

- (i) quality of steam at end of expansion
- (ii) Turbine shaft work
- (iii) Power required to drive the pump.
- (iv) Work ratio.
- (v) Rankine Efficiency. 10

8. (a) What do you mean by vacuum in a condenser? Explain how it is maintained?

10

(b) Define the terms "Equivalent Evaporation" and "Boiler efficiency", "Boiler Trial" and "Heat balance sheet" as used in boilers. 10

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Roll No.

B.Tech. IV Sem.

TU-124

B.Tech. Examination, May 2014

M. E. Branch

Human Values & Professional Ethics

BT-426 (N)

Time : Two Hours]

[Maximum Marks : 50

Note: Attempt any **five** questions. All questions carry equal marks.

1. What do you mean by values? How do they differ from skills? What are the basic guidelines for value education? 10
2. What is the content of Self - Exploration? Explain the process of Self - Exploration with the help of a diagram. 10

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3. What is the difference between 'animal consciousness' and 'human consciousness'? Explain with the help of a diagram. 10
4. "I am the seer, doer and enjoyer. The body is my instrument". Explain. 10
5. What is the difference between Svatantrata and partantrata? What is the program to become svatantra? Relate this with your own experience. 10
6. "If I trust everyone, people would take undue advantage of me." Do you agree? Explain. 10
7. What do you mean by 'universal human order'? What could be your role in moving towards it? 10

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8. What suggestions would you give to make value education more effective in the present scenario.

10

9. What is the vision for manaviya vyawastha?

Explain.

10

10. What do you mean by 'Profession'? What do you understand by competence in professional ethics? Explain.

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Roll No.

B.Tech.-IV Sem.

TU-122

B.Tech. Examination, May 2014

M.E.

MEASUREMENT & METROLOGY

[BT-415(N)]

Time : Two Hours]

[Maximum Marks : 50

Note: (i) Attempt any **five** questions.

(ii) Each question carries equal marks.

(iii) Be precise in your answer.

1. What is measurement? Why make measurements? Explain the operational description of a measurement system giving generalised input-output Configuration. 10
2. (a) Explain the working of the closed loop system giving at least one example. 5

P.T.O.

- (b) Define any **two** static calibration characteristics 5
- (i) Readability & Span
 - (ii) Repeatability
 - (iii) Hysteresis-Threshold
3. (a) What is Optical Encoder? Describe the incremental shaft encoders. 5
- (b) Describe the selection criteria of a transducer. 5
4. (a) Describe the block Diagram of FM recording system used in magnetic type recorder. Describe its operation. 5
- (b) Explain the principle & working of LVDT with the help of neat sketch. 5
5. (a) Explain the principle & working of McLeod Gauge with the help of neat diagram. 5
- (b) Classify the Strain - Gauges. Explain any

one gauge used for strain measurement
with the help of diagram. 5

6. (a) Explain the principle & working of Pneumatic load cell used for the measurement of force with neat sketch. 5

(b) Explain in brief the working of bimetallic thermometer & pyrometer with the help of line diagram. 5

7. (a) What do you understand by limit, fit & tolerance? Explain with the neat sketch. 5

(b) What is interchangeability? Explain in brief. 5

8. Calculate the fundamental deviation, tolerance and hence the limit of size for the shaft and hole for the following fit. 10

"50H8h7"

9. (a) Discuss the working of sigma comparator in brief. 5
- (b) Explain why the sine bar is not preferred for greater angles than 45° ? How will you use it for angles greater than 45° ? 5
10. (a) Explain in brief with help of neat sketch the "Three wire method" used for the measurement of effective diameter of a 'Bolt'. 5
- (b) Sketch and explain the working principle of "Johnson's Microkrator". 5

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Roll No.

B.Tech. IV Sem.

TU-121

B.Tech. Examination, May 2014

M.E.

Manufacturing Science-I

[BT-414(N)]

Time : Three Hours }

[Maximum Marks : 100

Note: Attempt any five questions. All questions carry equal marks.

1. (a) What is manufacturing. Enumerate the importance of manufacturing? 10
- (b) Describe the following types of deformation in metals: 10
 - (i) Elastic deformation
 - (ii) Plastic deformation
2. (a) List the limitation of open die forging and closed die forging process? Explain closed die forging in brief. 10

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- (b) Define forging? Explain any two types of forging with neat sketch. 10
3. (a) What do you mean by rolling? Explain briefly, the principle of rolling? 10
- (b) Give few examples of rolled products. 10
4. (a) Explain and differentiate: 10
- (i) Blanking and piercing
- (ii) Progressive and Compound die
- (b) Give the detail of various parts of power press 10
5. (a) Discuss the different methods of producing metal powders. 10
- (b) With the help of neat sketch, explain deep drawing operation 10
6. (a) Differentiate between Jig and Fixture. 10
- (b) What are the advantages and limitations

- of powder metallurgy 10
7. (a) Describe the process of compression moulding 10
- (b) What are the economic aspects of the use of Jigs and Fixtures? Differentiate between drill Jig and a Fixture 10
8. (a) Describe the various kinds of pattern in use? What are the allowances provided, when making a pattern? 10
- (b) What are the properties required for moulding sand? Also give the names of various types of moulding sand? 10
9. (a) Write short notes on the following: 10
- (i) welding of plastics
- (ii) future of plastics
- (b) Explain the Mechanism of solidification of casting of pure metals. 10

10. (a) Define the following Grating System:

- (i) Parting line gate 10
- (ii) Bottom gate
- (iii) Top gate

(b) Give the causes and remedies of the following casting defects: 10

- (i) Blow holes
- (ii) Pin hole Porosity
- (iii) Rat tails
- (iv) Hot tears

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Roll No.

B.Tech. IV Sem.

TU-120

B. Tech. Examination, May 2014

M.E.

Electrical Machine & Automatic Control

[BT-413(N)]

Time : Three Hours]

[Maximum Marks : 100

Note : Attempt any **five** questions. Be precise in your answer. Do not write any thing on question paper except Roll No. Use of calculator is allowed.

1. (a) Explain the construction of an auto transformer. Discuss the advantages and disadvantages of an autotransformer as compared to two winding

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transformers. Give the applications of two winding transformers and auto transformers.

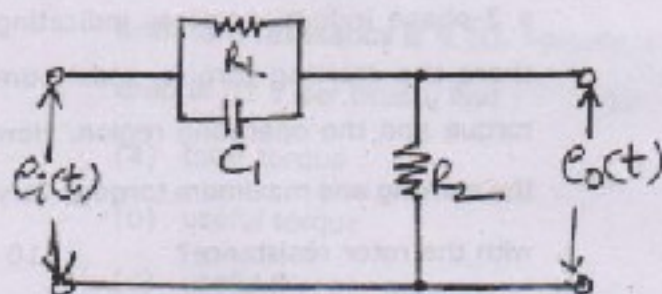
Derive an expression for copper saving in conductor material in an autotransformer over a two winding transformer of equal rating. 10

- (b) A 4-Pole, 250 V, wave connected shunt motor gives 10 KW when running at 1000 r.p.m, and drawing armature and field currents of 60 Amp. and 01 Amp. respectively. It has 560 conductors. Its armature resistance is 0.2Ω . Assume a drop of 01 V per brush, find : 10

- (a) total torque
- (b) useful torque
- (c) useful flux per pole

- (d) rotational losses
 - (e) efficiency
2. (a) What are different losses take place in dc machines and they vary with load current? Derive the condition for maximum efficiency. 10
- (b) Why the short circuit test is performed on the hv side of a transformer? Why the core loss is almost negligible in this test? 10
3. (a) What are V and inverted V-curves? How they are determined? 10
- (b) Sketch the torque-slip characteristic of a 3-phase induction motor indicating there the starting torque, maximum torque and the operating region. How the starting and maximum torques vary with the rotor resistance? 10

4. (a) Explain the working of a two phase servomotor. Draw its torque-speed characteristics for various control voltages. 10
- (b) Explain how the regulating of an alternator is determined using synchronous impedance method. 10
5. (a) Distinguish with suitable examples between the open and closed loop control system. 10
- (b) Derive the transfer function of the network shown below. 10



6. (a) Discuss the effect of feedback on the following : 10

- (i) Overall gains
- (ii) Stability
- (iii) Noise and disturbance

- (b) The open loop transfer function of a servo system with unity feedback is :

$$G(S) = \frac{10}{S(0.1S+1)} \quad 10$$

Evaluate the static error constants. (K_p , K_v and K_a)

7. (a) Derive the expression for the peak overshoot for the second order control system. 10

- (b) For the system having : 10

$$G(S) H(S) = \frac{K(S+4)}{S(S^3 + 5S^2 + 6S)}$$

Find :

- (i) Type of system
- (ii) Static error constants
- (iii) Error due to input $\frac{A}{2}t^2$.

8. (a) Explains the following : 10

- (i) PI Controllers
- (ii) PID Controllers
- (iii) PD Controllers

(b) Determine the Polar plots of the following : 10

(i) $G(j\omega) = \frac{j\omega}{1 + j\omega a}$

(ii) $G(j\omega) = \frac{(j\omega)^2}{1 + j\omega a}$

Also obtain gains and phase margin from Polar Plots in (i) and (ii) Parts.

9. (a) Sketch the Bode Plot for the system

having $G(s)H(s) = \frac{20}{s(0.1s + 1)}$ 10

(b) Define the following for Bode Plot : 10

(i) Resonant Peak

(ii) Gain Margin

(iii) Phase Margin

10. (a) Sketch the Nyquist plot for the following system having : 10

$$G(S) = \frac{100}{S(S+10)}, \quad H(S) = 1$$

Consider negative feedback, comment on the stability of the system.

(b) What is meant by step input, ramp input and impulse input? How these signals can be represented graphically.