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(21214) Roll No. ....

B.Tech. I Sem.

## TU-332

B.Tech. Examination, Dec - 2014

CS Branch

Computer System and Programming in 'C'

BT-102(N)

Time : Three Hours ]

[ Maximum Marks : 100

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

1. (a) What do you mean by Multi-user and Multi-tasking Operating System? 10  
(b) Give different layers of UNIX Architecture. Explain the intended purpose of each. 10

P.T.O.

2. Convert the following numbers into binary.

- (a)  $(101001)_2 = ( \quad )_{10}$
- (b)  $(241)_{10} = ( \quad )_8$
- (c)  $(142.39)_{10} = ( \quad )_{16}$
- (d)  $(813.DE)_{16} = ( \quad )_2$
- (e)  $(526.137)_8 = ( \quad )_2$

3. Differentiate between the following pairs:

- (a) Low Level Language and High Level Language.
- (b) Interpreter and Compiler.
- (c) System Program and Application Program.
- (d) Hardware and Software.

4. (a) Write a program in C to print all odd numbers and all even numbers between 1 and 100.

TU-332\220\2

- 20 (b) Write a program to add the digits of a given integer number. 10
5. (a) Write the purpose of if statement in C. Describe the different forms of if statement. Explain with suitable examples.
- 10
- 10 : 20 (b) Write a C program to find the largest in given four numbers 10
- 10 Level Lan-
- ation Pro- 6. What are storage classes? Give the classification of storage classes with suitable examples. 20
- 10
- 10 all even 7. (a) What do you understand by pointers? Explain. 10
- 10 between 10 (b) Write a C program to swap two integer numbers using pointers. 10

8. (a) What are dynamic memory operators? Explain.

(b) Write a program in C to input two strings.

9. (a) What do you understand by pointer in C? Also explain its advantages.

(b) Briefly explain the definition and how it is initialized?

10. (a) Write an algorithm to sort the elements of an array.

(b) Write a C program for search technique for an element in an array.

(c) Write an algorithm to find the greatest among three numbers and also write a C program for it.

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**TU-301**

**B.Tech. Examination, Dec. 2014**

**EC, ME, CS Branch**

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**Computer Concept and Programming-in-'c'**

n of structure

**BT-102**

10 **Time : Three Hours ] [Maximum Marks : 100**

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

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1. Draw a block diagram showing all the functional units of a Digital Computer. Explain the function and role of each unit in brief. 20

10

2. (a) Differentiate between computer Hardware and Computer Software. 10

(b) What do you mean by Internal DOS-Command and External DOS-Command? 10

P.T.O.

2. (a) Convert the following : 10

$$(i) \quad (575)_8 = ( \quad )_2$$

$$(ii) \quad (311.55)_{10} = ( \quad )_2$$

$$(iii) \quad (615)_8 = ( \quad )_{10}$$

(b) Draw a flowchart and write a function in C to calculate factorial of given number. 10

3. (a) What is the use of "Switch" statement? Write the syntax of "Switch" statement and explain how it is different from 'if' statement. 10

(b) Write a program in C that accepts  $N \times N$  matrix as input and prints transpose of this matrix. 10

4. (a) Write a C program to print the following pattern 10

8    6    5    4    3

6    5    4    3

5    4    3

4    3

3

TU-02\40\2

- 9
- (b) What is a pointer? Write a C program to swap the values of two variables making use of pointers. 10
5. (a) What is sorting. Explain any one sorting technique to sort following data. 10  
76 89 31 11 17 15 23
- (b) What do you mean by dynamic memory allocation? Discuss the functions available in C used for dynamic memory allocation. 10
6. (a) What do you mean by precedence and associativity of operators? Give the precedence and associativity of relational and logical operators. 10
- (b) What do you mean by modular programming? Give its advantages. 10
7. (a) What is the purpose of using structures in C? Explain with the help of example. 10

- (b) How macros are defined and called in C? Explain with example. 10
8. (a) Differentiate between call by value and call by reference. Make a program in C to show the usage of both. 10
- (b) What do you mean by loop? Differentiate between exit controlled and entry controlled loop. 10
9. (a) What are the different type of operators in C. 10
- (b) Write a program to find the octal equivalent of the entered number. 10
10. (a) If a five digit number is input through the keyboard, write a C program to calculate the sum of its digit and to reverse the number. 10
- (b) What are input/output functions? Also write any four string handling functions with syntax and purpose? 10

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(Printed Pages 3)

(21214)

Roll No. ....

B.Tech. I Sem.

**TU-303**

**B.Tech. Examination, Dec. 2014**

**EI, IT, CE, Branch**

**Environment and Ecology**

BT-103

*Time : Three Hours /*

*/Maximum Marks : 80*

**Note:** Attempt any **five** questions.

1. Discuss about the principles and objectives of environmental education.
2. What are the different factors responsible for climate change? Also, discuss about its impact on environment.
3. Write a note on different renewable energy resources of India.

P.T.O.

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- 12
4. What do you mean by Solid waste management? Explain various methods of solid waste management.
  5. Write short notes on (any **four**)
    - (a) Nitrogen cycle
    - (b) Ozone layer depletion
    - (c) Impact identification
    - (d) EIS
    - (e) Importance of environment
  6. Define Biodiversity. What are the different methods used for conservation of biodiversity?
  7. What do you mean by Air pollution? Explain various control devices used for treatment of air pollutants.
  8. Discuss the role of various environmental organizations and agencies in environment protection.

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9. Define acid rain and its impact on monuments.
10. What do you meant by ecosystem? With the help of the suitable models explain the energy flow in the ecosystem.

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(Printed Pages 2)

(21214)

Roll No. ....

B.Tech. I Sem.

### TU-03

B.Tech. Examination, Dec. 2014

EI/IT/CE/Ag./CS/EI

Environmental & Ecology

BT-103(O)

Time : Two Hours /

[Maximum Marks : 50]

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

1. Define term 'Environment', also explain environmental ethics and factors of it. 10
2. What do you mean by an ecosystem? Explain energy flow in any ecosystem. 10
3. Define term pollution, explain Air pollution its pollutant and controlling measures. 10
4. Explain environment impact assessment (EIA) and its different steps, and also briefly describe why it is mandatory? 10

P.T.O.

5. Write short notes any two of following :10  
(i) Renewable energy resources,  
(ii) Non - Renewable energy resources,  
(iii) Energy crisis in India.
6. Explain wind energy, wind mills and energy production by it in India. 10
7. Define term 'Food chain' also explain Detritus and grazing food chain. 10
8. What is H.D.I. explain human development index? Its role in development of any country like India. 10
9. Explain OTEC, how thermal energy is converted by heat exchange in ocean? 10
10. What is environmental audit, explain environmental audit procedure? 10

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M (Printed Pages 2)

(21214) Roll No. ....

B.Tech. I Sem.

## TU-333

B.Tech. Examination, Dec. 2014

E.I., I.T., C.E.

Environment & Ecology

BT-103 (N)

Time : Two Hours ] Maximum Marks : 50

Note : Attempt any five questions. All questions

carry equal marks.

1. What is Biogeochemical cycles? Explain various step involved in Nitrogen cycle. 10
2. What is ecosystem? How can we restore the damaged ecosystem? 10
3. What is population explosion? Discuss sigmoid (S-shape) and exponential (j-shape) growth curve of population. 10
4. What is "sustainable development"? Discuss its objectives and key components. 10

P.T.O.

5. What do you mean by environmental pollution? Explain different control method of air pollution. 10
6. Write down short notes on :  
 (a) Global warming  
 (b) O<sub>3</sub>- layer depletion
7. What is Bioindicators? Explain different type of bioindicators. 10
8. What is natural disasters? Explain "Disaster Management" Process. 10
9. Write down short notes on :  
 (a) Women education  
 (b) Value education
10. What is environment? Briefly discuss structure of atmosphere with altitude and temperature variation. 10
- (a) विषयात्मक दोष (प्रश्नात्मक दोष)  
 (b) विषयात्मक दोष का विवरण  
 (c) "भौतिकीय सदृशता" का विवरण  
 (d) विषयात्मक दोष का विवरण
- TU-333\220\2**

**M****(Printed Pages 2)****(21214)****Roll No. ....****B.Tech. I Sem.****TU-333****B.Tech. Examination, Dec. 2014****E.I., I.T., C.E.****Environment & Ecology****BT-103 (N)****Time : Two Hours / Maximum Marks : 50****Note : Attempt any five questions. All questions****carry equal marks.**

1. What is Biogeochemical cycles? Explain various step involved in Nitrogen cycle. 10
2. What is ecosystem? How can we restore the damaged ecosystem? 10
3. What is population explosion? Discuss sigmoid (S-shape) and exponential (j-shape) growth curve of population. 10
4. What is "sustainable development"? Discuss its objectives and key components. 10

**P.T.O.**

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(Printed Pages 8)

(21214)

Roll No. ....

B.Tech. I Sem.

## TU-008

B.Tech. Examination, Dec - 2014

EC, EI, CS, IT & M.E. Branch

Electrical Engg.

BT-107 (O)

Time : Three Hours]

[Maximum Marks : 100

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

1. (a) Write and solve the equations for the node voltages in the network of figure1. Then find the branch current  $I_x$  and the branch voltage  $V_y$ . 10

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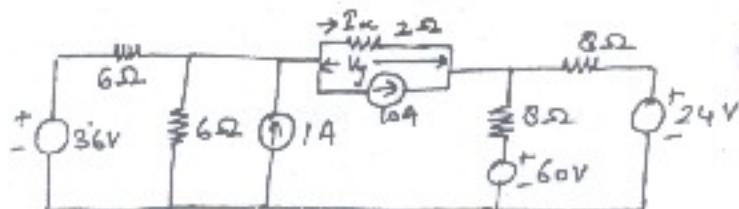


Fig. 1

- (b) Determine, the current through and voltage across 30 ohm resistor in Fig.2 using (i) Thevenins theorem and (ii) Nortons theorem.

10

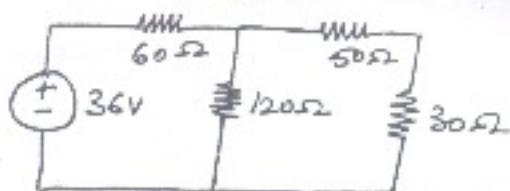


Fig. 2

2. (a) State and prove the maximum power transfer theorem for a d.c. network.

10

- (b) Find the value of  $R_L$  so that the power delivered to its maximum and find the

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value of maximum power refer fig.3.

10

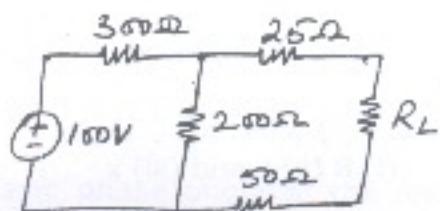


Fig. 3

3. (a) An rms voltage 100 angle  $0^\circ$  is applied to the series combination of  $z_1$  &  $z_2$ , where  $z_1 = 20$  angles  $30^\circ$ . The effective voltage drop across  $z_1$  is known to be 40 angle  $30^\circ$ . Find the reactive component of  $z_2$ . 10

- (b) A parallel RLC circuit is connected to an ac current source of variable frequency source of 14 rms. At resonance a voltage of 141.4 V rms is observed across the circuit. The voltage drops to 100 V rms at frequencies 1.9 KHz and 2.1 KHz. Determine the value of R, L and C. 10

- 10.
4. (a) A series R-L circuit dissipates 576 Watts when a sinusoidal voltage of 120 V rms is applied across it. The current is found to be  $16.97 \sin(314t + x)$ . Determine (i) R (ii) L and (iii) x. 10
- (b) A series R-L circuit with  $R = 5$  ohm and an inductive reactance of 12 ohm draws current from a.c. supply given by  $i(t) = 10 \sin 100 t$ , Determine (i) complex impedance (ii) instantaneous supply voltage (iii) value of inductance (iv) active and reactive power delivered by the source. 10
5. (a) Calculate the active and reactive components in each phase of a star-connected 10 KV 3-phase alternator supplying 3000 KW at a power factor of 0.8. If the total current remains the same when the load power factor is raised to 0.9, find the new output. 10

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TU-008\40\4

(b) A 400 V, 3 phase voltage is applied to a delta-connected balanced 3-phase load.

The rms value of the phase current is 10 angle  $30^\circ$ A. Find (i) the magnitude and phase angle of the line current, (ii) total power delivered by the load, (iii) the value of the resistive portion of the load.

10

6. (a) Discuss the merits and demerits of the 3-phase system on a symmetrical 3 phase system with phase sequence RYB, a capacitive reactance of 8 ohm is across Y-B and a coil  $R + jX$  is across R-Y. Find R and X such that  $I_y = 0$ . 10

(b) Show how 2 Wattmeter can be used to measure power in a 3-phase 3-wire system. Derive expressions for the readings of the two Wattmeter for a balanced 3-phase system in terms of the

10.

voltages, currents and phase angle of  
the load and hence derive an expression  
for the power factor in terms of  
the two Wattmeters readings. 10

7. (a) Derive an expression for the resonant frequency of a series RC circuit. 10

(b) A circuit supplied at 240 Volt, 50 Hz comprises of a resistor of 15 ohm in series with an inductor of 20-ohm reactance. Calculate the current and the power factor. 10

8. (a) A 3300/300 V, 50 Hz single phase transformer is built on a core having an effective area of 150 square cm and has 90 turns in low voltage winding. Calculate the value of maximum flux density in the core and number of turns in high Voltage Winding. 10

TU-0

TU-008\40\6

- (b) A 4 KVA, 200/400V, 50 Hz single phase transformer on test gave the following results : 10

Open ckt test on L.V. side 200 V 0.7 amp 70 Watt

Short ckt test on H.V. side 15 V 10 amp 80 Watt

Find the voltage regulation at full load at 0.8 power factor lagging.

9. (a) Derive the e.m.f. equation of a d.c. generator from the fundamental. 10

- (b) A shunt machine connected to 250 volts mains has an armature resistance (including brushes) of 0.12 ohms and the resistance of the field winding is 125 ohms. Find the ratio of the speed as a generator to speed as a motor, the line current in each case being 80 amps.

10

TU-008(40)7

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10. (a) What is an induction motor? How it is different from a d.c. motor. 10

(b) The frequency of the emf in the stator of 4-pole induction motor is 50 Hz. And that in the rotor is 1.5 Hz. What is the slip and at what speed the motor is running? 10

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(Printed Pages 6)

(21214)

Roll No. ....

B.Tech.-I Sem.

**TU-307****B. Tech. Examination, Dec. 2014**

EC, EI, CS, IT, ME, CH Branch

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**Electrical Engineering**

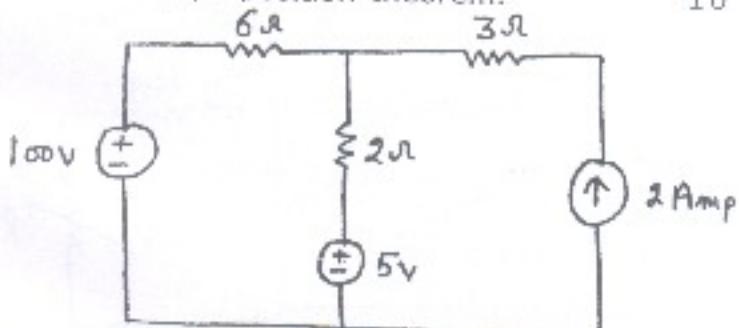
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Time : Three Hours ]

[Maximum Marks : 100]

Note : "Use of Calculator is permitted". Attempt any **five** questions. **All** questions carry equal marks.

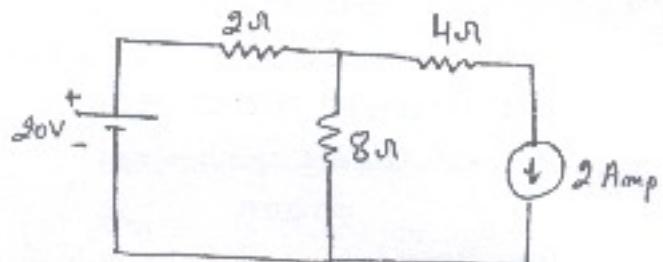
1. (a) In the circuit shown in figure, find the current through the  $6\Omega$  resistor using superposition theorem. 10



P.T.O.

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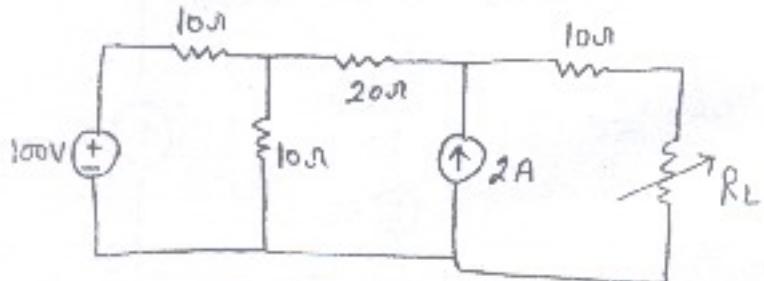
- (b) State Thevenin's theorem and determine current through  $8\Omega$  resistor by using Thevenin's theorem. 10



2. (a) In the network shown below determine-

10

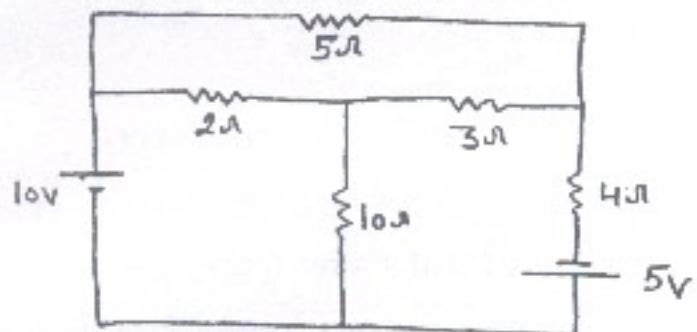
- (i) The value of  $R_L$  for maximum power dissipation.  
(ii) The value of maximum power.



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- (b) Determine the currents through  $5\Omega$  and  $10\Omega$  for given network by using mesh analysis.

10



3. (a) Derive the expression for frequency in Parallel resonance circuit. Explain Quality factor.

10

- (b) Derive the Sinusoidal response of Parallel R-C Circuit.

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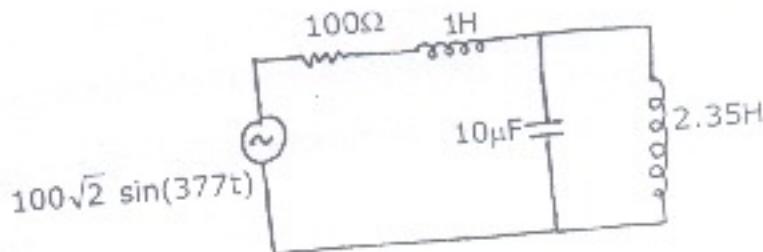
4. (a) Refer to the circuit shown in the following figure :

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Find -

- (i) r.m.s. Line current.
  - (ii) Power dissipated
  - (iii) Power factor
- (b) What are 'Active' and 'Reactive' Powers? Why is the term 'reactive power' not encountered, when DC sources are used in an electric circuit? 10

5. (a) Derive the relations between line voltage and phase voltage, line current and phase current for 3-phase star connected balanced load. 10

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- (b) In a 2-Wattmeter method power measured was 40KW at 0.7 Pf Leading. Find the reading of each watt meter. 10
6. (a) Explain Dynamometer type watt meter in detail. 10  
(b) Explain moving Iron instruments in detail. 10
7. (a) Draw Standard Transmission Line System in detail. 10  
(b) Differentiate analogy between Electric and Magnetic circuits in detail. 10
8. (a) Define the efficiency of transformer. Obtain expression of efficiency of its VA rating. Also deduce condition for maximum efficiency. 10  
(b) Explain the Auto transformer. How it can be used in step-up and step-down mode? 10

P.T.O.

9. (a) Explain the classification of DC generator. 10  
(b) Define 'Slip' in 3-Phase Induction motor. Derive an expression for the frequency of the rotor current in 3-Phase Induction motor. 10
10. (a) Why Single Phase Induction motor is not self starting? Explain capacitor start capacitor run single phase Induction motor. 10  
(b) Explain the working principle of Alternator and Synchronous motor. Write down various applications of both Alternator and Synchronous motor. 10

M (Printed Pages 5)

(21214) Roll No. ....

B.Tech.-I Sem.

**TU-336**

**B. Tech. Examination, Dec. 2014**

**EC, CS, ME**

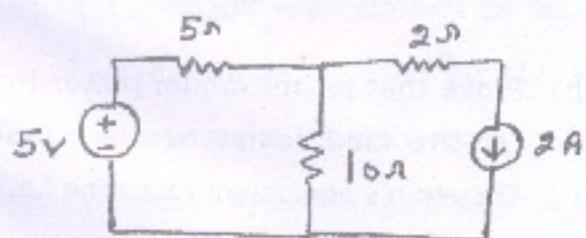
**Electrical Engg.**

**BT-107(N)**

**Time : Three Hours / Maximum Marks : 100**

**Note :** Attempt any **five** questions.

1. (a) State Thevenin's theorem and find the current in  $10\Omega$  resistance. 10



P.T.O.

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(Printed Pages 6)

(21214)

Roll No. ....

B.Tech.-I Sem.

**TU-308****B. Tech. Examination, Dec. 2014**

E.C./CS/ME Branch

Electronics Engineering

BT-108(N)

Time : Three Hours / Maximum Marks : 100

**Note :** Attempt any **five** questions. **All** questions carry equal marks. Use of calculator is permitted.

1. The required d.c. voltage for the load is 10V and the diode drop may be assumed to be 1V. Calculate the a.c. rms input voltage required in the following cases.
  - (a) Bridge rectifier using 4 diodes.
  - (b) Full wave rectifier circuit, using centre-

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tapped transformer and having two di-

ode. Draw the circuit in both cases.

2. (a) Explain the basic series clipper circuit and determine  $V_0$  for the circuit shown in fig. 01.

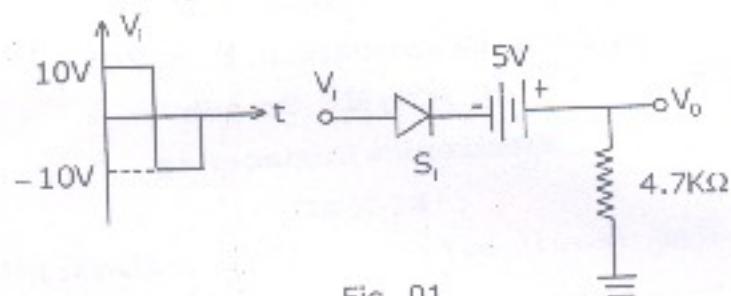


Fig. 01

- (b) Explain the basic clamper circuit and sketch  $V_0$  for the network shown in fig.

02.

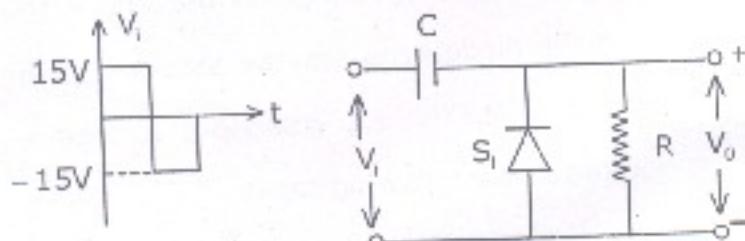


Fig. 02

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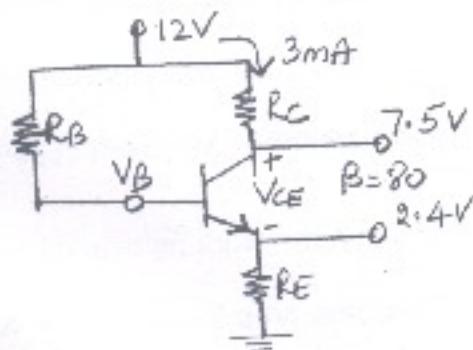
3. (a) Draw the circuit diagram of capacitor filter used in rectifier and explain its operation.

(b) Explain the working of P-n-P transistor in active, saturation region with indicating proper current components.

4. (a) Compare common emitter, common base and common collector amplifier on the basis of different parameters.

(b) For the circuit shown in fig. 03, find :

(a) $R_C$	(b) $R_E$
(c) $R_B$	(d) $V_B$

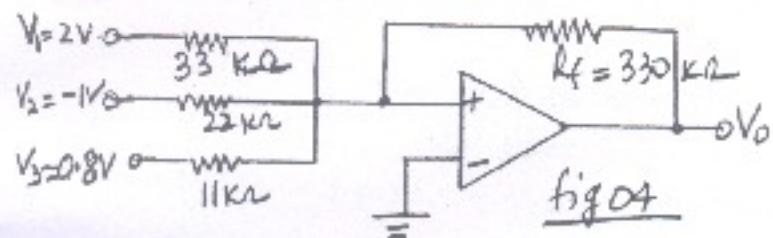


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5. Draw the voltage-divider Bias circuit with coupling and by pass capacitor and find the input Impedance, output impedance and voltage gain with small signal (a.c.) analysis.
6. Explain the construction and characteristic of n-channel JFET and draw its transfer characteristic. Sketch the transfer curve defined by  $I_{DSS} = 12\text{mA}$  and  $V_p = -6\text{V}$  using short-hand method.
- 7 (a) Explain the basic construction, operation drain and transfer characteristic for an n-channel depletion-type MOSFET.
- (b) Explain the working of inverting and non inverting amplifier using OP-AMP.

8. Draw and explain with circuit diagram the comparator with zero and non zero reference. Calculate the output voltage developed by the circuit in fig. 04 if  $R_f = 330 \text{ k}\Omega$ .



9. (a) Draw the Schematic diagram of CRT and show its Principal parts. Explain the method for the measurement of voltage, frequency and phase using CRO.

10. Write short notes :

- (a) Zener as voltage regulator
- (b) Digital multimeter

- (c) Voltage multiplier
- (d) CMOS and its applications

M..... (Printed Pages 6)

(21214) Roll No. ....

B.Tech.-I Sem.

**TU-337**

**B. Tech. Examination, Dec. 2014**

**EC, CS, ME, Branch**

**Electronics Engg.**

**BT-108(N)**

*Time : Three Hours / Maximum Marks : 100*

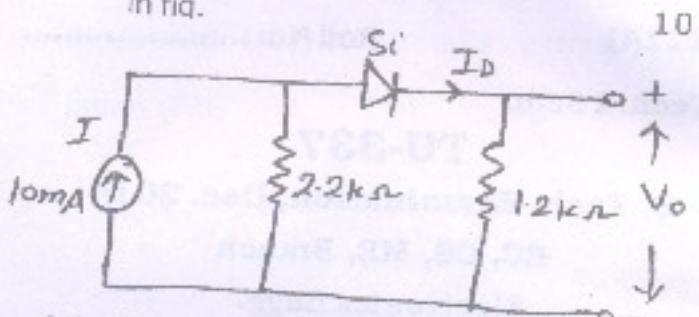
**Note :** Attempt any **five** questions. All questions  
carry equal marks.

1. (a) What will happen on number of free electrons in a semiconductor on increasing temperature? 10
- (b) Discuss the current flow mechanism in a p-n Junction under no bias. 10
2. (a) Write the diode current equation and describe it's variable. 10

P.T.O.

56

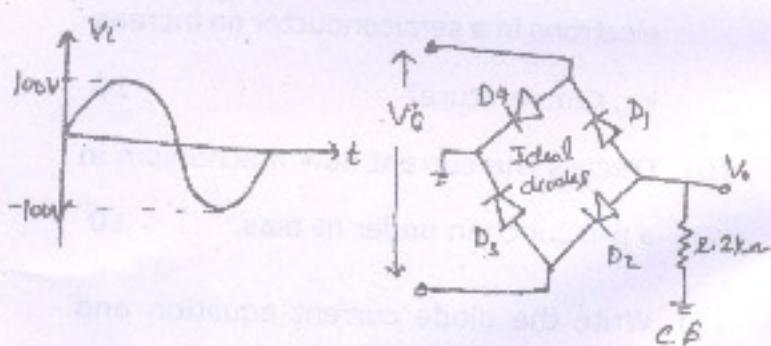
- (b) Calculate  $V_o$  and  $I_D$  for the circuit shown in fig.



3. (a) Draw a neat diagram of a full wave bridge rectifier circuit. 10

- (b) Determine  $V_o$  and required PIV rating of each diode in the circuit as shown in Fig.

10



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Roll No. ....

**B.Tech. I Sem.****TU-311****B.Tech. Examination, Dec. 2014****M.E. Branch****Manufacturing Practice****BT-122(N)****Time : Two Hours J [Maximum Marks : 50]****Note:** Attempt any **five** questions.

1. (a) What are different types of wood? Give example of each? 5  
(b) Why seasoning of wood is required. Explain what do you understand by seasoning? 5
2. (a) Explain the different parts and use of various files used in fitting shop? 5  
(b) Sketch and describe-Inside and outside Spring Calipers. 5

**P.T.O.**

- 52
3. (a) What are different operations performed in forging shop? Explain any one. 5  
(b) Mention the tools used in forging? Explain any two. 5
4. (a) What is the working principle of electric arc welding? Name different types of electric arc welding? 5  
(b) Give the classification of welding processes. Give the function of electrode flux? 5
5. (a) Sketch different types of snips used in sheet metal shop. 5  
(b) Give the names of the metals used in sheet metal work. Give the names of tools used in sheet metal shop. Explain any one. 5
6. Give the block diagram of Lathe machine showing main parts of it. How Lathe is classified. 10

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**OR**

- What is the working principle of Lathe. Enlist various operations performed on Lathe.
7. (a) Describe with neat sketch any six types of pattern used in casting. 5  
(b) What should be the characteristics of sand used in casting? 5
8. (a) Describe the main parts of chisel. Explain various types of chisel used in carpentry shop? 5  
(b) What are the tools used in foundry shop? Explain any two. 5
9. (a) Write the qualities that a good timber should posses. 5  
(b) Explain the different parts and use of any **one** :  
    (i) Micrometer  
    (ii) Combination set  
    (iii) Try square and Bevel square

10. Write short on any **three** :

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- (I) Stakes
- (ii) Smoothing plane
- (iii) Anvil
- (iv) Hack saw
- (v) Electric arc welding
- (vi) Files

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(Printed Pages 2)

(21214)

Roll No. ....

B.Tech I Sem.

**TU-302****B.Tech Examination, Dec. 2014**

EC, CS, MI

Introduction to Bio-Science

BT-121

Time : Three Hours ]

[Maximum Marks : 80]

Note: Attempt any **five** questions.

1. What is cell size. Describe the detail structure of cellular Membranes. 16
2. What is metabolic Engineering. Explain the Electron Transport System. (ETS). 16
3. Briefly describe the structure of DNA, and state different applications of DNA Fingerprinting. 16
4. Explain Human Genome project Techniques and its application. 16

P.T.O.

5. Explain Male Reproductive system and the Female Reproductive system. 16
6. Explain the following.
- (i) Lysosomes
  - (ii) The DNA code
7. Describe the Problems and strategies of Reproductive Health. 16
8. Write short notes on the following. 16
- (i) Controlling MITOSIS
  - (ii) Birth Control
9. Explain vacuoles and vesicles 16
10. Explain Medical Termination of Pregnancy. 16

M

(Printed Pages 3)

(21214)

Roll No. ....

B.Tech. I Sem.

**TU-15(C)**

**B.Tech. Examination, Dec. 2014**

**Ag Branch**

**Environment Control Engineering**

BT-118(N)

*Time : Two hours /*

*/Maximum Marks : 50*

**Note:** Attempt any **five** questions.

1. Define the term water pollutants. Discuss about the sources and impact of water pollution on human beings.
2. What is noise pollution? Enumerate its impact on human beings and also give some preventive measures.
3. What do you understand by Environmental impact assessment? Discuss its various steps.

- 58
4. Write short notes on (any four)
    - (a) Chemical disaster
    - (b) Environmental auditing
    - (c) Secondary treatment of water pollution
    - (d) Biotechnology
    - (e) Climate change
  5. Define solid waste management. How it poses harmful effect on environment?
  6. What are the different air pollution control devices? Explain with the help of a neat and clean diagram.
  7. Discuss about the role of biotechnology in pollution control methods.
  8. What do you mean by Air pollution? Discuss about the different kinds of air pollutants.

TU-15(C)\120\2

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9. What is biomedical waste? How do you dispose biomedical waste and also explain its effects on environment.
10. Define ozone depletion and discuss the factors responsible for it. How it causes harmful impact on plants and human beings?

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(Printed Pages 4)

(20714)

Roll No. ....

B.Tech.-I Sem.

**TU-15B****B. Tech. Examination, Dec. 2014**

Ag. Engg.

**Work Shop Technology**

BT-117(N)

Time : Two Hours /

[Maximum Marks : 50]

Note : Attempt any **five** questions. **All** questions

carry equal marks.

1. Define timber. Explain the various defects in timber. 10
2. Define seasoning of timber. Classify the different methods of seasoning of timber. 10
3. Classify the different types of pattern allowances. 10

P.T.O.

4. Write short notes on the following (Any four) : 2.5×4

(a) Percussion welding

(b) TIG welding

(c) MIG welding

(d) Rightward welding

(e) Torch Tip

(f) Use of timber

5. Define Oxy-acetylene gas welding. Explain the various equipment Oxy-acetylene gas welding. 10

6. What are the three different types of oxy-acetylene flames? Explain in detail. 10

7. Define milling machine. Explain the function  
of main parts of a knee type milling machine.

10

8. What do you mean by drilling machine? Write  
the various operations perform by drilling  
machine. 10

9. Briefly describe with neat sketch, the follow-  
ing operations (Any **four**) : 2.5×4

- (a) Step turning
- (b) Taper turning
- (c) Facing
- (d) Knurling
- (e) Parting off
- (f) Boring

10. Define CNC machine. Why necessity of CNC machine? Discuss the various advantages of CNC machine.

10

TU-15B(100)4

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(Printed Pages 4)

(21214)

Roll No. ....

B.Tech. I Sem.

**TU-15**

B.Tech. Examination, Dec. 2014

Ag. Enggi Branch

Engineering Physics

**BT-115(O)**

Time : Three Hours]

[Maximum Marks : 100

Note: Attempt any **five** questions. Marks of each question part are shown against it.

1. Explain why : 5+5+5+5

- (a) Two streamlines do not cross each other in a flowing liquid?
- (b) The moisture in a field is retained better on ploughing?
- (c) Rain drops ultimately fall at constant speed?
- (d) Light waves are transverse in nature?

P.T.O.

2. Define coefficient of viscosity. Establish Poiseuille's equation. State the assumptions involved.

4+12+4

3. On the basis of band theory of solids, distinguish between metals, insulators and semiconductors.

5+5+5+5

4. (a) Discuss the interference of light in thin films.

10

- (b) A thin film of soap (refractive Index  $\mu = 1.33$ ) by normal reflection in sodium light ( $\lambda = 5893 \text{ \AA}$ ) appears dark. Find the thickness of the film.

10

5. Explain the construction and working of a Michelson interferometer. How it can be used to measure the wavelength of a spectral line?

12+8

TU-15\40\2

6. (a) What is a quarter - wave plate? How would you use it for producing and analyzing a beam of circularly and elliptically polarized light?
- (b) Calculate the thickness of a quarter wave plate given  $\lambda = 6000\text{\AA}$ ,  $\mu_E = 1.553$  and  $\mu_o = 1.550.$  5
7. (a) Explain optical activity. 5
- (b) Describe Laurent's half - shade polarimeter for the determination of specific rotation and strength of sugar solution. 10+5
8. (a) What is a LASER? State the requisites for producing laser action. 10
- (b) Describe the construction and working of a He-Ne laser. 10
9. (a) Derive Bragg's equation for reflection of x-rays by crystal planes. 10
- (b) Calculate the largest wavelength that can

be analyzed by a rock salt crystal of spacing 2.82

$\text{\AA}$  in first and second orders.

10

10. Write detailed notes on any **two** of the following.

(a) Viscometer

10+10

(b) Intrinsic and Extrinsic Semiconductors.

(c) Einstein A and B coefficients.

(d) Bragg's Spectrometer.

TU-15(40)4

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(Printed Pages 4)

(21214)

Roll No. ....

B.Tech.-I Sem.

TU-313

B.Tech. Examination, Dec. 2014

Ag. Engg. Branch

Engg. Physics - I

(BT-115(N))

Time : Three Hours / Maximum Marks : 80

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

1. (a) It is difficult to introduce mercury in a fine glass tube whereas water can be introduced into that tube with comparative ease. Explain. 8
- (b) Can two streamlines intersect each other? If not, why? 8

P.T.O.

2. Define viscosity and deduce the Poiseuille's equation for flow of liquid through tubes. 16
3. (a) What do you understand by coherent sources? How are they realized in practice? 8  
(b) Why center of Newton's ring appears dark? Derive expressions for the radius of  $n^{\text{th}}$  dark ring. 8
4. Define dispersive power and resolving power of grating. Derive expressions for dispersive and resolving power of grating. 16
5. Describe how, with the help of Nicol prism and quarter wave plate, plane-polarized light, circularly polarized light and elliptically polarized light are produced and detected. 16
6. (a) Define population inversion, coherence length, temporal and spatial coherence. 8

- (b) What are the requirements for producing laser action? How they are achieved? 8
7. (a) Obtain the Miller indices of a plane whose intercepts are  $a$ ,  $\frac{b}{2}$  and  $3c$  on  $x$ ,  $y$  and  $z$  axes respectively. 8
- (b) Calculate the longest wavelength that can be analyzed by a rock salt crystal of spacing  $d=2A^{\circ}$  (i) in the first order  
(ii) in the second order. 8
8. Give the construction and working of GM counter. 16
9. (a) Derive time dependent Schrödinger wave equation. Also describe wave function. 8
- (b) Give one method for production of ultrasonic waves. Mention applications of ultrasonic waves. 8

10. Write short notes on any **two** of the follow-

ing:

16

- (i) Pyrometers
- (ii) Diffusion Pump
- (iii) Manometer
- (iv) Pirani Gauge

TU-313(160)4

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(Printed Pages 3)

(21214)

Roll No. ....

B.Tech. I Sem.

## TU-010

B.Tech. Examination, Dec. 2014

EC, EI, CS, IT & M.E. Branch

Manufacturing Process

BT-110 (O)

Time : Two Hours ]

[Maximum Marks : 50

Note : Attempt any **five** questions. Give figures  
wherever required.

1. What are the main characteristics of non-ferrous alloys; Why are they preferred over ferrous alloys inspite of their high cost? 10
2. Explain any two :
  - (a) Annealing
  - (b) Tempering
  - (c) Normalising
  - (d) Hardening

P.T.O.

3. Compare hot working and cold working processes with suitable examples indicating advantages and disadvantages of each. 10
4. Explain the various principal mechanical properties of Engg. materials. State their importance in the design of a machine or structural element. 10
5. Name the various allowances given on patterns. Explain them with suitable examples. Explain permeability and collapsibility in relation to moulding sand.
6. Describe in brief, the process of oxy acetylene welding. Draw and label a neat sketch of the equipment used in oxy-acetylene welding.
7. Differentiate between thermo setting and thermo plastics. Explain various properties and applications of cement concrete. 10

TU-010\40\2

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8. Draw the block diagram of lathe machine.  
Showing different parts. Explain the different  
operations performed on Lathe. 10
9. Attempt any **two** of the following : 10
- Differentiate between capstan and Tur-  
ret lathe.
  - Functions of coated electrodes.
  - Galvanizing and electroplating.
10. Write short notes an the following :
- Blanking
  - Piercing
  - Notching
  - Hardnen and Toughness.

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(Printed Pages 4)

(21214)

Roll No. ....

B.Tech. I Sem.

**TU-309**

B.Tech. Examination, Dec. 2014

M.E. Branch

Manufacturing Science

BT-110

Time : Three Hours / Maximum Marks : 80

**Note :** Attempt any **five** questions.

1. (a) Explain about the following :  $4 \times 2 = 8$ 
  - (i) Ductility      (ii) Forgeability
  - (ii) Hardness      (iv) Brittleness

(b) Why is testing of metals required? What are its types? Explain any two of those. 8
2. (a) Explain in detail about low - carbon and medium carbon steels with their properties and applications. 8

P.T.O.

- (b) Write short notes on :  $4 \times 2 = 8$
- (i) Wrought iron      (iii) Cast iron
  - (ii) stainless steel      (iv) Tool steel
3. (a) Explain about following:  $4 \times 2 = 8$
- (i) Normalizing      (ii) Tempering
- (b) Write short notes on :  $2 \times 4 = 8$
- (i) Copper Alloys
  - (ii) Aluminium alloys
4. (a) What is hot working of metals? How is it different from cold working? 8
- (b) Write a note of Metal forming with diagram and examples. 8
5. (a) What is Gating system? Explain with neat sketch. 8
- (b) Write short note on Moulding sands. What are their desired properties. 8

6. (a) Draw a neat sketch and explain about Cupola Furnce. 8

(b) What do you mean by Allowances? Why are these given? Name different allowances given and explain about any two of them. 8

7. (a) What does Turning, facing and knurling mean in lathe working? Explain about these with neat sketches. 8

(b) Explain about the following :  $2 \times 4 = 8$   
(i) Feedrate  
(ii) Depth of cut

8. (a) Draw a neat sketch of drill. What is drilling process, give basic description and uses of drill. 8

(b) Differentiate between Soldering and Brazing and mention their uses. 8

9. (a) Write the concept of formation of Arc  
in Arc welding. Explain in detail about  
different types of electric-Arc welding  
processes.
- (b) Write a note on Oxyacetylene welding.

8

10. Write detailed notes on the following:

$$4 \times 4 = 16$$

- (a) Production verses Productivity.
- (b) Types of Plant layout.
- (c) Plastic products manufacturing.
- (d) Powder metallurgy and its applications.

91

(Printed Pages 4)

(21214)

Roll No. ....

B.Tech. I Sem.

**TU-C7**

**B.Tech. Examination, Dec. 2014**

**E.C,E.I.,C.S.,I.T. & M.E. Branch**

**Electronics Engineering**

BT-108(O)

*Time : Three Hours / Maximum Marks : 100*

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

1. What is zener diode. Draw V-I characteristics of zener diode. Explain how zener diode work as a voltage regulator. 20
2. What is Rectifier. Derive the expression for Full wave Bridge Rectifier and find all parameters. 20

P.T.O.

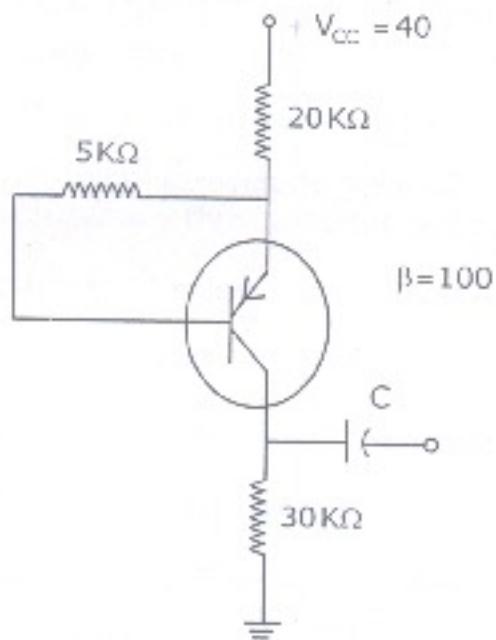
3. Derive the general expression in term of h-parameters and the load for Input Impedance, current gain, voltage gain and output resistance. 20
4. Draw the Block diagram and explain the working of following. 20
- DVM
  - CRO
5. What is op-amp. Draw the block diagram of op-amp. also draw the circuit diagram of Integrator and find its output voltage. 20
6. Sketch the structure of P-channel enhancement type MOSFET and explain the operation of device. Discuss and draw its characteristics. 20

7. Minimize the following expression using K-map 20

(a)  $Y = \sum m(1, 5, 6, 7, 11, 12, 13, 15)$

(b)  $Y = \overline{ABCD} + \overline{ABC}\overline{D} + \overline{ABC} + \overline{AB}\overline{D} + AC + \overline{B}$

8. Find  $\theta$ -Point of a VDB circuit 20



also sketch the Input and output characteristics.

9. Give the comparison of the following. 20
- (a) zener breakdown and Avalanche break down
  - (b) BJT and FET
10. Explain the following. 20
- (i) Relation between  $\alpha$  and  $\beta$
  - (ii) Characteristics of Ideal op-amp
  - (iii) Transfer characteristics of JFET
  - (iv) Concept of universal Gate.

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(Printed Pages 4)

(21214)

Roll No. ....

B.Tech. I Sem.

**TU-15D**

**B.Tech. Examination, Dec. 2014**

**Ag Engg.**

**Technical Writing**

**BT-119(N)**

*Time : Two Hours /*

*/Maximum Marks : 50*

**Note:** Read the following passage and answer  
the questions given below. All questions  
carry equal marks-

**UNIT-I**

20

1. A noise is a sound that is unpleasant to the ears. However, a noise unpleasant to one person may be pleasant to another. In scientific terms, noise is made by an irregular pattern of sound waves. There are number of things which make our world unpleas-

P.T.O.

antly or even dangerously noisy, such as jet aircraft taking off, road drills, heavy traffic or loud speakers. The sound waves bang into structures and causes them to vibrate giving rise to noise. In the process, they get damaged. In younger people, deafness can be caused by too loud a noise or from prolonged exposure to loud noise as produced by too much amplification in a discotheque or by machines in a factory. The noise depends on the energy the sound waves carry. Decibel scale is used to measure loudness of the sound. 20

1. How would you define noise scientifically?
2. Name the things which cause noise pollution.
3. How is noise produced?
4. How is noise harmful for the younger people?
5. How can we measure the loudness of the sound.

**UNIT-II**

10

2. Write synonyms of any five

- (a) (i) Vigil
- (ii) Postpone
- (iii) Horror
- (iv) Curse
- (v) Handsome
- (vi) Cite
- (vii) Eager

(b) Write antonyms of any five

- (i) Optimist
- (ii) Unity
- (iii) Sharp
- (iv) Kind
- (v) Loss
- (vi) Heaven
- (vii) Internal

P.T.O.

TU-15D(12013)

**UNIT-III**

10

3. You have passed your class XII with flying colours and you want to throw a party for your friend. Write a letter inviting him for the same

**OR**

Write a letter to your friend describing 'A Hill station' you visited in your holidays.

**UNIT-IV**

10

4. Write an informal speech on the occasion of 'Blood Donation Camp'

**OR**

Write a paragraph on 'an ideal teacher' in about 150 words.

**M** (Maximum Total Marks) (Printed Pages 3)

**(21214)** Roll No. ....

B.Tech. I Sem.

**TU-334**

**B.Tech. Examination, Dec - 2014**

**EI, IT, ME, EC, CE Branches**

**Engineering Physics - I**

**BT-104(N)**

*Time : Two Hours /*

*/ Maximum Marks : 50*

**Note:** Attempt any **five** questions. Each question carries equal marks.

1. Define the inertial and non inertial frame of reference. Is earth is an inertial fram? Give reasons. 10
2. State and explain the Einsteins postulates and then deduced the Lorentz's transformations. 10

**P.T.O.**

3. What are the coherent light sources? Give the theory of interference due to two coherent light sources and deduce the expression for fringe width.

10

4. Define the plane diffraction grating. How is it used to determine the wave length of light?

5. What do you mean by polarization of light? Explain the construction and working of Nicol prism.

10

6. What are the characteristics of laser beam? Describe its importance.

7. Give the construction and reconstruction of image on hologram. Give its applications.

8. (a) What is the de-Broglie matter waves?

10

- (b) Explain the Heisenberg uncertainty principle. 5
9. Deduce the Schrödinger wave equation for a particle in a box. 10
10. Write short notes on any **two** :  $5 \times 2$
- (a) Length contraction
  - (b) He-Ne Laser
  - (c) Dispersive power of grating

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(Printed Pages 4)

(21214)

Roll No. ....

B.Tech.-I Sem.

**TU-304****B.Tech. Examination, Dec - 2014****EI/IT/CE Branch****Engineering Physics - I****BT-104***Time : Three Hours /**/ Maximum Marks : 80*

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

1. (a) Derive the Lorentz-Fitzgerald contraction formula. Explain its significance. 8  
 (b) Deduce an expression for the time-dilation on the basis of Lorentz Transformation equations. Give an example to show that time dilation is a real effect. 8
2. (a) Find the mass and speed of 2 MeV electrons. Given :  
 Mass of electron =  $9.1 \times 10^{-31}$  Kg. 8

P.T.O.

- (b) Show that no signal can travel faster than light. 4
- (c) What was objective of conducting the Michelson Morley experiment? 4
3. (a) Prove the relation  $E^2 - p^2 c^2 = m_0^2 c^4$ , where  $p$  is the momentum. 4
- (b) What is minimum uncertainty in the energy state of an atom if an electron remains in the state for  $10^{-8}$  sec? 4
- (c) A particle limited to the  $x$ -axis has wave function  $\psi = ax$  between  $x = 0$  and  $x = 1$ ,  $\psi = 0$  elsewhere. Find the probability that the particle can be found between  $x = 0.40$  and  $x = 0.50$ . 8
4. (a) Calculate the energy difference between ground state and first excited state for electron if the length of box is  $10^{-8}$  cm. 6
- (b) Derive Schrodinger's time dependent and time independent wave equations. 10
5. (a) State and explain Heisenberg's uncertainty principle. Apply this to prove the non-existence of the electron in the nucleus. 8

- (b) In Newton's ring arrangement the diameter of 10<sup>th</sup> dark ring changes from 1.5 cm to 1.27 cm when a liquid is introduced between the lens and the glass plate. Calculate the refractive index of the liquid. 8
6. (a) A parallel beam of light ( $\lambda = 5890 \text{ \AA}$ ) strikes a film of oil ( $\mu = 1.46$ ). If the 8<sup>th</sup> dark ring be seen, when viewed at an angle of  $30^\circ$  to the normal, calculate the thickness of the film. 8
- (b) Explain what will happen 8
- (i) If white light is used instead of monochromatic light in Newton's ring experiment
- (ii) When air in the inter-space is replaced by a transparent liquid.
7. (a) A screen is placed 200 cm away from a narrow slit which is illuminated with light of wavelength  $6 \times 10^{-5} \text{ cm}$ . If first minima lies 5 mm on either side of central maxima, calculate the slit width. 8

- (b) Find the missing orders in a double slit diffraction pattern if  $d = 2e$  where  $d$  is width of opaque and  $e$  is slit width. 8
8. (a) Describe the construction and working of Nicol Prism. 8
- (b) Show that circularly polarised light is the special case of elliptically polarized light. 8
9. (a) Describe the construction and working of Ruby Laser. 8
- (b) Show that, when the probability of stimulated emission is equal to the probability of induced absorption, the ratio of spontaneous emission and stimulated emission is proportional to the cube of frequency. 8
10. (a) Derive an expression for acceptance angle. Show its relation with numerical aperture. 8
- (b) What is basic principle of holography? Explain construction and reconstruction process of an image in holography. 8

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(Printed Pages 6)

(21214)

Roll No. ....

B.Tech.-I Sem.

**TU-306****B. Tech. Examination, Dec. 2014**

(EC,EI,CS,IT,ME &amp; CH Branch)

**Engg. Mathematics-I**

[BT-105]

Time : Three Hours] [Maximum Marks : 100

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

1. (a) If  $y^{1/m} + y^{-1/m} = 2x$ , prove that

$$(x^2-1)y_{n+2} + (2n+1)xy_{n+1} + (n^2-m^2)y_n = 0$$

10

- (b) Expand  $\sin^{-1}x$  by Maclaurin's theorem as far as the term  $x^7$ . 10

2. (a) If CP, CD be a pair of Conjugate semi-diameters of an ellipse, prove that the

P.T.O.

radius of curvature at P is  $(CD)^3/ab$ , a  
and b being the lengths of the semi-  
axes of the ellipse. 10

(b) Trace the curve  $r = a(1 - \cos \theta)$ . 10

3. (a) If  $u = f(r)$  where  $r^2 = x^2 + y^2$ , prove that

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = f''(r) + \frac{1}{r} f'(r) \quad 10$$

(b) If  $u_1 = x_1 + x_2 + x_3 + x_4$ ,

$$u_1 u_2 = x_2 + x_3 + x_4$$

$$u_1 u_2 u_3 = x_3 + x_4$$

$u_1 u_2 u_3 u_4 = x_4$  then find the value of

$$\frac{\partial(x_1, x_2, x_3, x_4)}{\partial(u_1, u_2, u_3, u_4)}$$

4. (a) Find the envelope of the family of  
straight lines 10

$$\frac{ax}{\cos \theta} - \frac{by}{\sin \theta} = a^2 - b^2,$$

where the parameter is  $\theta$ .

- (b) Find a point within a triangle such that  
the sum of the squares of its distances  
from the three vertices is a minimum.

10

5. (a) Evaluate  $\iint (x^2 + y^2)^{1/2} dx dy$

over the circle  $x^2 + y^2 = 1$  10

- (b) Find the volume of the solid bounded  
by the surface  $x=0, y=0, x+y+z=1$  and  
 $z=0$ . 10

6. (a) Evaluate

$$\left[ \int_0^{\pi/2} \sqrt{\sin \theta} d\theta \right] \times \left[ \int_0^{\pi/2} \frac{d\theta}{\sqrt{\sin \theta}} \right]$$

- (b) Evaluate  $\iiint x^{2i-1} y^{2m-1} z^{2n-1} dx dy dz$  for  
all positive values of  $x, y$  and  $z$  such that  
 $x^2 + y^2 + z^2 \leq a^2$ .

TU-306(100)3

P.T.O.

7. (a) A particle moves along the curve  $x = e^{-t}$ ,

$y = 3 \cos 3t$ ,  $z = 3 \sin 3t$ . Determine the velocity and acceleration at any  $t$  and their magnitudes at  $t = 0$ .

3.

(b) If  $\vec{F} = xy^2\vec{i} + 2x^2yz\vec{j} + 3yz^2\vec{k}$ , find  $\text{Div } \vec{F}$  and  $\text{Curl } \vec{F}$  at the point  $(1,1,1)$ . 10

8. (a) Give that  $\vec{r}(t) = \begin{cases} 2\vec{i} + \vec{j} + 3\vec{k}, & \text{when } t = 1 \\ 4\vec{i} + 2\vec{j} - 3\vec{k}, & \text{when } t = 2 \end{cases}$

then find the value of  $\int_1^2 \left( \vec{F} \cdot \frac{d\vec{r}}{dt} \right) dt$ . 10

(b) By using Gauss divergence theorem evaluate  $\iint_S \vec{F} \cdot \vec{n} dS$ . 10

4.

Where  $\vec{F} = (2x - z)\vec{i} + x^2y\vec{j} - xz^2\vec{k}$  and  $S$  is the surface bounded by  $x=0, x=1, y=0, y=1, z=0, z=1$ . 10

TU.

TU-306(100)4

9. (a) Reduce the matrix A to its normal form  
and find its rank where 10

$$A = \begin{bmatrix} 1 & 2 & 0 & -1 \\ 3 & 4 & 1 & 2 \\ -2 & 3 & 2 & 5 \end{bmatrix}$$

- (b) Solve the following equations by matrix  
method 10

$$x + 2y + z = 2$$

$$3x + 6y + 5z = 4$$

$$2x + 4y + 3z = 3$$

10. (a) By using Cayley-Hamilton theorem find  
the inverse of matrix A, where 10

$$A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$$

- (b) The following matrix gives the vitamin  
Contents of four foods in conveniently

TU-306\100\5

P.T.O.

chosen units.

Vitamin	A	B	C
---------	---	---	---

Food I	0.5	0.4	0.2
Food II	0.3	0.2	0.1
Food III	0.1	0	0.3
Food IV	0	0.1	0.4

If we eat 5 units of food I, 4 units of food II, 10 units of food III and 6 units of food IV, how much of each type of vitamin have we consumed. If we pay only for the vitamin content of each food, paying Rs.10, Rs.15 and Rs.20 respectively for units of three vitamins, how much does a unit of each type of food cost? Calculate the total cost of the food we ate.

TU-306(100)6

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(Printed Pages 4)

(21214)

Roll No. ....

B.Tech.-I Sem.

**TU-05****B. Tech. Examination, Dec. 2014**

(EC/EI/IT/CS/ME)

**Mathematics-I**

[BT-105 (Old)]

Time : Three Hours] [Maximum Marks : 100

**Note :** Attempt all the **five** questions. All questions carry equal marks.1. Attempt any **two** of the following :(a) If  $y = \sin(m\sin^{-1}x)$  Prove that

$$(1-x^2)y_{n+2} - (2n+1)x.y_{n+1} + (m^2-n^2)y_n = 0$$

(b) If  $u = \log(x^3+y^3+z^3-3xyz)$  show that

$$\left( \frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z} \right)^2 u = -\frac{9}{(x+y+z)^2}$$

(c) If  $u = \tan^{-1} \frac{x^3+y^3}{x-y}$ , Prove that

$$(i) x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \sin 2u$$

P.T.O.

$$(ii) x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = 2 \cos 3u \sin u$$

2. Attempt any **two** of the following :

(a) Find the value of the Jacobian  $\frac{\partial(u, v)}{\partial(r, \theta)}$

where  $u = x^2 - y^2$ ,  $v = 2xy$  and

$$x = r \cos \theta, y = r \sin \theta$$

(b) Find the Extreme values of

$$u = x^2y^2 - 5x^2 - 8xy - 5y^2$$

(c) A balloon is in the form of right circular cylinder of radius 1.5cm and length 4m and is surmounted by hemi spherical Ends. If the radius is increased by 0.01 and the length by 0.05m find the percentage change in the volume of the balloon.

3. Attempt any **two** of the following :

(a) Use elementry transformation to reduce the following matrix A to triangular form and hence find the rank of A

$$A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$$

- (b) Find for what value of K the set of Equations :

$$2x - 3y + 6z - 5t = 3,$$

$$y - 4z + t = 1$$

$$4x - 5y + 8z - 9t = k$$

has (i) no solution (ii) infinite number of solutions.

- (c) Using Cayley-Hamilton theorem find the inverse of the matrix.

$$A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$

4. Attempt any **two** of the following :

- (a) Evaluate  $\iint_R xy \, dx \, dy$

where R is the quadrant of the circle

$$x^2 + y^2 = a^2 \text{ where } x \geq 0 \text{ and } y \geq 0$$

- (b) Change the order of integration in the double integral.

$$\int_0^{2a} \int_{\sqrt{2ax-x^2}}^{\sqrt{2ax}} v \, dx \, dy$$

(c) The mass of a solid right circular cylinder of radius  $a$  and height  $h$  is  $M$ . Find the moment of inertia of the cylinder about

(i) its axis

(ii) a line through its centre of gravity perpendicular to its axis

5. Attempt any **two** of the following.

(a) Find the directional derivative of the function  $\phi = x^2 - y^2 + 2z^2$  at the point  $P(1,2,3)$  in the direction of the line  $PQ$  where  $Q$  is the point  $(5,0,4)$ .

(b) Show that  $\operatorname{div}(\operatorname{grad} r^n) = n(n+1)r^{n-2}$ ,  
where  $r = \sqrt{x^2 + y^2 + z^2}$

Hence, show that  $\Delta^2 \left( \frac{1}{r} \right) = 0$ .

(c) Using Stoke's Theorem, evaluate

$$\int_C [(2x-y)dx - yz^2dy - y^2zdz]$$

where  $C$  is the circle  $x^2 + y^2 = 1$ , corresponding to the surface of sphere of unit radius.

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(Printed Pages 4)

(21214)

Roll No. ....

B.Tech.-I Sem.

**TU-335****B. Tech. Examination, Dec. 2014**

EC,EI,CS,IT,ME,CE,

Mathematics-I

[BT-105(N)]

Time : Three Hours / Maximum Marks : 100

**Note :** Attempt any five questions. All questions carry equal marks.1. (a) If  $x = \tan(\log y)$ , Prove that 10

$$(1+x^2)y_{n+1} + (2nx-1)y_n + n(n-1)y_{n-1} = 0$$

(b) If  $u(x,y,z) = \log(\tan x + \tan y + \tan z)$ 

Show that

$$\sin 2x \frac{\partial u}{\partial x} + \sin 2y \frac{\partial u}{\partial y} + \sin 2z \frac{\partial u}{\partial z} = 2 \quad 10$$

2. (a) If  $u = \tan^{-1} \left[ \frac{x^3 + y^3}{x - y} \right]$ , Prove that 10

$$x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = 2 \cos 3u \sin u$$

P.T.O.

(b) Trace the curve  $y^2(a-x) = x^2(a+x)$ .

10

3. (a) Obtain the first four terms in the expansion of  $\log \sin x$  in power of  $(x-3)$ .

10

(b) Determine the functional dependence and if so find the relationship between

$$u = \frac{x-y}{x+y}, v = \frac{x+y}{x} \quad 10$$

4. (a) Compute an approximate value of

$$(1.04)^{3.01}. \quad 10$$

- (b) Find the minimum value of  $x^2 + y^2 + z^2$ , given that  $ax+by+cz = P$  10

5. (a) Employing elementary transformations, find the inverse of the matrix 10

$$A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$$

- (b) Reduce the matrix A to its normal form when 10

$$A = \begin{bmatrix} 1 & 2 & -1 & 4 \\ 2 & 4 & 3 & 4 \\ 1 & 2 & 3 & 4 \\ -1 & -2 & 6 & -7 \end{bmatrix}$$

6. (a) Determine the values of a and b for which the system 10

$$\begin{bmatrix} 3 & -2 & 1 \\ 5 & -8 & 9 \\ 2 & 1 & a \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} b \\ 3 \\ -1 \end{bmatrix}$$

- (b) Find the eigen values and eigen vectors of the following matrix 10

$$A = \begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$$

7. (a) Change the order of integration in the following integral and evaluate 10

$$\int_0^{4a} \int_{\frac{x^2}{4a}}^{2\sqrt{ax}} dy dx$$

- (b) Evaluate 10

$$\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} \frac{1}{\sqrt{1-x^2-y^2-z^2}} dz dy dx$$

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8. (a) Find the volume of the solid bounded by  
the coordinate planes and the surface

$$\sqrt{\frac{x}{a}} + \sqrt{\frac{y}{b}} + \sqrt{\frac{z}{c}} = 1 \quad 10$$

- (b) Prove that  $\beta(m, m) = 2^{1-2m} \beta\left(m, \frac{1}{2}\right)$   
10

9. (a) If  $u = x+y+z$ ,  $v = x^2+y^2+z^2$ ,  
 $w = yz+zx+xy$ , Prove that grad  $u$ , grad  
 $v$  and grad  $w$  are Coplaner vectors.

10

- (b) If  $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$  then show that 10

$$\text{grad } r = \frac{\vec{r}}{r} \text{ and } \text{grad } \frac{1}{r} = -\frac{\vec{r}}{r^3}$$

10. Verify Stoke's theorem for 20

$\vec{F} = y\hat{i} + z\hat{j} + x\hat{k}$  and surface  $S$  is the portion of  
the sphere  $x^2+y^2+z^2=1$  above the  $xy$ -plane.

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(21214)

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B.Tech. I Sem.

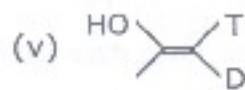
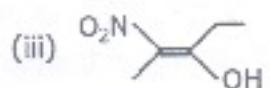
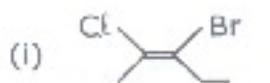
**TU-09****B.Tech. Examination, Dec. 2014****EC/CS/ME****Engineering Chemistry****BT-109(O)***Time : Three Hours] / Maximum Marks : 100***Note:** Attempt any **five** questions. All questions carry equal marks.

1. (a) Describe M.O. theory and calculate the bond order of  $N_2$  and CO molecules on the basis of their M.O. diagrams. 15  
 (b) Derive the relation,  $n\lambda = 2d \sin \theta$  in crystallography. 5
2. (a) Describe concentration cell and its applications. Calculate emf of the Deniel Cell if the concentrations of  $ZnSO_4$  and  $CuSO_4$  solutions are 0.01 M and 0.1 M respectively. 15  
 $(E^\circ_{Zn^{+2}/Zn} = -0.76V \text{ & } E^\circ_{Cu^{+2}/Cu} = -0.34V)$

P.T.O.

- (b) Differentiate between order and molecularity of the reactions. 5
3. Complete any **two** of the following reactions and give their mechanism  $2 \times 10 = 20$
- (a)  $\text{CH}_3\text{CONH}_2 + \text{Br}_2 + \text{KOH} \rightarrow ?$
- (b)
- $$\begin{array}{c} \text{C}_6\text{H}_5 \\ | \\ \text{C}=\text{N} \\ | \\ \text{CH}_3 \end{array} \xrightarrow{\text{OH}^-} ?$$
- (c)  $(\text{CH}_3)_2\text{CH}.\text{CHO} \xrightarrow{\text{CH}^+} ?$
4. (a) How many NMR signals do you expect from the following compounds? Indicate also the splitting pattern of various signals. 10
- (i) 1-Chloro propane
  - (ii) 2-Chloro propanoic acid
  - (iii) 1-Propanol
  - (iv) 2-Propanol
- (b) Discuss zeolite method for softening the hard water. 10

5. (a) Assign E or Z configuration of the followings : 10



- (b) What is conformation? Describe the conformation of n-butane with its potential energy diagram. 10

6. Define the terms Phase, Component and Degree of Freedom used in phase rule. Explain in detail phase rule diagram of water system. Discuss also meta stable state curve. 20

7. (a) A sample of water on analysis was found to contain the following impurities

Impurity	Ca(HCO <sub>3</sub> ) <sub>2</sub>	Mg(HCO <sub>3</sub> ) <sub>2</sub>	CaSO <sub>4</sub>	MgSO <sub>4</sub>
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Quantity (mgL <sup>-1</sup> )	4.0	6.0	8.0	10.0
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Calculate the temporary, permanent

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and total hardness of water in ppm,  ${}^{\circ}\text{F}_r$   
and  ${}^{\circ}\text{Cl}_r$ .

(Ca = 40, Mg = 24, S = 32, O = 16,  
C = 12, H = 1) 15

8. (a) Write a short note on Bio-mass. 5  
 (b) What do you know about liquid crystals? Classify them and write their characteristics. 10  
 (b) What is Fuel? Give the characteristics of good Fuel. 10

9. (a) Differentiate the following :

(i) Thermoplastics and Thermo setting 5

(ii) Homopolymer and Copolymer 5

(b) Describe in brief about conducting polymers with their applications. 10

10. Write notes on any **four** of the following :

$$4 \times 5 = 20$$

- |                   |                |
|-------------------|----------------|
| (i) Nylon 66      | (ii) Polyester |
| (iii) PVC         | (iv) Buna-S    |
| (V) Vulcanisation | (vi) Bakelite  |

TU-09(40)4

(Printed Pages 3)

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(21214)

Roll No. ....

B.Tech.-I Sem.

**TU-338****B.Tech. Examination, Dec. 2014****E.C.,C.S., E.I.,I.T. Branch****Engg. Chemistry****BT-109 (N)****Time : Three Hours J [Maximum Marks : 100]****Note:** Attempt any **five** questions. All questions carry equal marks.

1. What is liquid crystal? Discuss the different types of liquid crystal with their application. 20

2. Derive Bragg's equation for diffraction of X-ray by a crystal.

In Bragg's reflection of X-ray, a reflection was found at  $30^\circ$  with inter planar distance  $1.85 \text{ \AA}$ . If this is first order reflection. Calculate the wave length of X-rays. 20

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3. Describe in brief about conducting polymer with their application. 20
4. What is polymer? Give the difference between "addition polymer" and "Condensation polymer" with example. 20
5. Give the difference between enantiomer and diastereomer with example. 20
6. (a) What is finger print region in Infrared spectroscopy? 20  
(b) Define the terms chromophores and Auxochrome.
7. What is phase rule? Explain the following terms:  
(a) Phase  
(b) Component  
(c) Degree of freedom  
(d) Triple point  
(e) Metastable curve

TU-338|240|2

8. State Zeolite process for removal of hardness of water and regeneration of Zeolite.

What are the limitations of their process?

20

9. Write a brief note on cement and its application. 20

10. (a) What is Calorific value of a Fuel? Give the difference between Gross calorific value and Net calorific value. 20

(b) Write a short note on Biomass.

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(Printed Pages 8)

(21214)

Roll No. ....

B.Tech.-I Sem.

**TU-310****B. Tech. Examination, Dec. 2014****EI, IT, CH Branch****Engineering Mechanics**

[BT-111(N)]

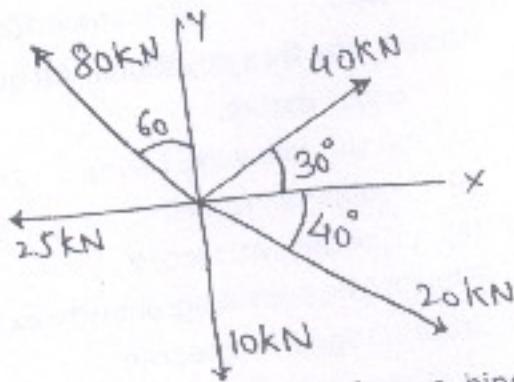
Time : Three Hours / Maximum Marks : 100

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

1. (a) Define the following terms :  $2 \times 10 = 20$ 
  - (i) Coplanar forces
  - (ii) Concurrent forces
- (b) Explain free body diagram with example.
- (c) State Varignon's theorem.
- (d) Give the methods used to analyze plane truss.
- (e) List out the different types of friction.  
What is coefficient of static friction.
- (f) Give the centroid of quarter circle arc.
- (g) Define radius of gyration with respect to x-axis of an area.

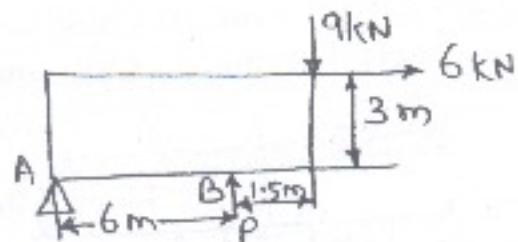
P.T.O.

- (h) Explain the difference between Kinematics and Kinetics.
- (i) What do you mean by general plane motion?
- (j) Define mechanical advantage.
2. (a) A system of concurrent force is as shown in fig. Find the net components along x and y direction. 10



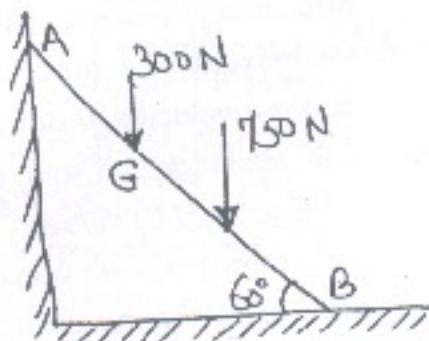
- (b) A block is supported on a hinge at A and subjected to three forces 9KN, 6KN and P as shown in fig. Neglecting the weight of the block, determine the force P and the reaction at the hinge. 10

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3. (a) A ladder 6m long weighing 300N is resting against a wall at an angle of  $60^\circ$  to the horizontal plane as shown in fig. A man weighing 750N climbs the ladder from position B towards A. At what position along the ladder from the bottom of the ladder does he induce slipping Coefficient of friction for both wall and the ground with the ladder is 0.2.

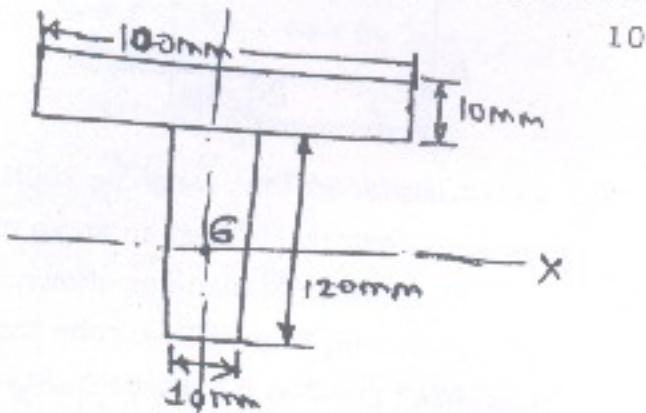
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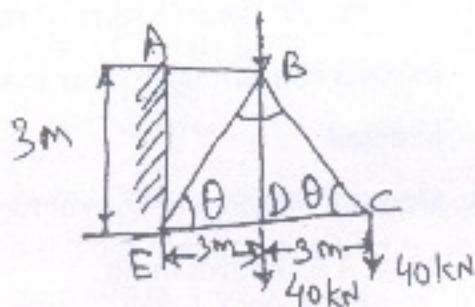
- (b) Find the moment of area of the diagram shown about its centroidal axis.



4. (a) A rectilinear motion of motor car starting from rest is governed by the equation  $a=8/1.5 v+2$ , where 'a' is the acceleration in  $m/s^2$  and  $v$  is velocity in  $m/s$  at any instant. Find the distance moved and the time taken by car to attain a velocity of  $8m/s$ . 10
- (b) A 30 kg block shown in fig. is imparted a velocity of  $10m/sec$ . The coefficient of friction between the block and floor is 0.28. Determine the distance covered

TU-310\6014

6. (a) Explain : 10  
 (i) Coefficient of friction  
 (ii) Angle of friction  
 (iii) Angle of repose  
 (b) Determine the forces in all members of the trun. 10



7. (a) Determine the centroid of semi circular area of radius 'r' using method of integration. 10  
 (b) Explain :  
 (i) Parallel axes theorem 10  
 (ii) Perpendicular axes theorem

TU-310\60\6

8. (a) Explain plane rectilinear motion of rigid body. 10
- (b) Explain plane curvilinear motion of rigid body. 10
9. (a) Explain :  
 (i) D'Alembert's Principle 10  
 (ii) Dynamic Equilibrium  
 (iii) Principle of Virtual work
- (b) In a lifting machine an effort of 98.2N raised a load of 1000N and an effort of 498.2N raised a load of 6000N. By using law of machine, find what effort is required to lift a load of 10000N. Find also the maximum mechanical advantage. 10

10. (a) Prove  $\frac{T_1}{T_2} = e^{u\theta}$  10
- (b) Determine the man moment of inertia

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of a circular ring of uniform cross-section.

10

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(21214)

Roll No. ....

B.Tech.-I Sem.

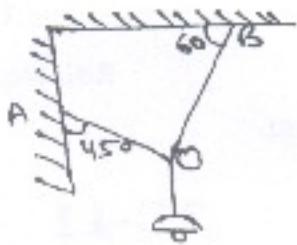
**TU-11****B.Tech. Examination, Dec . 2014****ME, EC, EI, CS, IT****Engg. Mechanics****(BT-111)***Time : Three Hours]**[Maximum Marks : 100]*

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

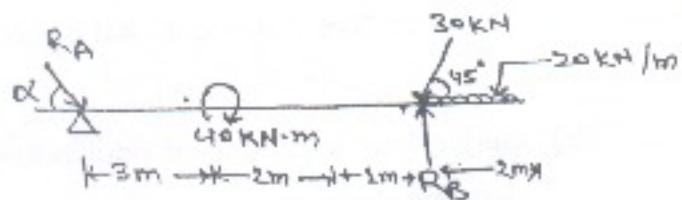
1. (a) Derive the equations of equilibrium in two and three dimensional systems. 10

- (b) An electric light fixture weighing 150 N is supported by two wires as shown in figure. Determine the tensile forces developed in the wires- 10

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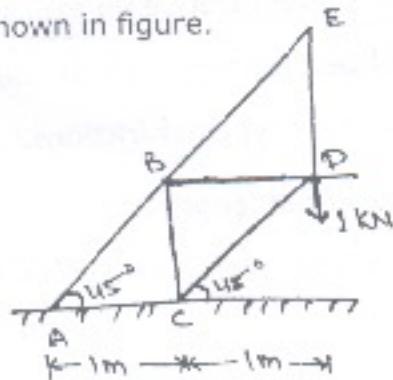
2. (a) Derive the expressions among load intensity shear force & bending moment. 10  
 (b) Determine the reaction at A & B in the overhanging beam shown in figure.10



3. (a) What is the difference between centroid and centre of gravity? What do you mean by radius of gyration? 10  
 (b) State & prove the perpendicular axis theorem of moment of inertia of plane figures. 10

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4. State & explain impulse momentum method.  
 A train weighing 3000 KN is moving up a slope 2 in 100 with an acceleration of  $0.04 \text{ m/sec}^2$ . Tractive resistance is  $6\text{N}/\text{KN}$ . Determine the acceleration of the train if it moves with the same tractive force: 20  
 (a) on a level track;  
 (b) down the plane inclined at 2 in 100.
5. (a) Show the volumetric strain is equal to the sum of strains in three mutually perpendicular directions. 10  
 (b) Establish relation between bending stresses and radius of curvature. 10
6. (a) Derive relation between modulus of elasticity and bulk modulus. 10  
 (b) Determine the forces & their nature in each member of the truss loaded as shown in figure. 10

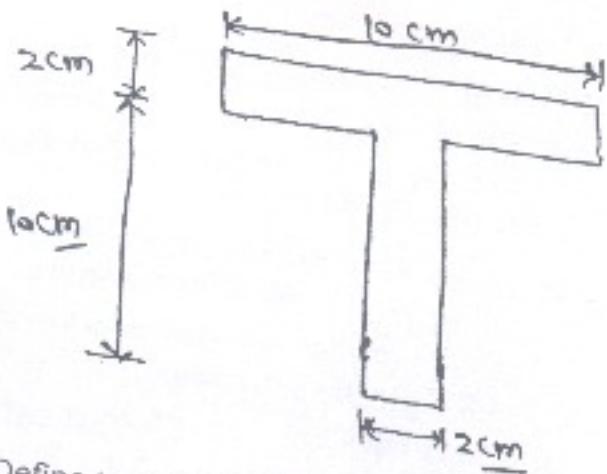


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P.T.O.

7. Determine the moment of inertia of T section about the horizontal & vertical axis, passing through the C.G. of the section as shown in the following figure.

20



8. Define tension. Derive an expression for the ratio of belt tensions in a flat belt drive. Explain various types of frictions.

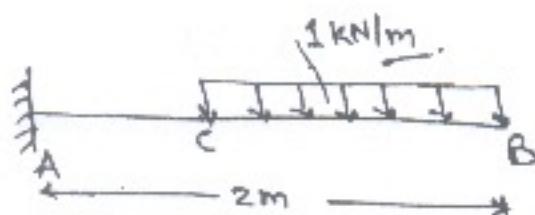
20

9. A cantilever of length 2 m carries a V.D.L. of 1 KN/m run over a length of 1.5 m from

TU-1114014

free end. Draw shear force & Bending moment diagram.

20



10. (a) Determine the centre of gravity of a solid hemisphere of radius  $r$  from its diametral axis. 10
- (b) Derive the mass moment of inertia of a body. 10

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(Printed Pages 3)

(21214)

Roll No. ....

B.Tech. I Sem.

**TU-012**

B.Tech. Examination, Dec. 2014

Ag. Engg.

English Language &amp; Technical Writing

**BT-112**

Time : Two Hours ]

[Maximum Marks : 50]

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

1. What is the difference between Listing and Reading comprehension of speech. Explain.

10

2. What is the difference between claim and complaint letter. Draft a claim letter on any topic.

5+5

3. What is the difference between General and Technical writing. Explain with your examples.

10

P.T.O.

4. What is the difference between Technical paper and scientific article writing. 10
5. How many kinds of Reports are? What is the significance of reports. 5+5
6. Difference between Inductive and Deductive orders. 10
7. Write paragraph on any **one** : 10
- (a) (i) Population Increasing
  - (ii) Unemployment
  - (b) Elements of Resumes writing
8. Give one word for the following: 1×10
- (i) One who does not believe in God.
  - (ii) A person who is talkative.
  - (iii) A word no longer in use
  - (iv) One who is new to a profession.
  - (v) Theft of literary ideas.
  - (vi) A short walk for pleasure or exercise.

TU-012\40\2

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- (vii) One who believes in one God.  
(viii) One who knows very language.  
(ix) eclipse of the moon.  
(x) A style full of wonder.
9. Bring out the difference of meaning in the following pairs of words:  $2 \times 5 = 10$
- (i) Abstain, refrain
  - (ii) Abuse, misuse
  - (iii) Admit, confess
  - (iv) Adore, worship
  - (v) Adorn, decorate
10. Write short notes on any **two** : 10
- \*(i) Scope of Technical writing
  - (ii) Stress and Intonation
  - (iii) Sentence writing

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(Printed Pages 4)

(21214)

Roll No. ....

B.Tech.-I Sem.

**TU-14(E)**

**B. Tech. Examination, Dec. 2014**

Ag. Engg.

Engg. Mathematics-I

[BT-114(N)]

Time : Three Hours / Maximum Marks : 100

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

1. (a) If  $u = \sin^{-1}\left(\frac{x}{y}\right) + \tan^{-1}\left(\frac{y}{x}\right)$ , then find the

value of  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ .

(b) If  $u = e^{xyz}$ , find the value of  $\frac{\partial^3 u}{\partial x \partial y \partial z}$ .

2. If  $u = \sin^{-1}\left(\frac{x+y}{\sqrt{x} + \sqrt{y}}\right)$

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prove that

$$x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = \frac{-\sin u \cos 2u}{4 \cos^3 u}$$

3. Find the shortest and the longest distances from the point  $(1, 2, -1)$  to the sphere  $x^2 + y^2 + z^2 = 24$ .

4. (a) Show that the function

$f(x, y) = x^3 + y^3 - 63(x+y) + 12xy$  is maximum at  $(-7, -7)$  and minimum at  $(3, 3)$ .

- (b) Expand  $x^2y + 3y - 2$  in powers of  $(x-1)$  and  $(y+2)$  using Taylor's Theorem.

5. (a) Calculate the volume of the solid bounded by the surface  $x=0$ ,  $y=0$ ,  $x+y+z=1$ , and  $z=0$ .

- (b) Find the area of a plate in the form of a quadrant of the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ .

6. (a) Evaluate

$$\iint r \sin \theta dr d\theta$$

over the area of the cardioid

$r = a(1+\cos\theta)$  above the initial line.

(b) Evaluate  $\int_0^a \int_0^{\sqrt{a^2 - x^2}} \sqrt{a^2 - x^2 - y^2} dy dx$

7. State and prove Dirichlet's theorem for three variables.

8. (a) Evaluate  $\int_0^1 \frac{dx}{(1-x^n)^{1/n}}$

(b) Evaluate  $\int_0^{\pi/2} \sqrt{\cot \theta} d\theta$

9. Test the Convergence of the following series.

(a)  $\sum \left[ \sqrt{n^2+1} - n \right]$

(b)  $\sum \cos\left(\frac{1}{n}\right)$

10. Test the convergence of the following series

(a)  $1 - \frac{1}{2} \cdot \frac{x^2}{4} + \frac{1 \cdot 3 \cdot 5}{2 \cdot 4 \cdot 6} \cdot \frac{x^4}{8} - \frac{1 \cdot 3 \cdot 5 \cdot 7 \cdot 9}{2 \cdot 4 \cdot 6 \cdot 8 \cdot 10} \cdot \frac{x^6}{12} + \dots$

(b)  $1^{-p} - 2^{-p} + 3^{-p} \dots$

when  $p > 0$

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Roll No. ....

B.Tech.-I Sem.

**TU-16****B. Tech. Examination, Dec. 2014**

(Ag.Engg.)

**Mathematics-I**

[BT-116 (Old)]

Time : Three Hours / Maximum Marks : 100

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

1. (a) If  $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$ , find  $A^{-1}$

(b) Find the rank of matrix

$$\begin{bmatrix} -1 & 2 & 3 & -2 \\ 2 & -5 & 1 & 2 \\ 3 & -8 & 5 & 2 \\ 5 & -12 & -1 & 6 \end{bmatrix}$$

P.T.O.

2. Determine for what values of  $\lambda$  and  $\mu$  the following equations have

- (i) no solution
- (ii) a unique solution
- (iii) Infinite number of solutions.

$$x+y+z=6, \quad x+2y+3z=10, \quad x+2y+\lambda z=\mu$$

3. Find the characteristic Equation of the matrix

$$A = \begin{bmatrix} 1 & 2 & -2 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$$

Hence find  $A^{-1}$

4. (a) Solve the Equation

$$\frac{dy}{dx} = \frac{y}{x} + x \sin \frac{y}{x}$$

(b) Solve

$$\tan y \frac{dy}{dx} + \tan x - \cos y \cos^2 x$$

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5. Solve the following Simultaneous Equations

$$\frac{d^2x}{dt^2} - 3x - 4y = 0$$

$$\frac{d^2y}{dt^2} + x + y = 0$$

6. Use variation of parameters method to solve

$$y'' + y = \sec x$$

7. (a) Evaluate  $\iint_R xy \, dx \, dy$

where R is the quadrant of the circle

$$x^2 + y^2 = a^2 \text{ where } x \geq 0 \text{ and } y \geq 0$$

(b) Evaluate

$$\int_0^{\pi/2} \left[ \int_0^{a \cos \theta} r \sqrt{a^2 - r^2} dr \right] d\theta$$

8. If  $u = \tan^{-1} \frac{x^3 + y^3}{x - y}$ , prove that

$$(i) x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \sin 2u$$

$$(ii) x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = 2 \cos 3u \sin u$$

9. (a) If  $y_1 = \frac{x_2 x_3}{x_1}$ ,  $y_2 = \frac{x_3 x_1}{x_2}$ ,  $y_3 = \frac{x_1 x_2}{x_3}$

Show that the Jacobian of  $y_1, y_2, y_3$  with respect to  $x_1, x_2, x_3$  is 4.

- (b) Expand  $e^x \sin y$  in powers of  $x$  and  $y$ .

$x=0, y=0$  as far as terms of third degree.

10. (a) Differentiate

(i)  $(\tan x)^{\sec x}$

(ii)  $(\sin x)^{\log x}$

- (b) Test the following function for continuity at the origin

$$f(x) = \begin{cases} \frac{xe^{1/x}}{1+e^{1/x}} & \text{if } x \neq 0 \\ 0 & \text{if } x = 0 \end{cases}$$