THIRD SEMESTER **B.TECH (MC)**
MID SEMESTER EXAMINATION **SEPTEMBER 2016**
MC-201 DISCRETE MATHEMATICS

Time: 1.30 Hours **Maximum Marks: 25**

Note: Attempt ALL.

Q1(a).Let S be a non-empty set and R be an equivalence relation on S. Let a and b be arbitrary elements in S. Then prove that

i. $a \in [a]$
ii. If $b \in [a], then\ [b] = [a]$
iii. $[a] = [b]\ iff\ (a,b) \in R$
iv. $Either\ [a] = [b] or\ [a] \cap [b] = \emptyset$.

(b) (i) Is an injective map from a set to itself a surjective map? Give reason.

(ii) If A, B, C are sets then prove that

$$A \times (B \cup C) = (A \times B) \cup (A \times C)$$

Q2. (a) By the principle of mathematical induction, prove that

$$2n < 3^n\ \forall n \in N.$$

(b) (i) Using algebra of propositions, show that

$$(p \rightarrow q) \wedge (r \rightarrow q) \equiv (p \vee r) \rightarrow q$$

(ii) Show that the logical expression

$$\{[p \rightarrow (q \vee r)] \wedge (\sim q)\} \rightarrow (p \rightarrow r) \text{ is a tautology.}$$

Q3. (a) Test the validity of the following arguments:

If the computer was down Saturday, then Mary went to a matinee.

Either Mary went to a matinee or took a nap Saturday afternoon

Mary did not take a nap that afternoon

Therefore, the computer was down Saturday afternoon.

Input: A sequence of character.

(b) Let p denote the statement "the material is interesting", q denote "the exercises are challenging" and r denote "the course is enjoyable".

Write the following in symbolic form:

i. The material is interesting and the exercises are challenging.
ii. If the material is uninteresting then the exercises are not challenging and the course is not enjoyable.
iii. If the material is not interesting and the exercises are not challenging then the course is not enjoyable.
iv. The material is interesting means the exercises are challenging and conversely.

(c) Using rule of inference show that

$$(\forall x)(P(x) \Rightarrow Q(x)) \wedge (\forall x)(Q(x) \Rightarrow R(x)) \Rightarrow (\forall x)(P(x) \Rightarrow R(x))$$

Total No. of Pages: 02

Roll No. 118/cobm

THIRD SEMESTER **B.Tech. (CSE/IT/SE)**

MID SEMESTER EXAMINATION *Septerber-2016*

CSE/IT/SE-261 ANALOG ELECTRONICS

Time: 1.5 Hours *Max. Marks: 30*

Note: Assume suitable missing data, if any.
Attempt all the parts of the same question at one place.

Question No. 1 **[3+3=6]**

[a] Discuss the formation of donor and acceptor level in extrinsic semiconductors with suitable diagram.

[b] Discuss the difference between Zener and Avalanche breakdown phenomenon. Also, sketch the *V-I* characteristic curve of p-n junction diode that shows the Avalanche and Zener breakdown.

Question No. 2 **[6]**

Consider a circuit shown in Fig.1, an avalanche diode in the circuit regulates at *50 V* over a range of diode currents from *5* to *40 mA*. The supply voltage *V=200 V*. Find the value resistance *R* to allow voltage regulation from a load current $I_L=0$ up to I_{max}, the maximum possible value of I_L

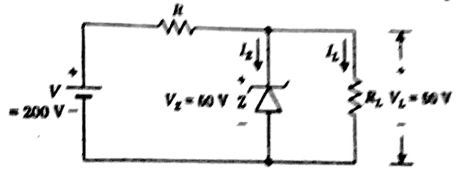
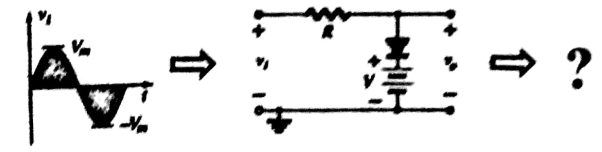


Fig.1

Question No. 3 **[2+4=6]**

[a] Define ripple factor, rectification efficiency of a rectifier.

[b] Consider a circuit given in Fig. 2. An input signal is passed through the circuits, sketch the output signal wave form. Diode used in the circuit if practical.



Input signal

Fig.2

Question No. 4 **[2+4=6]**

[a] Discuss the early effect in BJT.

[b] Explain the Ebers- Moll of BJT and with the help of this model define large signal current gains.

Question No. 5 **[6]**

Consider a circuit shown in Fig.3, determine:

[a] Region of operation of transistor

[b] V_o. Assume $\beta=100$.

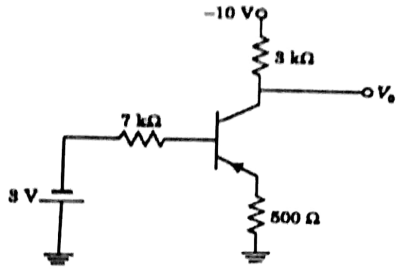


Fig.3

Total No. of Pages 1 Roll No. .....

THIRD SEMESTER **B.Tech.(CO/SE/IT)**

MID SEMESTER EXAMINATION ***September-2016***

CO/SE/IT-201 Data Structures

Time: 1 Hour 30 Minutes **Max. Marks: 30**

Note: Answer **ALL** questions. Each question carries 6 marks. Assume suitable missing data, if any.

1. a) Write pseudo-code to evaluate a given Postfix Expression.
   b) Convert the below infix expression to Postfix using Stack:

   ((A+B)-((C-D)*E)/F)*G

   Show contents of stack at each step.

2. Write a C Program for implementation of queue using Array.

3. a) Write the steps to insert an element after a given Node pointed to by pointer P in a singly link list.
   b) Write the steps to delete a given Node pointed to by pointer P *in a doubly link list.*

4. a) Consider the Linear Array A(5:50,1:100). Suppose Base(A)=300 and w=4 words per memory cell for A. Find the address of A[15,20].
   b) How we can analyse whether a particular algorithm is good or bad?

5. Given a linked list with data stored in ascending order, write code to remove all duplicate nodes such that only one copy of a data is there in result.

Total no. of pages 1 Roll No:....118.....

THIRD SEM B.TECH(CO/SE/IT)

MID SEMESTER EXAMINATION Sepember 2016

CO/SE/IT-203 OBJECT ORIENTED PROGRAMMING

Time:1 Hour 30 min. Max. Marks : 30

Note : Answer all questions
Assume suitable missing data, if any.
Give suitable examples, wherever needed

Q1. (a) What are the rules and max length of the identifiers in C and C++? 1

(b) How does main() function in C++ differ from main() in C? 1

(c) Write a program to illustrate the call by reference using (i) pointer and (ii) reference variable. How memory is allocated in both cases? 4

Q2. (b) Explain the following with examples

(i) Pointer to member 1

(ii) difference between address & and reference & ? 1

(b) What are Static data members & member functions? Write a program to count number of objects created using static members. 4

Q3 (a) What is inline function? Explain its use, limitations, advantages with examples. Where inline function may not work? 3

(b) How to create constant objects, constant arguments and constant member function? What are the purpose of creating them? 3

Q4. (a) What is a friend function? What is the difference between member function as friendly function and general function as friendly function? 3

(b) Write a program to calculate the sum of complex numbers using all type of constructors. 3

Q5. Write short notes 6

(a) Features of OOP

(b) Default arguments

(c) Difference between macros, inline and normal function

Total No. of Pages: 01

Roll No. .....

B. Tech. (BT/CO/EC/EE/EL/EN/IT/SE)

Third Semester

Mid Semester Examination

(Sep-2016)

BT/CO/EC/EE/EL/EN/IT/SE-201: Engineering Economics

Time: 1 hr 30 min

Max. Marks: 25

Note: **All Questions are Compulsory.**
Assume suitable missing data, if any.

1. Fill up the blanks: 10*1/2=5

a. If two or more goods are required together to satisfy single need, they are called ---------goods.

b. When other things remain same, price and demand of a product are ---------- proportionate to each other.

c. In Oligopoly, there are ---------- number of firms.

d. There in only one ---------- bank in a country.

e. Burden of tax falls on the same person who pays tax in case of ---------- tax.

f. Sales Tax is ---------- tax.

g. Total Cost divided by number of unit produced is called ---------- cost.

h. Value of money ---------- in Inflation.

i. Labour gets --------- for its contribution in Production.

j. In case of Adverse Balance of Payment, value of Export is --------- than value of Import.

2. Differentiate between Monopoly and Monopolistic Competition Market? (5)

3. Discuss concept of Business Cycle. (5)

4. What do you mean by Dumping in International Trade? (5)

5. What do you mean by Opportunity Cost? How it is different from Total Cost? Three engineers started their own enterprise after graduation. What is their Opportunity Cost? (5)

Total No. of Pages 1

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THIRD SEMESTER

B.Tech.

MID SEMESTER EXAMINATION ***September-2016***

SE207/CO207/IT207 Engineering Analysis and Design (Modeling and Simulation)

Time: 1:30 Hours *Max. Marks: 25*

Note : Answer ***FIVE*** questions.
Assume suitable missing data, if any.

1 Define Computer Simulation. Explain different steps of sound simulation study. [5]

2 Explain different types of Classification of simulation Model with real time examples. [5]

3 Explain different components and organization of Discrete Event Simulation Model. *[5]*

4 Explain Simulation of Inventory system. *[5]*

5 An airport runway for arrivals only. Arriving aircraft join a single queue for the runway service time are exponentially distributed with a rate μ=27 arrivals / hour. Poisson arrivals with a rate λ=20 arrivals / hour. Calculate
a) Length of System and Queue
b) Waiting time in System and Queue.
Now suppose we have a bad weather and service rate decreases μ=22 arrivals / hour.
Explain how will "Length of System and Queue" and "Waiting time in System and Queue" change. [5]

6 What do you understand by term "Modeling". What are application areas of Modeling and Simulation? What are the pros and cons of Simulation? [5]

Total No. of Pages 2

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THIRD SEMESTER **B.Tech.**

END SEMESTER EXAMINATION ***November-2016***

SE207/CO207/IT207 Engineering Analysis and Design (Modeling and Simulation)

Time: 3 Hours ***Max. Marks: 50***

Note : Answer *FIVE* questions.
Assume suitable missing data, if any.

Q1(a) Explain in detail the term "Modeling and Simulation". [3]

(b) Explain:

i) Continuous Simulation

ii) Discrete event Simulation

iii) Monte Carlo Simulation. [7]

Q2 What are the conditions in which Simulation is performed and explain the steps involved in performing Simulation? Also write name of some simulation softwares (min three) and their application areas. *[10]*

Q3(a) Suppose that future short term outlook for the economy is favorable with the probability 0.6 and unfavorable with probability of 0.4. For two stocks F and G, returns are 0.25 and 0.2 respectively, in favorable conditions , and 0.01 and 0.02 in unfavorable conditions. Calculate Cov(Rf , Rg) and degree to which these variables are related. [5]

(b) What is Inventory Simulation? Draw flowchart for-

a) Order arrival routine

b) Demand routine

c) Inventory Evaluation routine. [5]

Q4(a) Explain diagrammatically, how simulation can help in decision making and understanding people's problem in better way in case of demonetizing issue. Write your answer to support your solution in points. [5]

(b) Explain the term "Goodness of fit" with example. What are the tests involved for its calculation. What are the features of these tests and conditions in which these tests are performed? [5]

Program-1

Q5(a)X and Y are jointly continuous with joint probability density function(pdf)

$$f(x, y) = \begin{cases} cxy & \text{if } 0 \le x \le 1, 0 \le y \le 1 \\ 0, & \text{otherwise.} \end{cases}$$

(i) Find c. [1]
(ii) Find marginal pdf 's of X and of Y [2]
(iii) Are X and Y independent (justify!). [2]

(b) Consider a switch which has an infinite buffer and an infinite number of users generating messages according to a Poisson process with average inter-arrival time of 800 milliseconds. The switch serves requests with a service time that is exponentially distributed with an average service time of 500 milliseconds. What is the average waiting time of system and queue? Suppose that the switch is upgraded to reduce average service time to 400 milliseconds. How would that affect the average waiting time? [5]

6 *Explain any four-*

i) Normal Distribution and its properties.
ii) Central Limit Theorem with example
iii) Covariance and Correlation
iv) Confidence Interval
v) Steps of Hypothesis Testing *[10]*

No. of pages:2

End Sem Examination
III Semester, November 2016
Discrete Mathematics
(CO-205)

Max Marks: 50

Note:

- Attempt all Questions and do any two parts out of the three in each Question.
- All Questions carry equal marks.
- Assume suitable missing data if any.

Q 1. (a) Prove that

$$[(A \cup (B \cap C)) \cap (\bar{A} \cup (B \cap C))] \cap (\bar{B} \cup \bar{C}) = \phi$$

for any three set A, B and C.

(b) Find the next permutation in the lexicographic order after 362541

(c) Let x be a real number such that $x \geq -1$. Prove by induction that for $n \geq 0$ $(1+x)^n \geq 1 + nx$.

Q 2. (a) Solve the recurrence relation

$$a_n = 5a_{n-1} - 6a_{n-2} + 7^n$$

(b) Give the chromatic numbers of

i. $K_{5,7}$, a complete bipartite graph.

ii. C_n, a cycle of length n

(c) Solve using Generating function, solve the following recurrence relation

$$a_n = 5a_{n-1}, k = 1, 2, \ldots, a_1 = 3$$

Q 3. (a) Define the following with suitable example:

i. Boolean Lattice

ii. A trail in a graph

iii. Complete Bipartite Graph

iv. Distributive Lattice

v. Isomorphic Graph

vi. Hamiltonian graph

(b) i. Show that the set $\{1, -1, i, -i\}$; fourth root of unity forms an abelian group with respect to multiplication.

ii. If order of an element x is n. Then, prove that $x^m = e$ if and only if n divides m.

(c) If in a group G, $x^5 = e$, $xyx^{-1} = y^2$ for $x, y \in G$ then show that $O(y) = 31$

Q 4. (a) $D_n = \{x : x|n \; \forall \; x \in N\}$
Consider $D_{30} = \{1, 2, 4, 5, 10, 20\}$

i. draw diagram for above set.

ii. Find all the lower bounds of 10 and 15.

iii. Determine GLB and LUB of 10 and 15.

iv. Is it a complemented Lattice? Justify.

v. Find least and greatest element of D_{30}.

(b) Simplify using K-map

$$F = \sum m(0, 2, 4, 5, 6)$$

(c) Express the sentences in predicate logic:

i. Everyone in the room spoke Hindi or English.

ii. Someone in the room either spoken Hindi or English.

Q 5. (a) If G is a group in which $(ab)^i = a^i b^i$ for three consecutive integers i and any a, b in G, then G is abelian.

(b) Let G be a graph of n vertices and m edges then G has a Hamiltonian circuit if

$$m \geq \frac{1}{2}(n^2 - 3n + 6)$$

(c) Express the following in its complete sum of product form

$$E(x, y, z) = ((xy)'z)'((x' + z)(y' + z)')$$

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THIRD SEMESTER

B.Tech. (CSE/IT/SE)

END SEMESTER EXAMINATION

November -2016

EC-261 ANALOG ELECTRONICS

Time: 3 Hours

Max. Marks: 40

Note: Answer any **FIVE** questions.
Assume suitable missing data, if any.

Question No. 1 **[2+6=8]**

[a] Discuss the need of stabilization in BJT.

[b] The circuit in Fig.1 has to be designed to make $V_0 = 0\,V$ and $V_{CEQ} = 3\,V$. Determine R_C and R_E. Give $\beta = 200$.

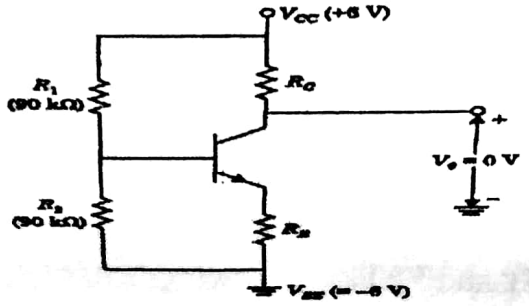

Fig.1

Question No. 2 **[8]**

Consider a transistor circuit with $\beta_F = 99$ and negligible reverse saturation current is used in circuit as shown in Fig.1. the element values are $V_{CC} = 10\,V, R_C = 2.7\,k\Omega$ and $R_F = 180\,k\Omega$, and R_B is open circuited.

[a] Determine the value of V_{CE} and I_C.

[b] For β_F increased to 199, repeat [a].

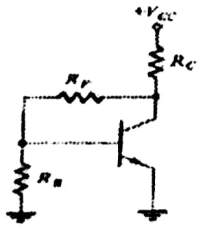

Fig.2

Question No. 3 **[2+6=8]**

[a] Why output characteristic of CE configuration have slope in active region while in CB configuration it doesn't have?

[b] Derive the expression for current gain, input resistance, voltage gain, and output resistance of CC configuration with R_E having $r_b = 0$, and $r_0 = \infty$.

Question No. 4 [4x2=8]

Consider a CE amplifier as shown in Fig.3 uses a transistor with $\beta = 100$ and $V_A = 100\ V$.

[a] Determine the dc bias current I_B.

[b] Determine R_i, voltage gain, current gain.

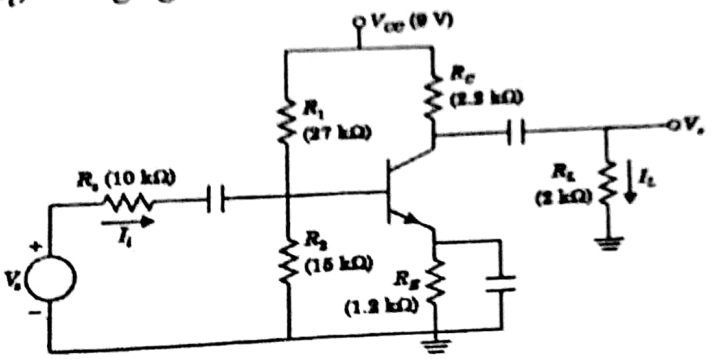

Fig.3

Question No. 5 [4+4=8]

[a] Explain drain and transfer characteristic of JFET.

[b] Derive the expression for voltage gain and output resistance for common source JFET amplifier with source resistance.

Question No. 6 [2+6=8]

[a] Discuss the comparison of BJT and FET.

[b] An n-channel JFET, having $V_P = -4V$ and $I_{DSS} = 10mA$, is used in the circuit of Fig. 4. The parameter values are $V_{DD} = 18\ V, R_S = 2k\Omega, R_D = 2k\Omega, R_1 = 450\ k\Omega$ and $R_2 = 90\ k\Omega$. Determine I_D and V_{DS}.

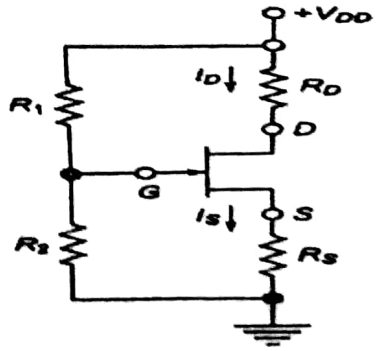

Fig.4

Question No. 7 [4x2=8]

Write the short notes on any ***TWO*** of the following:

[a] Output characteristic of CE and CB configuration of BJT.

[b] Voltage series and Current series feedback oscillator.

[c] Operational amplifier as a summer and differentiator circuit.

Total No. of Page: 2

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III SEMESTER
END SEMESTER EXAMINATION
B.TECH. [COE/SE/IT]
NOV- 2016

CO/SE/IT- 201 Data Structures

Time: 3:00 Hours *Max. Marks: 40*

Note: Question 1 is compulsory. Attempt four questions in total. All questions carry equal marks.

Q1. (a) Which sorting Algorithm is best if the list is already sorted? (2)
(b) B-tree of order 4 is built by 10 successive iterations. What is the maximum number of node splitting operations that may take place ? (2)
(c) For a 2 dimensional array A(-2:2, 2:22), what is the address of element A(1,3), if base address is 400 and w=4 words per memory cell, using row major order. (2)
(d) Find the minimum number of nodes in a complete binary tree with depth 'd' by assuming the depth of root node is zero ? (2)
(e) What is the number of comparisons required in merging two ordered files A and B of sizes 'M' and 'N' respectively. Prove your answer through calculation. (2)

Q2. (a) . Show the AVL tree that results after each of the integer keys 9, 27, 50, 15, 2, 21, and 36 are inserted, in that order, into an initially empty AVL tree. Clearly show the tree that results after each insertion, and make clear any rotations that must be performed. (5)
(b) Convert the following infix expression into postfix using stack and also write an algorithm for this transformation :- A + (B*C – (D/E ^ F)* G)*H (5)

Q3. (a) Sort the following data using heap sort and show all the intermediate steps.

88,12,91,23,10,36,45,55,15,39,81 (5)

(b) Write an algorithm to delete a particular node from binary search tree. (5)

Q4. [a] Define the following for a graph with suitable example: (6)

i. Graph
ii. Adjacency List
iii. Weighted Graph
iv. Null Node
v. Path
vi. Cycle

P.T.O.

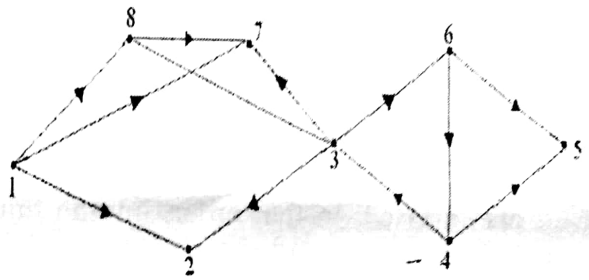
(b) Write algorithms for following :-

(i) To add a node at the end of doubly linked list.

(ii) To add a node in between the circular linked list. (4)

Q5. (a) What do you mean by hash function? Consider a hash table of size m=10. Using quadratic probing , insert the keys 72,27,36,24,63,81,101 into the table. Take H'(k)=k mod m and C_1=1 And C_2=3. (5)

(b) Show the result of running BFS and DFS on the directed graph given below using vertex 3 as source. Show the status of the data structure used at each stage. (5)



Q 6. Write short note on any two of the following: (5 * 2 =10)

a) Priority Queue

b) Threaded Binary Tree

c) B-Tree

d) Tower of Hanoi problem

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THIRD SEMESTER **B.Tech. (CO/SE/IT)**

END SEMESTER EXAMINATION **NOVEMBER-2016**

CO/SE/IT-203 Object Oriented Programming

Time: 3:00 Hours *Max. Marks: 40*

Note: Answer any five. All questions carry equal marks.
Assume suitable missing data, if any.

1. (a) Explain the features of object oriented programming. 3
   (b) Explain 5 differences between the language C and C++. 2
   (c) List some of OOP languages and their features. 3

2. (a) How the memory is allocated to class member functions, data members, static members? 2
   (b) What is the difference between overloading and overriding? Explain with examples. 3
   (c) What are virtual function and pure virtual function? 3

3. (a) Write a program, using inline function, to find the sum, multiplication, difference between two numbers. 3
   (b) Explain the purpose, syntax, advantages of using default arguments? Give suitable example. 3
   (c) What are non type template arguments? 2

4. (a) What are the characteristics of the static data members and member function? Write a program to count the numbers of objects created for a class. Use static members in the program. 5
   (b) Explain the use of 3
   (i) this pointer (ii) destructors

5. (a) Write a program, using pointer to member functions and to data members, to find the sum of the data members " int i, j" of a class. 6
   (b) What are the characteristics of the constructor function? 2

6. (a) Write a program to overload pre and post ++ operators using friend. 4

(b) Explain the exception handling mechanism available in C++ with suitable Write a program to illustrate divide-by-zero exception. 4

7. Write short notes (any four) 8

(a) Function template with multiple arguments
(b) I/O operations
(c) Features of Java
(d) Virtual base class
(e) Copy constructor

Total No. of Pages 2 *Roll No. 11.8..*

THIRD SEMESTER **B.Tech.**

END SEMESTER EXAMINATION ***(Nov -2016)***

BT/EC/EE/EL/EN/CO/IT/SE -201- ENGINEERING ECONOMICS

Time: 3 Hour ***Max. Marks: 50***

Note: Answer any five questions. Assume suitable missing data, if any.

1.a Discuss Production Function and its relevance for Engineers in the globalised economic environment. 5

1.b A person is planning for his retired life. He has 10 more years of service. He would like to deposit Rs. 8500 at the end of first year and thereafter, he wishes to deposit the amount with an annual decrease of Rs. 500 for the next 9 years with an interest rate of 15%. Find the total amount at the end of the 10^{th} year of the above series. 5

2.a Discuss Business Cycle. Discuss role of engineer in bringing out the economy out of recession. 5

2.b A concrete aggregate mix must contain at least 31% sand by volume for proper batching. One source of material, which has 25% sand and 75% coarse aggregate, sells for Rs 3 per cubic meter (m^3). Another source, which has 40% sand and 60% coarse aggregate, sells for Rs. 4.40 per cubic meter (m^3). Determine the least cost per cubic meter of blended aggregates. 2

2.c If the demand function is given by $x=20/(p+1)$, find the Price Elasticity of Demand at the point where $p=3$. 3

3.a Discuss five salient features of the India economy. 5

3.b A computer producing company can either purchase the screen or can manufacture within the company. The Detail is given below 5

	Purchase	Manufacture
Price per screen	4000	
Tax rate	@ 10% per unit	
Cost of machine		20 lakh
Cost of labour		2000/unit
Cost of raw material		1000/unit
Overhead Cost		400/ unit

If the annual demand is 2200, the company should make or buy.

4.a Recently Rs 1000 and Rs.500 notes have been banned in India and not a legal tender any more. Discuss its implication on the Indian economy? 5

P.T.O.

4.b A transport company has been looking for a new tyre for its truck and has located the following alternative: 5

Brand	Tyre warranty (months)	Price per tyre (Rs.)
A	12	1,200
B	24	1,800
C	36	2,100
D	48	2,700

If the company feels that the warranty period is a good estimate of the tyre life and that a nominal interest rate (compounded annually) of 12% is appropriate, which tyre should it buy? Use Annual Equivalent Method for taking decision.

5.a What do you mean by Commercial Bank? How they are different from Central Bank. Discuss mechanism of credit creation by Commercial Banks. 5

5.b A firm, Prime Manufacturing is planning to expand its production operation. It has identified three machines which are technologically capable to serve the purpose. The initial outlay and annual revenues with each of the machines are given below: 5

	Initial Outlay (Rs.)	Annual revenue	Life (in years)
Machine I	Rs. 5,45,000	Rs. 2,50,000	15
Machine II	Rs. 6,14,000	Rs. 3,30,000	12
Machine III	Rs. 6,00,900	Rs. 3,50,000	10

If the rate of interest is 12%, which machine the company should opt for? Find out the result by Present Worth method.

6.a Discuss similarity and differences between Oligopoly and Monopolistic Competition. 5

6.b A firm's total cost function = $\frac{1}{3}x^3 - 7x^2 + 111x + 50$; and $x = 100 - p$ where p is the price and x is the quantity 5

(i) Write the total revenue function TR
(ii) Find profit maximising level of output
(iii) What is the maximum profit?

7.a Discuss factors which should be considered while deciding location of the firm aboard. 5

7.b The Total Cost (TC) associated with producing and marketing x units of an item is given by $TC = .005x^3 - .02x^2 - 30x + 3000$ 5

(i) Total cost when output is 4 units.
(ii) Average cost of output of 10 units
(iii) Marginal Cost when output is 3 units
(iv) The output where AC =MC