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I B.TECH. I SEM

SUPPLEMENTARY EXAMINATIONS

MARCH 2022

I B.Tech I Semester Supple Examinations, March-2022

Sub Code: 19BCC1TH02

ENGINEERING PHYSICS

Time: 3 hours

(Common to CE, ME, ECE)

Max. Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12 = 60M)

Q. No.	Questions	Marks
Unit-I		
1	A I) Prove that the diameter of the n^{th} dark ring in a Newton's ring set-up is directly proportional to the square root of the ring number.	[8M]
	A II) In Newton's rings experiment, the diameter of 4^{th} and 12^{th} dark rings is 0.3 cm and 0.6 cm respectively. Find the diameter of 20^{th} dark ring.	[4M]
	OR	
	B I) Describe the construction of Nicol prism and show how it can be used as a polarizer or analyser.	[10M]
	B II) Two Nicols have parallel polarising directions so that the intensity of transmitted light is maximum. Through what angle must either Nicol be turned if intensity is to drop by one-fourth of its maximum value?	[2M]
Unit-II		
2	A I) Explain the Characteristics of lasers?	[4M]
	A II) With the help of suitable diagram, explain the principle, construction and working of Ruby laser.	[8M]
	OR	
	B I) Derive an expression for acceptance angle and discuss the concept of acceptance cone for an optical fiber.	[10M]
	B II) Calculate the fractional index change and numerical aperture for a given optical fiber, if the refractive indices of the core and cladding are 1.532 and 1.467 respectively.	[2M]
Unit-III		
3	A I) Define the terms (a) Space lattice (b) Basis (c) Unit Cell (d) Lattice parameters.	[6M]
	A II) Define packing fraction in crystals. Obtain the expression for packing fraction of SC, BCC and FCC crystals.	[6M]
	OR	
	B I) Define Miller indices in crystals.	[4M]
	B II) Derive an expression for the interplanar spacing between two adjacent planes of Miller indices (h k l) in a cubic lattice of edge a.	[8M]
Unit-IV		
4	A I) State and prove Stokes theorem.	[6M]
	A II) Write the Maxwell's equation in integral and differential forms.	[6M]
	OR	
	B I) Write any four differences between diamagnetic, paramagnetic and ferromagnetic materials.	[6M]
	B II) Distinguish between hard and soft magnetic materials.	[6M]
Unit-V		
5	A I) Explain the Physical significance of wave function.	[4M]
	A II) Derive the Schrodinger Time Independent wave equation.	[8M]
	OR	
	B I) Explain the origin of energy band formation in solids	[8M]
	B II) Write the applications of Hall effect.	[4M]

I B.Tech I Semester Supple. Examinations, March-2022

Sub Code: 19BCC1TH03

LINEAR ALGEBRA AND CALCULUS

Time: 3 hours

(Common to CE, EEE, ME, ECE, CSE, IT)

Max. Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12 = 60M)

Q.No.	Questions	Marks
Unit-I		
1	a) Reduce the matrix to normal form and hence find its rank $\begin{bmatrix} 2 & 1 & 2 & 4 \\ 4 & 2 & 5 & 8 \\ 3 & 1 & 4 & 6 \\ 1 & 1 & 2 & 2 \end{bmatrix}$	[6M]
	ii) Solve the system $\lambda x + y + z = 0$, $x + \lambda y + z = 0$, $x + y + \lambda z = 0$, if the system has non-zero solutions.	[6M]
	OR	
	b) Solve the system of equations by the Gauss-Siedal Method $10x - 2y - z - u = 3$, $-2x + 10y - z - u = 15$, $-x - y + 10z - 2u = 27$, $-x - y - 2z + 10u = -9$	[12M]
Unit-II		
2	a) Verify Cayley Hamilton theorem for $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$ and hence find A^{-1} and A^4 .	[12M]
	OR	
b) Determine the diagonal matrix orthogonally similar to the following symmetric matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$.	[12M]	
Unit-III		
3	i) Verify Rolle's theorem for $f(x) = x $ in $[-1, 1]$.	[6M]
	ii) Show that, for any $x > 0$, $1 + x < e^x < 1 + xe^x$.	[6M]
	OR	
	i) Verify Cauchy's mean value theorem for $f(x)$ and $f'(x)$ in $[1, e]$ given $f(x) = \log x$.	[6M]
ii) Show that $\sin x(1 + \cos x)$ is a maximum when $x = \frac{\pi}{3}$.	[6M]	

Unit-IV			
4	a	i) Determine whether the following function is functionally dependent or not. If functionally dependent find the relationship between them $u = \frac{x^2 - y^2}{x^2 + y^2}, v = \frac{2xy}{x^2 + y^2}.$	[6M]
		ii) If $u = e^{xyz}$ show that $\frac{\partial^3 u}{\partial x \partial y \partial z} = (1 + 3xyz + x^2 y^2 z^2) e^{xyz}.$	[6M]
	OR		
	b	i) Apply Taylor's series to expand $f(x, y) = x^2 - xy + y^2$ in powers of $(x+1)$ and $(y-2)$. ii) Divide 24 into three parts such that the continued product of the first, square of second and cube of third is maximum.	[6M]
Unit-V			
5	a	Find the volume of the solid obtained by revolving the cissoid $y^2(2a - x) = x^3$ about its asymptote.	[12M]
	OR		
	b	i) By change of order of integration evaluate $\int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2}} y^2 dy dx.$	[6M]
		ii) Evaluate $\int_0^{1-x} \int_{x^2} xy dy dx.$	[6M]

I B.Tech I Semester Supple. Examinations, March-2022

Sub Code: 19BCC1TH05

PROBLEM SOLVING WITH PYTHON

Time: 3 hours

(Common to CE, ECE)

Max. Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12 = 60M)

Q.No	Questions	Marks
Unit-I		
1	a	i) What is the difference between System and Application software? [6M]
		ii) Describe the data representation in computers. [6M]
	OR	
	b	i) Explain the hardware architecture of the computer system. [6M]
	ii) Describe the use of algorithms in computer science. [6M]	
Unit-II		
2	a	i) Describe Arithmetic Operators, Assignment Operators, and Comparison Operators in detail with examples. [6M]
		ii) Draw a flowchart to generate the Fibonacci series. [6M]
	OR	
	b	i) Explain the various symbols of the flowchart with example. [6M]
	ii) Draw a flowchart to calculate the gcd of two numbers. [6M]	
Unit-III		
3	a	i) Explain the basic data types available in Python with examples. [6M]
		ii) Explain input/output statements with examples. [6M]
	OR	
	b	i) Explain the user-defined function with example. [6M]
	ii) Describe recursive function with example. [6M]	
Unit-IV		
4	a	i) Explain basic list operators and demonstrate with example. [6M]
		ii) Write an algorithm to insert, replace, delete an element from the list. [6M]
	OR	
	b	i) Explain dictionary literals with example. [6M]
	ii) Write an algorithm to add and remove keys from the dictionary. [6M]	
Unit-V		
5	a	i) Explain class and objects with proper example. [6M]
		ii) Write a program to demonstrate the concept of polymorphism. [6M]
	OR	
	b	i) Explain the concept of Object-Oriented Programming. [6M]
	ii) Write a program to demonstrate the concept of inheritance. [6M]	

I B.Tech I Semester Supple. Examinations, March-2022

Sub Code: 19BCC1TH07

ENGINEERING CHEMISTRY

Time: 3 hours

(Common to EEE, CSE, IT)

Max. Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12 = 60M)

Q.No	Questions	Marks
1	Unit-I	
	a	i) State the differences between hard water and soft water. [3M] ii) A water sample contains 333 mg of CaCl ₂ per litre water. Calculate the hardness in terms of CaCO ₃ equivalents. [4M] iii) Differentiate between cold lime soda process and hot lime soda process in softening of hard water. [5M]
	OR	
	b	i) Explain the following terms: Break point chlorination, Chemical Oxygen Demand and Biological Oxygen Demand [6M] ii) Explain the method of determination of hardness of water by EDTA. [6M]
	Unit-II	
	a	i) Explain the mechanism of free-radical chain polymerization with a suitable example. [6M] ii) What are thermosetting plastics and thermoplastics? Give examples. [3M] iii) State the characteristics of a good fuel. [3M]
2	OR	
	b	i) When 0.935 gm of a fuel underwent complete combustion in excess of oxygen, the increase of temperature of water in a calorimeter containing 1365 gm of water was 2.40 °C. Water equivalent of calorimeter is 135 gm. Calculate gross and net calorific value of the fuel. [5M] ii) Explain knocking in IC engine. Mention the anti-knocking additives used in petrol and diesel engine. [3M] iii) Distinguish between proximate analysis and ultimate analysis of coal [2M] iv) Why are gaseous fuels more advantageous than solid fuels? [2M]
	Unit-III	
	a	i) Explain sol-gel method for the synthesis of nanomaterials. [6M] ii) Explain the working principle of Transmission Electron Microscope. [6M]
	OR	
b	i) What are liquid crystals? State the differences between thermotropic and lyotropic liquid crystals. [6M] ii) Write down the applications of composite materials and carbon nanotubes [4M] iii) Mention any two properties of fullerenes. [2M]	
4	Unit-IV	
	a	i) An electrochemical cell consists of Zn ²⁺ /Zn and Ag ⁺ /Ag electrodes. Calculate the EMF of the cell at 298 K when [Zn ²⁺] = 0.1 M and [Ag ⁺] = 10 M. Given Standard electrode potential of Zn ²⁺ /Zn and Ag ⁺ /Ag electrodes are -0.76 V and +0.80 V, respectively. [5M] ii) What is galvanic corrosion? Explain its mechanism [4M] iii) Rusting of iron is quicker in saline water than in ordinary water. Give reason. [3M]
	OR	
	b	i) Explain working principle of H ₂ -O ₂ fuel with a suitable diagram and mention the chemical reaction involved in it. [6M]

		ii) What is meant by anodic sacrificial protection? Mention two applications of this method.	[4M]
		iii) How is galvanization different from cathodic protection?	[2M]
		Unit-V	
5	a	i) How Portland cement manufactured from raw materials? Explain with a suitable flow-diagram and chemical reactions involved in the process.	[7M]
		ii) What are refractory materials? Give examples. Mention any four characteristics of a good refractory material.	[5M]
		OR	
	b	i) Define lubricants. Discuss the classification of lubricants with suitable examples.	[5M]
		ii) State the differences between boundary lubrications and extreme-pressure lubrications.	[4M]
iii) Explain aniline point of a lubricating oil.		[3M]	

I B.Tech I Semester Supple Examinations, March-2022

Sub Code: 19BCC1TH10

C PROGRAMMING

Time: 3 hours

(Common to EEE, ME, CSE, IT)

Max. Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12 = 60M)

Q.No.	Questions	Marks
Unit-I		
1	i) Write an algorithm and draw a flowchart for finding maximum of three numbers.	[6M]
	ii) Explain Generations of programming languages with its advantages and disadvantages.	[6M]
	OR	
b	Define Operator & Operand. Explain various operators available in C with an example.	[12M]
Unit-II		
2	a Explain different types of function invocation methods with an example to each.	[12M]
	OR	
	i) Write a C Program to develop calculator application using switch statement.	[6M]
b	ii) What are the differences between entry control and exit control loop statements. Give an example to each.	[6M]
Unit-III		
3	i) Write a C program to perform multiplication of two matrices of size 4x4, and display the result in matrix order.	[8M]
	ii) Write a C program to find sum of the elements in the list.	[4M]
	OR	
b	i) Write a C program to reverse a string without using string handling function.	[6M]
	ii) Define string. Explain any three string handling function with an example.	[6M]
Unit-IV		
4	i) Define Pointer. How to declare & initialize a pointer. Explain the concept of pointer arithmetic in detail.	[6M]
	ii) What is the need of dynamic memory allocation. Explain dynamic memory allocation functions in detail.	[6M]
	OR	
b	i) Define Structure. What are the different ways to pass structure as a function argument, explain with an example?	[6M]
	ii) Compare and contrast structures and Unions with an example.	[6M]
Unit-V		
5	a Explain all file handling functions in detail with an example.	[12M]
	OR	
b	Write a C program to copy content from one file to another file	[12M]



NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS)

I B.Tech I Semester Supple Examinations, March-2022

Sub Code: 19BC11TH06

ELECTRONIC DEVICES AND LOGIC DESIGN

Time: 3 hours

(CSE & IT)

Max. Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12 = 60M)

Q.No.	Questions	Marks
Unit-I		
1	a	i) Explain the formation of p-n junction. (i) forward biased? and (ii) reverse biased. [6M]
		ii) Give the differences between n-type & p-type semiconductors. [6M]
	OR	
	b	i) Compare the characteristics of p-n junction diode, zener diode. [6M]
	ii) Explain briefly about the operation of Zener diode as a Voltage Regulator with necessary equations. [6M]	
Unit-II		
2	a	i) Discuss the working principle and characteristics of depletion mode MOSFET. [6M]
		ii) Explain how does the bipolar junction transistor work as a Switch. [6M]
	OR	
	b	i) Compare CB, CE and CC transistor configurations. [6M]
	ii) Explain CE configuration with the help of input and output characteristics. Indicate the three operating regions on the characteristics [6M]	
Unit-III		
3	a	i) Convert $AB.CD_{16}$ to binary, octal and decimal formats. [6M]
		ii) Design an OR gate using only NAND gates [6M]
	OR	
	b	i) Demorganise $(\bar{A} + B)(C + \bar{D})$ and implement using only NOR Gates [6M]
	ii) Using k-map, obtain minimal SOP expression $F = \sum m(4, 5, 6, 8, 9) + d(3, 7, 10, 11, 14, 15)$. [6M]	
Unit-IV		
4	a	i) A combinational circuit produces the binary sum of two 2-bit numbers, X_1X_0 and Y_1Y_0 . The outputs are C, S_1 and S_0 . Provide a truth table of the combinational circuit. Design the circuit using two full adders. [6M]
		ii) What is a decoder? Construct a 4 to 16 line decoder with five 2 to 4 line decoders with enable. [6M]
	OR	
	b	i) Design a 32:1 multiplexer using two 16:1 multiplexers and a 2:1 multiplexer. [6M]
	ii) Draw and explain operation of JK – flip flop also write its truth table. [6M]	
Unit-V		
5	a	i) Draw and explain different shift register configurations? [6M]
		ii) Design mod-12 ripple counter with timing diagram? [6M]
	OR	
	b	i) Explain universal shift register with neat diagram? [6M]
	ii) What are the limitations of asynchronous counter? [6M]	