AR16

CODE: 16BS2006 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, February-2021

COMPLEX VARIABLESAND STATISTICAL METHODS

(Common to CIVIL & MECH)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. Prove that the function $f(z)$ defined by

$$f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^2+y^2}(z \neq 0), \qquad f(0) = 0$$

is continuous and the Cauchy-Riemann equations are satisfied at the origin, but $f'(0)$ does not exist. 14 M

(OR)

2. a) If $f(z)$ is a regular function of z, then prove that 7 M

$$\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4\,|f'(z)|^2 .$$

b) Determine analytic function $f(z)$ in terms of z whose real part is 7 M

$$x^3 - 3\,x\,y^2 + 3\,x^2 - 3\,y^2 .$$

UNIT-II

3. a) Using Cauchy's Residue theorem, evaluate $\int_C \frac{e^{2z}}{(z+i)^4}\,dz$ where $C : |\,z\,| = 3$. 7M

b) If $f(a) = \int_C \frac{3z^2+7z+1}{z-a}\,dz$ where $C : |\,z\,| = 4$, then find the values of $f(1)$ 7M

(OR)

4. Evaluate $\int_C \frac{z-3}{z^2+2z+5}\,dz$ where C is the circle 14 M

(i) $|\,z\,| = 1$ (ii) $|\,z+1-i\,| = 2$

UNIT-III

5. a) Find the Taylor's series expansion of $f(z) = \frac{1}{z+3}$ about the point $z = i$. Also find the region of convergence and radius of convergence. 7 M

b) Find the Laurent's series expansion of $f(z) = \frac{1}{z^2+5z+6}$ in the region $2 < |z| < 3$. 7 M

(OR)

6. Expand $f(z) = \frac{1}{(z-1)(z-2)}$ in the region: 14 M

(i) $|z| < 1$ (ii) $1 < |\,z\,| < 2$ (iii) $|\,z\,| > 2$

AR16

CODE: 16BS2006 **SET-1**

UNIT-IV

7. a) Fit a Poisson distribution to the set of observations: 7 M

x:	0	1	2	3	4
f:	122	60	15	2	1

b) In a test of 2000 electric bulbs, it was found that the life of a particular make, was normally distributed with an average life of 2040 hours and S.D. of 60 hours. Estimate the number of bulbs likely to burn for 7 M
(i) more than 2150 hours (ii) less than 1950 hours and
(iii) more than 1920 hours and less than 2160 hours.

(OR)

8. a) The probability that an entering student will graduate is 0.4. Determine the probability that out of 5 students 7M
(i) none (ii) one and (iii) at least one will graduate.

b) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and S.D. of the distribution. 7 M

UNIT-V

9. By the method of least squares, find the straight line that best fits the following data: 14M

x:	1	2	3	4	5
y:	14	27	40	55	68

(OR)

10. Predict y at $x = 3.75$, by fitting a power curve $y = ax^b$ to the given data: 14M

x:	1	2	3	4	5	6
y:	298	4.26	5.21	6.10	6.80	7.50

***

AR16

CODE: 16EE2010 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, February-2021

ELECTRO MAGNETIC FIELD THEORY

(Electrical & Electronics Engineering)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	State and explain Coulomb's law and also mention its limitations?	6M
	b)	It is required to hold the four point charges +Q each in equilibrium at the corners of a square. Find the point charge which will do this, if placed at the centroid of a square.	8M

(OR)

2.	a)	Derive an expression for Electric field intensity in terms of potential gradient.	7M
	b)	Find the electric field strength at the point (1, -2, 1)m for the given potential $V = 3x^2y + 2yz^2 + 2xyz$.	7M

UNIT-II

3.	a)	Obtain an expression for ohm's law in point form.	6M
	b)	A parallel plate capacitor consists of two square metal plates of side 600mm and separated by a 9 mm. A slab of Teflon with $\varepsilon_r = 3$ and 5 mm thickness is placed on the lower plate leaving an air gap of 4mm thick between it and upper plate. If 200V is applied across the capacitor, find D, E, and V in Teflon and air.	8M

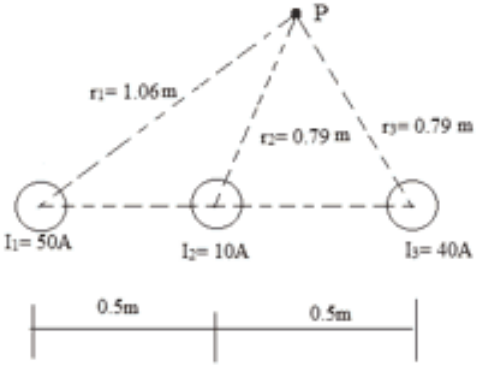
(OR)

4.	a)	Derive the boundary conditions of the normal and tangential components of electric field at the Inter face of two media with different dielectrics.	7M
	b)	Derive the expression for the continuity equation of current in differential form.	7M

UNIT-III

5.	a)	State Gauss's law and derive an expression for magnetic field intensity (**H**) due to an infinite line of current carrying conductor.	7M

b) Find the magnetic field intensity H at P due to currents I1, I2, I3 as shown in figure. 7M



(OR)

6. a) Using Biot-Savart's law derive the expression for the magnetic field at a point due to an infinitely long conductor carrying current. 8M
   b) State and prove maxwell's third equation. 6M

UNIT-IV

7. a) State and explain Lorentz force equation. 6M
   b) Two parallel wires separated 2m apart carry currents of 5A and 100A respectively in the same direction. Determine the magnitude and direction of the force between them per unit length. 8M

(OR)

8. a) Obtain an expression for the self-inductance of a toroid of a circular cross-section, with N closely spaced turns. 7M
   b) A point charge of value -60 nC is moving with a velocity of 6000 km/sec in a direction specified by the unit vector $a_v = -0.48a_x - 0.6a_y + 0.64a_z$. Using Lorentz's force equation, find the force F if $B = 2a_x - 6a_y + 5a_z$ mT ? 7M

UNIT-V

9. a) Explain the terms i) statically induced emf ii) dynamically induced emf 7M
   b) Find the frequency at which conduction current density and displacement current density are equal in a medium with σ = 2x10-4 mho/m and ε_R=81. 7M

(OR)

10. a) Modify Maxwell's equations for time varying fields. 7M
    b) A certain material has σ=0, μr=1. If E = 800sin(106t-0.01z)ay V/m make use of Maxwell's equation to find ϵ r . 7M

***

AR16

CODE: 16EC2007 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, February-2021

ANALOG COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	Explain demodulation of AM signal using square law detector	7M
	b)	Explain generation of AM waves using squre law modulator	7M
		(OR)	
2.	a)	Define modulation. Derive expression for the bandwidth required to transmit AM signal with the help of its spectrum.	7M
	b)	What are the main resources of Communication? Derive expression for the power required to transmit multi-tone AM signal.	7M

UNIT-II

3.	a)	Compare AM, DSBSC, SSBSC, and VSB modulation techniques	7M
	b)	Explain generation of DSBSC signal using any of the methods.	7M
		(OR)	
4.		Explain generation and demodulation of VSB wave	14M

UNIT-III

5.	a)	Explain the generation of FM using Direct method.	8M
	b)	Discuss the transmission bandwidth of FM signal.	6M
		(OR)	
6.	a)	A single tone modulating signal $\cos(15\pi 10^3 t)$ frequency modulates a carrier of 10MHz and a frequency deviation of 75KHz.Find the modulation index and phase deviation	6M
	b)	Explain generation of PM using FM	8M

UNIT-IV

7.	a)	Classify radio transmitter and explain them.	6M
	b)	Explain the functioning of "Tuned radio frequency receiver" with the help of a block diagram	8M
		(OR)	
8.	a)	Compare AM and FM receivers	6M
	b)	Illustrate the communication receiver	8M

UNIT-V

9.	a)	Explain the generation of PWM signal	7M
	b)	What are the types of pulse modulation and explain in detail.	7M
		(OR)	
10.	a)	Explain Noise in AM systems	7M
	b)	Explain Noise in FM systems	7M

AR16

CODE: 16CS2006 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, February-2021

COMPUTER ORGANIZATION AND ARCHITECTURE

(Common to CSE & IT)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	List the basic functional units of a computer. Describe their functionality.	7 M
	b)	What is meant by system software? Describe the various functions performed by it.	7 M
		(OR)	
2.	a)	Write in detail about the fixed-point representation of data.	8 M
	b)	List the steps needed to execute the machine instruction in terms of transfers between the functional units components and some simple control commands. Add LOCA, R0 Assume that the instruction itself is stored in the memory at location INSTR and that this address is initially in register PC.	6 M

UNIT-II

3.	a)	Provide an algorithm for performing addition and subtraction with signed-2's complement data. Explain it with an example.	7 M
	b)	Write in detail about the decimal multiplication operation.	7 M
		(OR)	
4.		Explain in detail about the floating-point arithmetic operations.	14 M

UNIT-III

5.	a)	What is an instruction format? Explain in detail about different types of instruction formats with suitable examples.	8 M
	b)	Describe the working of Arithmetic Logic shift unit.	6 M
		(OR)	
6.	a)	Explain the general register organization.	7 M
	b)	Write notes on bus and memory transfers.	7 M

UNIT-IV

7.		Discuss in detail about the modes of data transfer.	14 M
		(OR)	
8.	a)	What is auxiliary memory? Explain why is it needed in a computer system.	5 M
	b)	Explain in detail about the cache mapping techniques.	9 M

UNIT-V

9.		What is pipelining? Elaborate the concept of pipelining with appropriate examples.	14 M
		(OR)	
10.	a)	Elaborate the characteristics of multiprocessors.	7 M
	b)	Write brief notes on interprocessor communication and synchronization.	7 M

AR13

CODE: 13BS2007 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, February-2021

COMPLEX VARIABLES AND STATISTICAL METHODS
(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Find the real and imaginary parts of $f(z)=\cosh z$.
   b) Check whether $u(x,y)=x^2+y^2$ is harmonic.
   c) Find the points at which $f(z)=\bar{z}$ is not analytic.
   d) Write the Cauchy's residue theorem.
   e) Find the residue of $f(z)=\frac{\sin z}{z^2}$ at $z=0$.
   f) Find the fixed points of $f(z)=\frac{1}{z}$.
   g) Define conditional probability.
   h) Find $\frac{1}{\sqrt{2\pi}}\int_0^1 e^{-\frac{x^2}{2}}dx$, using normal distribution.
   i) Define Type I, II errors.
   j) Find $\chi^2_{0.05}$ with degrees of freedom 2.

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2. a) Show that $f(z)=e^z$ is an entire function. **6 M**
   b) Evaluate $\int_C \frac{z^2+z}{(z-2)^2}dz$, where C: $|z+2|=1$. **6 M**

(OR)

3. Find the conjugate harmonic function of $3x^2y+2x^2-y^3-2y^2$. **12M**

UNIT-II

4. a) Evaluate $\int_{-\infty}^{\infty}\frac{1}{x^2+9}dx$, using Cauchy's residue theorem. **10M**
   b) Find the poles of $f(z)=\cot z$. **2 M**

(OR)

5. a) Show that $\int_0^{2\pi}\frac{d\theta}{1+a\sin\theta}=\frac{2\pi}{\sqrt{1-a^2}}$, $|a|<1$, using Cauchy's residue theorem. **10M**
   b) Find the residue of $f(z)=\frac{\sin z}{z^{101}}$ at $z=0$. **2 M**

UNIT-III

6. Find a bilinear transformation that maps points $z = 1, i, -1$ into $w = -1, i, 1$ respectively. **6M**

(OR)

7. a) Find the image of the circle $|z| < 1$ under the transformation $w = f(z) = \frac{z+1}{iz-i}$. **6M**

   b) Explain about the transformation $w = \cos z$. **6M**

UNIT-IV

8. a) In a bolt factory, machines A_1, A_2, A_3 manufacture 30%, 40% and30% of the total of their out put and 5%, 4% and 3% are defective. A bolt is drawn at random and found to be defective. Find the probabilities that it is manufactured from (i) machine A_1, (ii) machine A_2, (iii) machine A_3 **6M**

   b) If X is a normal random variable with mean, μ= 105, and standard deviation σ = 4 then find P{ X≤ 113}. **6M**

(OR)

9. a) If the probability that an individual suffers a bad reaction from a certain injection is 0.001. Determine the probability that out of 2000 individuals (i) Exactly 3 (ii) More than two individuals (iii) none suffers a bad reaction **6M**

   b) Find the mean of Normal distribution **6M**

UNIT-V

10. a) The specifications for a certain kind of ribbon call for a mean breaking strength of 180 pounds. If five pieces of the ribbon (randomly selected from different rolls) have a mean breaking strength of 169.5 pounds with a standard deviation of 5.7 pounds, test the null hypothesis μ= 180 against the alternative hypothesis μ < 180 pounds at 1 % level of significance. Assume that the population distribution is normal. **6M**

    b) A study shows that 16 of 200 tractors produced on one assembly line required extensive adjustments before they could be shipped, while the same was true for 14 of 400 tractors produced on another assembly line. At 1% level of significance, does this support the claim that the second population line does superior work? **6M**

(OR)

11. a) A company claims that is light bulbs are superior to those of its main competitor, If a study shown that a sample of $n_1 = 40$ of its bulbs has a mean lifetime of 647 hours of continuous use with a standard deviation of 27 hours, while a sample of $n_2 = 40$ bulbs made by its main competitor had a mean lifetime of 638 hours of continuous with a standard deviation of 31 hours, does this substantiate the claim at the 0.05 level significance? **6M**

    b) A random sample of size $n = 81$ is taken from a population with $\sigma = 0.9$. Given that the sample mean is $\bar{x} = 20.8$, construct a 95% confidence interval for the population mean μ. **6M**

***

AR13

CODE: 13ME2008 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, February-2021

FLUID MECHANICS AND HYDRAULIC MACHINERY
(Mechanical Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

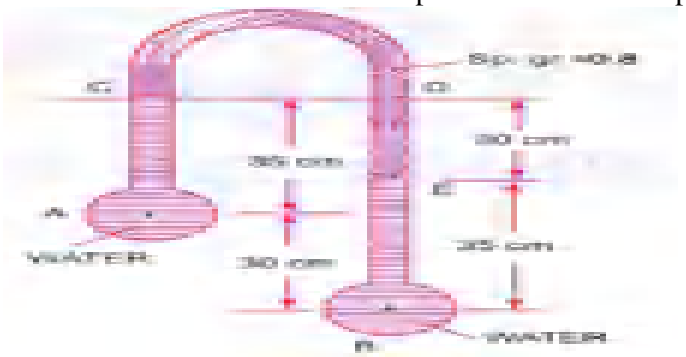
1. a) What is Newtonian fluid?
   b) Differentiate uniform and non-uniform flows.
   c) What are the limitations of the Bernoulli's equation?
   d) Show that the stream lines and equipotential lines from a net of mutually perpendicular lines.
   e) What do you mean by flow through parallel pipes?
   f) Define flow net
   g) Where Kaplan turbine used?
   h) What is surge tank?
   i) Define the term Slip in reciprocating pumps.
   j) Define NPSH.

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2. An inverted U-tube manometer is connected to two horizontal pipes A and B through which water is flowing. The vertical distance between the axes of these pipes is 30 cm. when an oil of specific gravity 0.8 is used as a gauge fluid, the vertical heights of water columns in the two limbs of the inverted manometer (when measured from the respective centre lines of the pipes) are found to be same and equal to 35 cm. determine the difference of pressure between the pipes 12M



(OR)

3. a) What is the significance of viscosity and surface tension in fluid flow phenomenon? Explain in detail with required equations. 8M
   b) Differentiate between stream lines and streak lines. 4M

UNIT-II

4.	a)	Derive the 3-D continuity equation in Cartesian co-ordinates.	8M
	b)	Write the equation and limitations of the Bernoulli's equation?	4M
		(OR)	
5.		Draw a neat sketch of the Reynolds apparatus, and explain how the laminar flow can be demonstrated with the help of the apparatus.	12M

UNIT-III

6.	a)	Explain the principle of Venturimeter with a neat sketch. Derive the expression for the rate of fluid through it.	8M
	b)	Write a short on minor losses in pipes?	4M
		(OR)	
7.	a)	Derive friction factor for the flow through the circular pipe by Darcy Weisbach Equation?	8M
	b)	Explain hydraulic gradient line and total energy line with neat sketch	4M

UNIT-IV

8.	a)	A Kaplan turbine works under a head of 60 m at a speed of 145 r.p.m utilizing $175 m^3/s$ of water. Diameter of runner and hub are 5.60 m & 3.20 m. Turbine develops 82500 kW. Find i) flow ratio ii) speed ratio iii) overall efficiency iv) Specific speed.	8M
	b)	List out various classification of turbines.	4M
		(OR)	
9.	a)	A Pelton wheel is supplied with 180 litres/sec of water under a head of 300 m. The mean peripheral velocity of the bucket is 20 m/s. If the outlet tip angle of the bucket is 160^0, find out the power developed and efficiency.	8M
	b)	Write a short notes on principles of radial flow and axial flow turbines. Give examples?	4M

UNIT-V

10.	a)	A centrifugal pump is to discharge 0.118m3/ sec at a speed of 1450 rpm against a head of 25m. The impeller diameter at outlet is 250mm and its width at outlet is 50mm and Manometric efficiency is 75%. Determine vane angle at outer periphery of the impeller.	8M
	b)	Define slip of reciprocating pump and under what circumstances does the negative slip will occur?	4M
		(OR)	
11.	a)	A single acting- acting reciprocating pump, running at 50 r.p.m. delivers 0.00736 m3/s of water. The diameter of the piston 200 mm and stroke length 300 mm. the suction and delivery heads are 3.5 m and 11.5 m respectively. Determine: Theoretical discharge, Co-efficient of discharge, Percentage slip of the pump, and Power required to run the pump.	8M
	b)	Differentiate between reciprocating pump and centrifugal pump.	4M

***

AR13

CODE: 13CS2008 SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, February-2021

COMPUTER ORGANIZATION AND ARCHITECTURE

(Common to CSE & IT)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1 a) What is 2's complement ?
b) What is BUS and its types?
c) Define Register Direct addressing mode ?
d) What is Secondary Memory with examples?
e) What are the benefits of using I/O Interface ?
f) What is CISC ?
g) What is the importance of error detection codes ?
h) What is Memory transfer?
i) What is stack organization ?
j) what is Instruction pipelining?

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2 a) Explain IEEE standard for floating point representation 6M
b) Explain the functional unit of computer with neat sketch. 6M

(OR)

3 a) Explain Arithmetic Micro-operations with neat diagram. 6M
b) Explain shift micro operations with examples. 6M

UNIT-II

4 a) Explain the Division algorithm with example. 6M
b) Explain General registers organization with example. 6M

(OR)

5 a) Explain the various address modes? Give the suitable examples. 6M
b) Explain Look ahead carry adders . 6M

UNIT-III

6 a) Explain Set associative mapping in cache memory . 6M
b) Explain the concept of how memory is connected to the CPU. 6M

(OR)

7 a) Explain the following 6M
i) Magnetic disk ii) Magnetic tape
b) Explain the importance of RAM and ROM with neat diagram. 6M

UNIT-IV

8 a) Explain Programmed I/O with flow chart. 6M
b) Explain interrupt initiated I/O. 6M

(OR)

9 a) Explain **Handshaking for asynchronous data transfer** with neat sketches. 6M
b) What is direct memory transfer? Give an overview and the block diagram of a DMA controller. 6M

UNIT-V

10 a) Explain Pipeline Hazards with suitable examples. 6M
b) Explain RISC architecture with neat diagram and discuss its advantages. 6M

(OR)

11 a) Explain CISC architecture with neat diagram and discuss its advantages. 6M
b) Discuss arbitration Procedure and types ? 6M