AMC EDUCATION

AMC ENGINEERING COLLEGE

DEPARTMENT OF COMPUTER SCIENCE (MCA)

18MCA51 - Programming Using C#.NET

4th Assignment Questions - Module 4 & 5

Last Date for Submission: 09/01/2021

1) Illustrate the working of Check Box, Radio Button, textbox and Group Box controls with windows forms application example.
2) What is WPF? With a neat diagram explain the WPF architecture and its components.
3) a) Explain XAML elements with an example.
   b) Explain Markup Extensions classes in XAML.
4) Explain in detail multi-tier application architecture with a neat diagram.
5) What is validation control? Briefly explain different types of validation controls available in ASP.NET.
6) Explain the following AJAX Server controls.
   i) Script Manager Control   ii) Update Panel Control.

PRINCIPAL
AMC ENGINEERING COLLEGE
BENGALURU - 560 083.

Course outcome of Engineering Physics (18PHY12/22)
Upon successful completion of this course students will be able to:
18PHY12/22.1 : Describe the fundamentals of damped, forced oscillations and shock waves.
18PHY12/22.2 : Discuss the concepts of elastic properties of materials.
18PHY12/22.3 : Explain the relation between electric-magnetic fields and the transverse nature of electromagnetic waves.
18PHY12/22.4 : Compute eigen values and eigen functions of sub atomic particles using 1-D Schrodinger's equation.
18PHY12/22.5 : Explain the principles, types and applications of LASER and optical fibers
18PHY12/22.6 : Describe the electrical properties of conductors, semiconductors and dielectric materials.

Module 1 - Waves and oscillations

1. Discuss the characteristics of simple harmonic motion and mention four examples for SHM.
2. Derive the differential equation of simple harmonic motion and mention its solution.
3. Derive the expressions for equivalent force constant for two springs in (a) series and (b) parallel.
4. What are free and forced vibrations. Establish an equation for damped vibrations and give its general solution.
5. Discuss the three cases in detail for damped vibration with suitable examples for each case.
6. Define quality factor(Q) with its physical significance.
7. Derive an expression for amplitude and phase of forced vibrations.
8. Discuss the dependence of amplitude and phase on the frequency of the applied force for three cases.
9. Discuss the condition for resonance with its physical significance along with two examples.

10. Write a note on the sharpness of resonance with reference to damping.
11. Discuss the resonance in a cavity resonator - Helmholtz resonator (mechanical resonance)
12. Write a short note on phasor representation of simple harmonic motion.
13. Define Mach number and Mach angle. Distinguish between acoustic, ultrasonic, subsonic, supersonic, transonic and hypersonic waves.
14. Define shock wave & explain its properties.
15. Define control volume.
16. Define and mention the laws of conservation of mass, energy and momentum.
17. Construct and label Reddy shock tube and explain its working.
18. Explain five applications of shock waves qualitatively.

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Module 2 - Elastic properties of materials

1. Explain Young's modulus, rigidity modulus and bulk modulus
2. Describe stress-strain graph.
3. Write a note on plasticity and elasticity along with one engineering application of elasticity,
4. Explain the following
   (a) Effect of continuous stress and temperature
   (b) Annealing
   (c) Effect of impurities of elasticity
   (d) Strain softening
   (e) Strain hardening
5. Define longitudinal strain coefficient and lateral strain coefficient. Show that poisson's ratio $\sigma = \frac{\beta}{\alpha}$.
6. Derive the relation between shear strain and linear strain.
7. Derive the relation between Young's modulus (Y), rigidity modulus (n) and poisson's ratio (σ).

8. Derive the relation between Young's modulus (Y), bulk modulus(k) and poisson's ratio (σ).
9. Derive the relation between Young's modulus (Y), rigidity modulus (n) and bulk modulus(k).
10. Write a note on the limiting value of σ.
11. Define beam, neutral axis, neutral surface, bending moment, single cantilever.
12. Derive an expression for bending moment (both rectangular and circular cross-section).
13. Discuss the different types of beams and their engineering applications.
14. Derive an expression for young's modulus of a single cantilever of a rectangular cross section.
15. Derive the expression for couple per unit twist (torsion of a cylinder).
16. Explain torsional oscillations giving two applications of torsional pendulum.

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Module 3 - Maxwell's equations, EM waves and optical fibers

1. Explain briefly divergence, curl of a field with their physical significance.
2. Explain Gauss law in electrostatics and magnetism.
3. Explain Stokes theorem.
4. Derive Gauss divergence theorem.
5. Describe Amperes law.
6. Explain Biot-Savarts law.
7. Derive the differential form of Faradays law.
8. Derive Maxwell-Amperes law using equation of continuity.
9. Derive the expression for displacement current.
10. List the four Maxwells equation for time varying condition. Also give two of the equations in the changed form for static conditions.
11. Derive the wave equation for electromagnetic waves using Maxwells equation.

12. Explain the transverse nature of electromagnetic waves.
13. Explain plane electromagnetic waves in vacuum.
14. Explain the conditions under which linear polarization, circular polarization and elliptical polarization could be achieved.
15. Develop the expression for the angle of acceptance and numerical aperture in an optical fiber.
16. List the types of optical fibers and modes of propagation.
17. Discuss the mechanisms involved in attenuation of the signal in optical fibers.
18. Outline the point to point communication system using optical fibers with the help of block diagram representation
19. Discuss the merits and demerits of optical fiber communication

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Module4 : Quantum mechanics & LASERs

1. State and explain Heisenbergs uncertainty principle and give its physical significance
2. Utilize Heisenbergs uncertainty principle to prove that the electron does not exist inside the nucleus.
3. Summarize the properties and physical significance of a wave function.
4. Develop one dimensional time independent Schrodinger wave equation.
5. Determine the energy eigen value & eigen function of a particle in a potential well of infinite depth. Compare its eigen function, eigen values and probability density for ground state, I excited & II excited states.
6. Build the expression for energy density in terms of Einstiens A & B coefficients.
7. Discuss the requisites and condition for a laser system.
8. Explain the construction and working of CO2 laser.
9. Elaborate the construction and working of a semiconductor laser.

10. How laser is used in defence (LASER range finder) and Engineering (Data sorage)

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Module 5 - Material Science

Quantum free electron theory of metals

1. Explain the failure of classical free electron theory.
2. List the assumptions of quantum free electron theory.
3. Discuss the dependence of Fermi factor on temperature & energy.
4. Elaborate on the density of states qualitatively.
5. Summarize on Fermi-Dirac statistics.
6. Develop the expression for electrical conductivity based on quantum free electron theory.
7. How do you conclude that quantum free electron theory is successful over the classical free electron theory?
8. Mention the expression for electron concentration in conduction band & hole concentration in valence band.
9. Prove that the Fermi level in an intrinsic semiconductor lies middle of energy gap.
10. Derive the expression for conductivity of semiconducting materials.

11. Explain Hall effect and derive the expression for Hall coefficient and Hall voltage.
12. Distinguish between polar and non-polar dielectric materials.
13. Explain the different types of polarization mechanisms and mention the relation between dielectric constant and polarization.
14. Define internal field and mention the expressions for one-dimensional and three dimensional cases and Lorentz field.
15. Derive the expression for Clausius-Mossotti equation.
16. Describe the solid, liquid and gaseous dielectrics with one example for each.
17. Explain the applications of dielectrics in transformers (qualitatively).

DEPARTMENT OF MATHEMATICS AMC ENGINEERING COLLEGE,
BANGALORE-560083

MODULE – 1:

DIFFERENTIAL CALCULUS – 1

1. Find the angle of intersection between the curves

(a) $r = a(1+sin\theta)$ & $r = a(1-cos\theta)$ (b) $r = a(1+cos\theta)$&$r^2 = a^2\cos 2\theta$.

(c) $r = \frac{a}{1+\cos\theta}$, $r = \frac{a}{1-\cos\theta}$ (d) $r = \frac{a\theta}{1+\theta}$ and $r = \frac{a}{1+\theta^2}$

(e) $r^n = a^n \cos n\theta$ and $r^n = a^n \sin n\theta$ (f) $r^2 \sin 2\theta = a^2$ and $r^2 \cos 2\theta = b^2$

(g) $r = \sin\theta + \cos\theta$ and $r = 2\sin\theta$ (h) $r = 4\sec^2\left(\frac{\theta}{2}\right)$ and $r = 9cosec^2\left(\frac{\theta}{2}\right)$

(i) $r = a(1+cos\theta)$& $r = b(1-cos\theta)$ (j) $r = a\,e^{\theta}$ and $re^{\theta} = b$

(k) $r = a(1+sin\theta)$ and $r = b(1-sin\theta)$ (l) $r^2\sin 2\theta = 4$ and $r^2 = 16\sin 2\theta$

2. Show that the angle between the curves $r^2 \sin 2\theta = 4$ and $r^2 = 16\sin 2\theta$ is $\pi/3$
3. Show that the angle between the pair of curves $r = a\log\theta$ and $r = a/\log\theta$ is $2tan^{-1}e$.
4. With usual notation, prove that $tan\varphi = r\left[d\theta/dr\right]$.
5. With usual notation, prove that $1/p^2 = 1/r^2 + 1/r^4\left[dr/d\theta\right]^2$.
6. Find the pedal equation of the curve

   (a) $r^m \cos m\theta = a^m$ (b) $\frac{2a}{r} = (1+\cos\theta)$ (c) $r^n = a(1+\cos n\theta)$

   (d) $r^n = a^n\cos n\theta$ (e) $r = a(1+\cos\theta)$ (f) $r^n = sechn\theta$

   (g) $r(1-\cos\theta) = 2a$ (h) $r = ae^{m\theta}$ (i) $l/r = 1 + e\cos\theta$.

   (j) $r^m = a^m(\cos m\theta + \sin m\theta)$.
7. Find the pedal equation of the curve $r^n = a^n \sin n\theta + b^n \cos n\theta$ in the form $p^2[a^{2n} + b^{2n}] = r^{2n+2}$.
8. Find the radius of curvature at the point $\left(\frac{3a}{2},\frac{3a}{2}\right)$ on the curve $x^3 + y^3 = 3axy$.
9. Find the radius of curvature of the curve $y^2 = \frac{4a^2(2a-x)}{x}$ where the curve meets the $x-axis$.
10. Show that the radius of curvature at any point θ on the cycloid $x = a(\theta + sin\theta)$, $y = a(1-cos\theta)$ is $4a\cos\left(\frac{\theta}{2}\right)$.
11. Find the radius of curvature of the curve $r^n = a^n\cos n\theta$ and $r^n = a^n\sin n\theta$.
12. Prove that for the curve $\frac{\rho^2}{r}$ is a constant for the cardioide $r = a(1+\cos\theta)$, where ρ *is the* radius of curvature.
13. Find the radius of curvature at a point 't' on the curve i) $x = at^2, y = 2at$ ii) $x = acos^3t, y = asin^3t$.

MODULE II

DIFFERENTIAL CALCULUS II

1. Expand $e^{\sin x}$ using Maclaurin's theorem upto the terms containingx^4
2. Obtain the Maclurin's expansion of $\log_e x$ upto the term containing fourth degree and hence obtain the value $\log_e(1.1)$
3. Using Maclaurin's series, expand *tanx* upto the term containing x^5
4. Obtain the Maclaurin's expansion of *log(1+sinx)* upto the term containing x^4.
5. Obtain the Maclaurin's expansion of $\sqrt{1+sinx}$upto the term containing x^4.
6. Obtain the Maclaurin's expansion of $\frac{e^x}{e^x+1}$up to the term containing x^4.
7. Obtain the Maclaurin's expansion of $log(1+e^x)$up to the term containing x^4.
8. Using Maclaurin's series, prove that $\sqrt{1+\sin 2x} = 1 + x - \frac{x^2}{2} - \frac{x^3}{6} + \frac{x^4}{24}$
9. Evaluate the following limits :

a) $\lim_{x\to 0}\left(\frac{a^x+b^x+c^x+d^x}{4}\right)^{1/x}$

b) $\lim_{x\to 0}\left[\left(\frac{\sin x}{x}\right)^{1/x}\right]$

c) $\lim_{x\to 0}\left(\frac{\sin x}{x}\right)^{1/x}$

d) $\lim_{x\to\frac{\pi}{4}}(\tan x)^{\tan 2x}$

e) $\lim_{x\to a}\left[\left(2-\frac{x}{a}\right)^{\cot(x-a)}\right]$

f) $\lim_{x\to 0}\left(\frac{a^x+b^x+c^x}{3}\right)^{1/x}$

g) $\lim_{x\to 0}\left(\frac{\tan x}{x}\right)^{1/x^2}$

h) $\lim_{x\to 0}\left(\frac{\tan x}{x}\right)^{1/x}$

i) $\lim_{x\to 0}\left(\frac{\sin x}{x}\right)^{1/x^2}$

j) $\lim_{x\to 0}\left(\frac{\cos x}{x}\right)^{1/x^2}$

k) $\lim_{x\to 0}(1+sinx)^{\cot x}$

l) $\lim_{x\to \pi/2}(cosx)^{(\pi/2)-x}$

MODULE - V

LINEAR ALGEBRA

I. Find the rank of the following matrices by elementary row transformations:

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

d. $\begin{bmatrix} 2 & -1 & 3 & 4 \\ 0 & 3 & 4 & 1 \\ 2 & 3 & 7 & 5 \\ 2 & 5 & 11 & 6 \end{bmatrix}$

b. $\begin{bmatrix} -2 & -1 & -3 & -1 \\ 1 & 2 & 3 & 3 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 \end{bmatrix}$

e. $\begin{bmatrix} 4 & 0 & 2 & 1 \\ 2 & 1 & 3 & 4 \\ 2 & 3 & 4 & 7 \\ 2 & 3 & 1 & 4 \end{bmatrix}$

c. $\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$

f. $\begin{bmatrix} 2 & -1 & 3 & 1 \\ 1 & 4 & -2 & -1 \\ 5 & 2 & 4 & 3 \end{bmatrix}$

II. Solve the following system of equation by Gauss elimination method.

1. $x + 2y + z = 3,\ 2x + 3y + 2z = 5,\ 3x - 5y + 5z = 2.$
2. $2x + y + 4z = 12,\quad 4x + 11y - z = 33,\quad 8x - 3y + 2z = 20$
3. $4x + y + z = 4,\quad x + 4y - 2z = 4,\quad 3x + 2y - 4z = 6$
4. $3x - y + 2z = 12,\quad x + 2y + 3z = 11,\quad 2x - 2y - z = 2$
5. $x + y + z = 9,\quad 2x - 3y + 4z = 13,\quad 3x + 4y + 5z = 40$
6. $x + y + z = 9,\ x - 2y + 3z = 8,\ 2x + y - z = 3$
7. $2x_1 + 4x_2 + x_3 = 3,\ 3x_1 + 2x_2 - 2x_3 = -2,\ x_1 - x_2 + x_3 = 6$

III. Find the Eigen value and Eigen Vector of the matrix

1. Find the Eigen value and Eigen Vector of the matrix $A = \begin{bmatrix} 1 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$
2. Using power method to find the largest value of the matrix $A = \begin{bmatrix} 4 & 2 \\ 1 & 3 \end{bmatrix}$. Do four steps only.
3. Find the Eigen value and Eigen Vector of the following matrix $A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$ apply 4 iteration take [1,0,0] as initial approximation. Using power method.
4. Using power method to find the largest value of the matrix $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$
5. Using power method to find the largest value of the matrix $A = \begin{bmatrix} 4 & 1 & -1 \\ 2 & 3 & -1 \\ -2 & 1 & 5 \end{bmatrix}$ by taking $X^{(0)} = [1, 0, 0]^T$ as initial eigen vector (perform 7 iterations)
6. Using power method to find the largest value of the matrix $\begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & 4 \end{bmatrix}$ by taking $X^{(0)} = [1, 0, 0]^T$ as initial eigen vector (perform 7 iterations)

CIVIL ENGINEERING DEPARTMENT

HIGHWAY ENGINEERING

Assignment Questions :-

1. Explain the significance of ESWL in pavement design ?
2. Explain the different types of pavement construction ?
3. Explain the construction steps for CC pavement slab ?
4. Explain the construction steps for WBM &WMM ?
5. Write a short note on
   1.prime coat 2.steel coat 3.bituminous mecadam and bituminous concrete ?

6. Explain the functions of granular material sub-base and explain its method of construction?
7. Explain the importance of highway drainage?
8. Discuss the various components of quant able and non quant able benefits to the road user to highway development project
9. Explain requirements and significance of highway drainage system ?
10. Explain the various road user benefits of highway improvements ?
11. Discuss the various method of economic analysis of highway

12. Explain surface drainage system and sub surface drainage system?
13. Explain types of cross drainage structure and their choices and location
14. Explain the design of soil aggregate mix by rothfutch method
15. Write a short note on :-

A).benefit cross ratio method.
B).NDP method
C).IRR method
D).BOT and BOOT
E). Dry lean concrete sub-base and PQC

Problems:-

1). A load penetration values of CBR tests conducted on a specimen of a soil sample are given below. Determine the CBR value of soil, if 100 divisions of load represents 190 kg and in the calibration chart of proving ring.

Penetration of plunger,in mm	0.0	0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0	7.5	10.0	12.5
Load dial readings(divisions)	0	8	15	23	29	34	37	43	48	57	63	67

2) Calculate the stresses at interior,edge and corner regions of cement concrete pavement using westergards stress equation use the following data wheel load P=5100 kg, modulus of elasticity, E= $3x10^5$ kg/cm^2 , pavement thickness, h=18cm, poisons ratio of concrete, μ=0.15, modulus of subgrade reaction k=6kg/cm^3 ,radius of contact area,a=15cm?

3). Compare the annual costs of two types of pavement structure ,a).WBM with thin bituminous surface at total cost of RS,2.2 lakhs per km life of 5 years intrest at 10% salvage value of RS,0.9 lakhs after 5 years; annual average maintenance cost of RS,0.35 lakhs per km and b). bituminous macadam base and bituminous concrete surface total cost of RS,4.2 lakhs per km life of 15 years intrest at 8% salvage value of RS. 2lakhs at the end of 15 years; annual average maintenance cost RS.0.25 lakhs per km?

4).The maximum quantity of water expected in longitudinal drains on clayey soil is 0.9 m^3/sec design the cross section and longitudinal slope of trapezoidal drain assuming the bottom width of the trapezoidal section to be 1.0m and cross slope to be 1.2 m/sec and mannings roughness coefficient is 0.02?

5).calculate the annual cost of a stretch of highway from the following particulars;

item	Total cost lakhs	Estimated life years	Rate of interest
Land	35.0	100	6%
Earthwork	40.0	40	8%
Bridges,culverts,drainage	50.0	60	8%
Pavement	90.0	15	10%
Traffic signs and road appurtenance	15.0	5	10%

The average cost of maintenance of the road is Rs.1.5 lakhs per year.

6). A plate load test was conducted on a soaked sub grade during monsoon using a plate diameter of 30cm. the load values corresponding to the mean settlement dial readings and given below .determine the modulus of sub grade reaction for the standard plate .

Mean settlement values,mm	0.0	0.24	0.52	0.76	1.02	1.23	1.53	1.76
Load values kg	0.0	460	900	1180	1360	1480	1590	1640

AMC ENGINEERING COLLEGE, BENGALURU – 560083

Department of Computer Science & Engineering

Machine Learning-17CS73

Assignment -2 (quiz)

Year-2020-21

Q.No	Question	Marks	Cos	Pos/ PSO	Blooms cognitive level
1.	Which of the following option is true about k-NN algorithm? • It can be used for classification • It can be used for regression • It can be used in both classification and regression	**1**	CO 1		Understand
2	Which of the following machine learning algorithm can be used for imputing missing values of both categorical and continuous variables? • K-NN • Linear Regression • Logistic Regression	1	CO 3	PO1,2,4	Apply
3	Which of the following is an application of reinforcement learning? • Topic modeling • Recommendation system • Pattern recognition • Image classification	**1**	CO 3	PO1,2,4	Apply
4	Which of the following is true about reinforcement learning? • The agent gets rewards or penalty according to the action • It's an online learning • The target of an agent is to maximize the rewards • All of the above	**1**	CO 1		Understand
5	Which algorithm is used in robotics and industrial automation? • Thompson sampling • Naive Bayes • Decision tree • All of the above	**1**	CO 2		Understand

6	If Linear regression model perfectly first i.e., train error is zero, then ______________________ • Test error is also always zero • Test error is non zero • Couldn't comment on Test error • Test error is equal to Train error	**1**	CO 3	PO1,2, 4	Apply
7	A machine learning problem involves four attributes plus a class. The attributes have 3, 2, 2, and 2 possible values each. The class has 3 possible values. How many maximum possible different examples are there? • 12 • 24 • 48 • 72	**1**	CO 1		Underst and
8	Which of the following is NOT supervised learning? • PCA • Decision Tree • Linear Regression • Naive Bayesian	**1**	CO 3	PO2 , PO5, PSO 1-	Underst and
9	Which of the following statements about Naive Bayes is incorrect? • Attributes are equally important • Attributes are statistically dependent of one another given the class value. • Attributes are statistically independent of one another given the class value. Attributes can be nominal or numeric	**1**			
10	Suppose we would like to perform clustering on spatial data such as the geometrical locations of houses. We wish to produce clusters of many different sizes and shapes. Which of the following methods is the most appropriate? • Decision Trees • Density-based clustering • Model-based clustering • K-means clustering	**1**			

CO1: Recall the problems for Machine Learning. And select the either supervised, unsupervised or reinforcement learning.

CO3: Illustrate concept learning, ANN, Bayes Classifier, k-nearest neighbour, Q

AMC ENGINEERING COLLEGE, BENGALURU – 560083

Department of Computer Science & Engineering

Machine Learning-17CS73

Assignment -1(quiz)

Year-2020-21

Q.No	Question	Marks	Cos	Pos/ PSO	Blooms cognitive level
1.	Suspose you are working on weather prediction, and use a learning algorithm to predict tomorrow's temperature (in degrees Centigrade/Fahrenheit).Would you treat this as a classification or a regression problem? ○ Regression ○ Classification		CO 1		Under stand
2	A computer program is said to learn from experience E with respect to some task T and some performance measure P if its performance on T, as measured by P, improves with experience E. Suppose we feed a learning algorithm a lot of historical weather data, and have it learn to predict weather. In this setting, what is T? ○ The weather prediction task. ○ None of these. ○ The probability of it correctly predicting a future date's weather. ○ The process of the algorithm examining a large amount of historical weather data.		CO 3	PO1,2,4	Apply
3	Assume that you are given a data set and a neural network model trained on the data set. You are asked to build a decision tree model with the sole purpose of understanding/interpreting the built neural network model. In such a scenario, which among the following measures would you concentrate most on optimizing? ○ Accuracy of the decision tree model on the given data set ○ F1 measure of the decision tree model on the given data set ○ Fidelity of the decision tree model, which is the fraction of instances on which the neural		CO 3	PO1,2,4	Apply

	○ network and the decision tree give the same output ○ Comprehensibility of the decision tree model, measured in terms of the size of the corresponding rule set				
4	Entropy value highest means that the partitions in classification ○ Pure ○ not pure ○ useful ○ useless		CO 1		Under stand
5	When data set is homogeneous then entropy value is ○ 1 ○ 2 ○ 0		CO 2		Under stand
6	Find-S algorithm starts from the most specific hypothesis and generalize it by considering only ______example ○ Negative ○ Positive ○ Negative or Positive ○ none of the above		CO 3	PO1,2, 4	Apply
7	Candidate -Elimination algorithm represents _________. ○ Solution space ○ Version space ○ Inductive bias set		CO 1		Under stand
8	Which of the following are the advantage/s of Decision Trees? ○ Possible Scenarios can be added ○ Use a white box model, If given result is provided by a model ○ Worst, best and expected values can be determined for different scenarios ○ All of the mentioned		CO 3	PO2 , PO5, PSO 1-	Under stand
9	In classification, the target variable is discrete. Hence, each data point in a leaf has an associated class label. ○ Leaves in regression contain labels. ○ Leaves in classification contain models ○ Leaves in regression contain models.				

10	Say you have a data set with lots of categorical variables and some numerical variables. The target variable is continuous, so it's a regression problem. After some exploratory data analysis, you figure out that it will be best to perform decision tree regression instead of linear regression. Which of the following statements will be correct? More than one option may be correct. ○ It is hard to represent all the data via a single model; so you don't want to use the linear regression model. ○ Decision trees will split the data set into multiple sets and will apply linear regression to each set separately. ○ The number of models will be less than the number of leaves on the tree.				

CO1: Recall the problems for Machine Learning. And select the either supervised, unsupervised or reinforcement learning.

CO3: Illustrate concept learning, ANN, Bayes Classifier, k-nearest neighbour, Q

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BASIC ELECTRONICS QUESTION BANK

Q: Explain the operation pf a p-n junction diode under unbiased , forward biased and reverse biased condition with neat diagrams.

Q: Explain the V_I characteristics of a diode . Also write Shockley's equation

Q: Explain different diode approximations (diode equivalent circuits)

Q: With neat circuit diagram and waveforms , explain the working of a half wave / full wave with 2 diodes and CT transformer / bridge rectifier .

Q: For HWR derive the equations for Average /DC load current 2.DC load voltage 3. Ripple factor 4. Efficiency. (Repeat the same for FWR))

Q: With neat circuit diagram and waveforms , explain the working of a half wave / full wave with 2 diodes and CT transformer / bridge rectifier **with capacitor filter.**

Q: Comparison of 3 rectifiers

Q: What is a zener diode ?Explain the operation of a zener voltage regulator with and without load.

Q: Write short notes on

Zener breakdown & Avalanche break down

Photodiode

Photocoupler

Light Emitting diode

Characteristics of IC reglulators

Q: Explain 78XX /7805 IC regulator with neat diagrams.

Q: Define: Knee/cutin voltage, Reverse breakdown voltage, PIV, Max power rating, Static and dynamic resistances for a diode.

Numericals :

1.A Si diode has reverse saturation current of 10nA OPERATING AT 25^0 c . Calculate the diode current for a forward bias of 0.6 V

2. For the circuits given determine Id and Vo using approximate model of diode

3.Problem on zener diode regulator

4. problems on FWR bridge .

	AMC ENGINEERING COLLEGE **DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING** **ACADEMIC YEAR 2020-2021**

Electromagnetic Field Theory (18EE45)

ASSIGNMENT - II

1. Calculate the work done in assembling four equal point charges of 1µC each on x axis and y axis at ±3 m and ±4m respectively.
    i. Given then potential field V= [Ar4+Br-4]sin4ϕ
    ii. Show that Δ2= 0
    iii. Select A and B such that V=100 and (|E|) $^{\rightarrow}$ =500V/m at P(r=1, ϕ= 22.50, z=2.
2. Derive the expression for capacitance of a parallel plate capacitor
3. Find the work done in moving a charge of 2C from (2,0,0) to (0,2,0)m along a straight line path joining the two points if E $^{\rightarrow}$= 120x(ax) $^{\rightarrow}$+ 4y(ay) $^{\rightarrow}$
4. Obtain an expression for the work done in moving a point charge in an electric field
5. Determine the work done in carrying a charge of 2 C from B (1,0,1) to A (0.8,0.6,1) in an electric field ($\vec{E} = ya_x + xa_y + 2a_z$) V/m along the short arc of circle $x^2 + y^2 = 1$, z=1
6. Define electric potential. Derive and expression for potential due to several point charges.
7. Electrical potential at an arbitrary point in free space is given as
8. V = $(x+1)^2 + (y+2)^2 + (z+3)^2$ volts. At P (2, 1, 0) find i) V ii) $\vec{E}$ iii) $\overrightarrow{|E|}$ iv) $\vec{D}$ v) $\overrightarrow{|D|}$
9. Find an expression establishing the relationship between electric field intensity and potential gradient.
10. Find the work done in assembling four equal point charges of 1µC each on x axis and y axis at ±3 m and ±4m respectively.
11. Write a note on energy density in electrostatic field.
12. Obtain the point form of continuity equation.

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MODULE 5 QUESTION BANK

Sub Name: Data structure and application Sub code: 18CS32

Q. No.	Questions	Marks
1	What is Data Structures? Classify and Explain the briefly. Also explain the basic operations that can be performed on data structures. List out the applications.	7
2	What is an Algorithm? Explain the criteria that an algorithm must satisfy.	8
3	What are the different types of memory Allocation? Explain the Different functions that supports Dynamic Memory Allocation	7
4	List out the differences between SLL and DLL.	7
5	Explain with an example: Insertion and Deletion in an array.	8
6	Define Structures .Illustrate different ways of declaring structures with Example.	8
7	List and explain 3 types of structures used to store the strings. (10m)	8
8	Write an algorithm for insertion sort. Also discuss about the complexity of the insertion sort.	8
9	Define Pointers. Give advantages and disadvantages of pointers. How do you declare and initialize the pointer. How do you access the value pointed to by a pointer.	7
10	What is pointer to pointer? Give the following declaration. int a=8;int b=9;int*p=&a; int*q=&b; What is the value of each of the following expression? ++a, ++(*p),--(*q),--b Write a function to swap the contents of2variablesusing pointer.	7

11	Write a C Program to define details of the Employee with the fields like EName,EmpID,DOJ(Date, Month, Year)and Salary(Basic,DA,HRA)Read data for 10 employees and display them. Find the Employee who is getting Highest Salary.	6
12	Suppose each student in a class of 25 students is given 4 tests, assume that the students are numbered from 1to25,and the test scores area ssigned in the 25X4 matrix called SCORE. Suppose Base(SCORE) =200w=4and the programming language uses row-major order tostorethis2Darray,thenfind The address of 3rd test of 12th student i.e. SCORE(12,3).	6
13	Write appropriate structure definition and variable declarations to storefollowinginformationabout50 students: Name, USN,GENDER, DOB and Marks in 3subjects S1,S2,S3. Date of birth should be a structure containing fields day, month and year	6
14	What is self-referential structure? Bring out the difference between Structure sand unions.	8
15	Write a c program to implement(i)Linear Search (ii)Binary Search(iii)SelectionSort(iv)BubbleSort.(Alsoalgorithmsforthese–Jan19(17s))	8
16	Write a C Program to Create 1D and 2D Arrays using dynamic memory Allocations. & also freeing the memory.(OR)What is dynamically allocated arrays? Explain with suitable examples.	10
17	Explain about the representation of 2D arrays in memory	7
18	Write a C Program to implement(i)Pattern matching(ii)strrev() (iii)strcpy()(iv)strcat()(v)strcmp()	7
19	What is a string?(How is a string declared and initialized).Explain the Following string functions with example :STRTOK,STRCAT& SUBSTR.(4M)	8
20	Consider the pattern ababab, construct the table and the corresponding labeled directed graph used in the second pattern matching algorithm.	8
21	What do you mean by pattern matching? Let P and T are 2 strings with lengths R and S respectively & stored as arrays with one character per element. Write a pattern matching algorithm that finds index Pin T. Also discuss about this algorithm. (10m)	7
22	Write the Knuth Morris Pratt(KMP)pattern matching algorithm and apply the same to search the pattern ‘abcdabcy’ in the text ‘abcxabcdabxabcdabcdabcy’	10
23	What is Polynomial? What is degree of polynomial? WriteaCProgramtoadd2 polynomials A and B, store the result in polynomials C. →Consider 2 polynomials, $A(x)=4x^{15}+3x^4+5$&$B(x)=x^4+10x^2+1$. Represent polynomials using array of structures(show diagrammatically show these 2polynomials canbestoredin1Darray)and also give its C representation →Consider2polynomials,$A(x)=2x^{1000}+1$and $B(x)=x^4+10x^3+3x^2+1$ with a Diagram to show how these polynomials arestoredin1D Array. Write an algorithm to implement a stack using dynamic array whose initial capacity is 1and array doubling is used to increase the stack’s capacity(i.e. dynamically reallocate twice the memory) whenever an element is added to full stack. Implement the	10

	operations—push, pop and display.	
24	Write the post fix form of the expression: • A÷(B*C –D/E ↑F)*G) *H. •((6+93-2)*4↑5+7) •AB C*D	8
25	Explain in detail multiple stacks, with relevant functions in C	7
26	Define queues. List the different types of queues. Write the implementation of ordinary queues using arrays.(*C function)	7
27	Write a short note on DE queues and priority queue.	7
28	Define Linked Lists. Explain in detail, the primitive operations performed on Singly Linked Lists. List the different types of linked lists.	8
29	How can an ordinary queue be represented using a singly linked list? Write C function for linked implementation of ordinary queue insertion &deletion.	7
30	List out the differences between SLL and DLL.	8
31	Write node structure for linked representation of polynomial. Write function to add two polynomials represented using linked list.(*with header nodes)	8
32	What is a tree? Write the routines to traverse the given string using i. Pre-order traversal ii. In-order traversal iii. Post-order traversal	8
33	List the rules to construct the threads. Write the routines for in-order traversal of a threaded binary tree.	7
34	Give in-order sequence: DJGBHEAFKIC and post-order sequence: JGDHEBKIFCA. Construct BT for the same.	7
35	Write an algorithm for insertion sort. Also discuss about the complexity of the insertion sort.	8
36	How an insertion sort works? Suppose an array A contains 8 elements as follows: *77,33, 44,11,88,22, 66,55*.Trace insertion sort algorithm for sorting in ascending order.	7
37	Write algorithm for BFS and DFS graph traversal methods.	8

DEPARTMENT OF MATHEMATICS AMC ENGINEERING COLLEGE,
BANGALORE-560083

MODULE – 1:

DIFFERENTIAL CALCULUS – 1

1. Find the angle of intersection between the curves

(a) $r = a(1 + sin\theta)$ & $r = a(1 - cos\theta)$ (b) $r = a(1 + cos\theta)$&$r^2 = a^2 \cos 2\theta$.

(c) $r = \frac{a}{1+\cos\theta}$, $r = \frac{a}{1-\cos\theta}$ (d) $r = \frac{a\theta}{1+\theta}$ and $r = \frac{a}{1+\theta^2}$

(e) $r^n = a^n \cos n\theta$ and $r^n = a^n \sin n\theta$ (f) $r^2 \sin 2\theta = a^2$ and $r^2 \cos 2\theta = b^2$

(g) $r = \sin\theta + \cos\theta$ and $r = 2\sin\theta$ (h) $r = 4\sec^2\left(\frac{\theta}{2}\right)$ and $r = 9cosec^2\left(\frac{\theta}{2}\right)$

(i) $r = a(1 + cos\theta)$& $r = b(1 - cos\theta)$ (j) $r = a\,e^{\theta}$ and $re^{\theta} = b$

(k) $r = a(1 + sin\theta)$ and $r = b(1 - sin\theta)$ (l) $r^2 \sin 2\theta = 4$ and $r^2 = 16\sin 2\theta$

2. Show that the angle between the curves $r^2 \sin 2\theta = 4$ and $r^2 = 16 \sin 2\theta$ is $\pi/3$
3. Show that the angle between the pair of curves $r = a \log\theta$ and $r = a / \log\theta$ is $2tan^{-1}e$.
4. With usual notation, prove that $tan\varphi = r\left[d\theta/dr\right]$.
5. With usual notation, prove that $1/p^2 = 1/r^2 + 1/r^4 \left[dr/d\theta\right]^2$.
6. Find the pedal equation of the curve

   (a) $r^m \cos m\theta = a^m$ (b) $\frac{2a}{r} = (1 + \cos\theta)$ (c) $r^n = a(1 + \cos n\theta)$

   (d) $r^n = a^n \cos n\theta$ (e) $r = a(1 + \cos\theta)$ (f) $r^n = sechn\theta$

   (g) $r(1 - \cos\theta) = 2a$ (h) $r = ae^{m\theta}$ (i) $l/r = 1 + e\cos\theta$.

   (j) $r^m = a^m(\cos m\theta + \sin m\theta)$.
7. Find the pedal equation of the curve $r^n = a^n \sin n\theta + b^n \cos n\theta$ in the form $p^2[a^{2n} + b^{2n}] = r^{2n+2}$.
8. Find the radius of curvature at the point $\left(\frac{3a}{2}, \frac{3a}{2}\right)$ on the curve $x^3 + y^3 = 3axy$.
9. Find the radius of curvature of the curve $y^2 = \frac{4a^2(2a-x)}{x}$ where the curve meets the $x - axis$.
10. Show that the radius of curvature at any point θ on the cycloid $x = a(\theta + sin\theta)$, $y = a(1 - cos\theta)$ is $4a\cos\left(\frac{\theta}{2}\right)$.
11. Find the radius of curvature of the curve $r^n = a^n \cos n\theta$ and $r^n = a^n \sin n\theta$.
12. Prove that for the curve $\frac{\rho^2}{r}$ is a constant for the cardioide $r = a(1 + \cos\theta)$,where ρ *is the* radius of curvature.
13. Find the radius of curvature at a point 't' on the curve i) $x = at^2, y = 2at$ ii) $x = acos^3t, y = asin^3t$.

MODULE II

DIFFERENTIAL CALCULUS II

1. Expand $e^{\sin x}$ using Maclaurin's theorem upto the terms containingx^4
2. Obtain the Maclurin's expansion of $\log_e x$ upto the term containing fourth degree and hence obtain the value $\log_e(1.1)$
3. Using Maclaurin's series, expand *tanx* upto the term containing x^5
4. Obtain the Maclaurin's expansion of *log(1+sinx)* upto the term containing x^4.
5. Obtain the Maclaurin's expansion of $\sqrt{1+sinx}$upto the term containing x^4.
6. Obtain the Maclaurin's expansion of $\frac{e^x}{e^x+1}$up to the term containing x^4.
7. Obtain the Maclaurin's expansion of $log(1+e^x)$up to the term containing x^4.
8. Using Maclaurin's series, prove that $\sqrt{1+\sin 2x} = 1 + x - \frac{x^2}{2} - \frac{x^3}{6} + \frac{x^4}{24}$
9. Evaluate the following limits :

a) $\lim_{x\to 0}\left(\frac{a^x+b^x+c^x+d^x}{4}\right)^{1/x}$

b) $\lim_{x\to 0}\left[\left(\frac{\sin x}{x}\right)^{1/x}\right]$

c) $\lim_{x\to 0}\left(\frac{\sin x}{x}\right)^{1/x}$

d) $\lim_{x\to\frac{\pi}{4}}(\tan x)^{\tan 2x}$

e) $\lim_{x\to a}\left[\left(2-\frac{x}{a}\right)^{\cot(x-a)}\right]$

f) $\lim_{x\to 0}\left(\frac{a^x+b^x+c^x}{3}\right)^{1/x}$

g) $\lim_{x\to 0}\left(\frac{\tan x}{x}\right)^{1/x^2}$

h) $\lim_{x\to 0}\left(\frac{\tan x}{x}\right)^{1/x}$

i) $\lim_{x\to 0}\left(\frac{\sin x}{x}\right)^{1/x^2}$

j) $\lim_{x\to 0}\left(\frac{\cos x}{x}\right)^{1/x^2}$

k) $\lim_{x\to 0}(1+sinx)^{\cot x}$

l) $\lim_{x\to\pi/2}(cosx)^{(\pi/2)-x}$

MODULE - V

LINEAR ALGEBRA

I. Find the rank of the following matrices by elementary row transformations:

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

d. $\begin{bmatrix} 2 & -1 & 3 & 4 \\ 0 & 3 & 4 & 1 \\ 2 & 3 & 7 & 5 \\ 2 & 5 & 11 & 6 \end{bmatrix}$

b. $\begin{bmatrix} -2 & -1 & -3 & -1 \\ 1 & 2 & 3 & 3 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 \end{bmatrix}$

e. $\begin{bmatrix} 4 & 0 & 2 & 1 \\ 2 & 1 & 3 & 4 \\ 2 & 3 & 4 & 7 \\ 2 & 3 & 1 & 4 \end{bmatrix}$

c. $\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$

f. $\begin{bmatrix} 2 & -1 & 3 & 1 \\ 1 & 4 & -2 & -1 \\ 5 & 2 & 4 & 3 \end{bmatrix}$

II. Solve the following system of equation by Gauss elimination method.

1. $x + 2y + z = 3,\ 2x + 3y + 2z = 5,\ 3x - 5y + 5z = 2.$
2. $2x + y + 4z = 12,\quad 4x + 11y - z = 33,\quad 8x - 3y + 2z = 20$
3. $4x + y + z = 4,\quad x + 4y - 2z = 4,\quad 3x + 2y - 4z = 6$
4. $3x - y + 2z = 12,\quad x + 2y + 3z = 11,\quad 2x - 2y - z = 2$
5. $x + y + z = 9,\quad 2x - 3y + 4z = 13,\quad 3x + 4y + 5z = 40$
6. $x + y + z = 9,\ x - 2y + 3z = 8,\ 2x + y - z = 3$
7. $2x_1 + 4x_2 + x_3 = 3,\ 3x_1 + 2x_2 - 2x_3 = -2,\ x_1 - x_2 + x_3 = 6$

III. Find the Eigen value and Eigen Vector of the matrix

1. Find the Eigen value and Eigen Vector of the matrix $A = \begin{bmatrix} 1 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$
2. Using power method to find the largest value of the matrix $A = \begin{bmatrix} 4 & 2 \\ 1 & 3 \end{bmatrix}$. Do four steps only.
3. Find the Eigen value and Eigen Vector of the following matrix $A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$ apply 4 iteration take [1,0,0] as initial approximation. Using power method.
4. Using power method to find the largest value of the matrix $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$
5. Using power method to find the largest value of the matrix $A = \begin{bmatrix} 4 & 1 & -1 \\ 2 & 3 & -1 \\ -2 & 1 & 5 \end{bmatrix}$ by taking $X^{(0)} = [1, 0, 0]^T$ as initial eigen vector (perform 7 iterations)
6. Using power method to find the largest value of the matrix $\begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & 4 \end{bmatrix}$ by taking $X^{(0)} = [1, 0, 0]^T$ as initial eigen vector (perform 7 iterations)

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