Subject: Mathematics for Engineer

Number of question: 50

Structure:

* level 1(knowledge & comprehension): 5;
* level 2 (application & analysis): 40;
* level 3 (synthesis & evaluation): 5.

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|  | HCM |
| **QN=1** | (Level 2) The function has |
| a. | two different horizontal asymptotes |
| b. | only one horizontal asymptote |
| c. | no horizontal asymptote |
| d. | three different horizontal asymptotes. |
| e. |  |
| f. |  |
| ANS: | A |
| PTS: |  |
| CHAPTER: | 1 |
| MIX CHOICES: | Yes |

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| **QN=2** | (Level 2) Let h(x)=f(g(x)) . If h(x)= 2x-4 and f(x)=x-5 then g(x) is |
| a. | -2x+7 |
| b. | -2x-2 |
| c. | -2x+3 |
| d. | 2x+1 |
| e. |  |
| f. |  |
| ANS: | D |
| PTS: |  |
| CHAPTER: | 1 |
| MIX CHOICES: | Yes |

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| **QN=3** | (Level 1) Use the table to evaluate the expression.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | *x* | 1 | 2 | 3 | 4 | 5 | 6 | |  | 3 | 4 | 2 | 0 | 1 | 2 | |  | 3 | 6 | 1 | 3 | 4 | 0 | |
| a. | 1 |
| b. | 2 |
| c. | 3 |
| d. | 4 |
| e. | 5 |
| f. | 0 |
| ANS: | B |
| PTS: |  |
| CHAPTER: | 1 |
| MIX CHOICES: | Yes |

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| **QN=4** | (Level 2) Find |
| a. | 1 |
| b. | 2 |
| c. | ½ |
| d. | ¼ |
| e. | None of the others. |
| f. | 0 |
| ANS: | F |
| PTS: |  |
| CHAPTER: | 1 |
| MIX CHOICES: | Yes |
| Level | 2 |

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| **QN=5** | Which of the following is (are) **odd** function(s)? |
| a. | f(x)= x3-2015 |
| b. | f(x)= sin(2x4) |
| c. | f(x)=sin(x-1) |
| d. |  |
| e. | f(x)=sinxcosx |
| f. |  |
| ANS: | E |
| PTS: |  |
| CHAPTER: | 1 |
| MIX CHOICES: | Yes |

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| **QN=6** | (Level 2) What is |
| a. | 4 |
| b. | ¼ |
| c. | 0 |
| d. |  |
| e. | None of the others. |
| f. |  |
| ANS: | C |
| PTS: |  |
| CHAPTER: | 2 |
| MIX CHOICES: | Yes |

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| **QN=7** | (Level 2) Choose the **false** statements. |
| a. | If f is continuous at *a* then f is differentiable at *a.* |
| b. | If f’(r) exists then the limit of f as x approaches r is f(r). |
| c. | If f is differential at *a*, f is continuous at *a*. |
| d. | If f is continuous at x=*a* then |
| e. |  |
| f. |  |
| ANS: | A |
| PTS: |  |
| CHAPTER: | 2 |
| MIX CHOICES: | Yes |

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| **QN=8** | (Level 2) Suppose h(x)=f(g(x)) and f(-1)=3,g(5)=1,g’(5)= -1,f’(3)=2, f’(1)=-2. Find h’(5). |
| a. | -3 |
| b. | -2 |
| c. | 2 |
| d. | -4 |
| e. | 3 |
| f. |  |
| ANS: | C |
| PTS: |  |
| CHAPTER: | 2 |
| MIX CHOICES: | Yes |

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| **QN=9** | (Level 2) Which of the following is the equation of the tangent line to the curve  at the point (1,2) ? |
| a. | y=2x-1 |
| b. | y=-2x+1 |
| c. | y=-2x-1 |
| d. | y=2x+2 |
| e. | y=2x-2 |
| f. | y=-x+3 |
| ANS: | F |
| PTS: |  |
| CHAPTER: | 2 |
| MIX CHOICES: | Yes |

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| **QN=10** | (Level 2) If y=x3+2x and dx/dt=3, find dy/dt when x=2. |
| a. | 14 |
| b. | 42 |
| c. | 62 |
| d. | None of the others |
| e. | 70 |
| f. |  |
| ANS: | B |
| PTS: |  |
| CHAPTER: | 2 |
| MIX CHOICES: | Yes |

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| **QN=11** | (Level 2) Suppose f(1)=3 and 7≤f’(x) for all x. How small can f(5) possible be? |
| a. | 31 |
| b. | 28 |
| c. | 4 |
| d. | 25 |
| e. | None of the others |
| f. |  |
| ANS: | A |
| PTS: |  |
| CHAPTER: | 3 |
| MIX CHOICES: | Yes |

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| **QN=12** | (Level 2) Find the points of inflection of the function |
| a. | (1,-1) |
| b. | (-1,1) |
| c. | (0,10) |
| d. | (1,-1) and (-1,1) |
| e. |  |
| f. |  |
| ANS: | C |
| PTS: |  |
| CHAPTER: | 3 |
| MIX CHOICES: | Yes |

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| **QN=13** | (Level 2) Use Newton’s Method with initial approximation x1= -2 to find x3, the third approximation to the root of the equation x3-2x+1=0. Which is the result correct to 2 decimal places? |
| a. | -1.61 |
| b. | -1.62 |
| c. | -1.63 |
| d. | -1.65 |
| e. | -1.7 |
| f. |  |
| ANS: | B |
| PTS: |  |
| CHAPTER: | 3 |
| MIX CHOICES: | Yes |

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| **QN=14** | (Level 2) A partical moves in the straight line and has acceleration given by a(t)=3t+2. Its initial velocity is v(0)=3m/s. Find its velocity after 2 seconds. |
| a. | 10 cm/s |
| b. | 8 cm/s |
| c. | 13 cm/s |
| d. | 3 cm/s |
| e. |  |
| f. |  |
| ANS: | C |
| PTS: |  |
| CHAPTER: | 3 |
| MIX CHOICES: | Yes |

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| **QN=15** | (Level 2) Find the Riemann sum for f(x)=x2 ,0≤x≤1, with four equal subintervals, taking the sample points to be right endpoints. |
| a. | 0.21873 |
| b. | 0.21875 |
| c. | 0.21874 |
| d. | 0.33333 |
| e. | 0.46875 |
| f. |  |
| ANS: | E |
| PTS: |  |
| CHAPTER: | 4 |
| MIX CHOICES: | Yes |

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| **QN=16** | (Level 2)Suppose  Find g’(x). |
| a. | g’(x)=sin(x-1) |
| b. | g’(x)=sin(x2-1) |
| c. | g’(x)=cos(x-1) |
| d. | g’(x)=3xcos(x2-1) |
| e. | g’(x)=3x2 sin(x3-1) |
| f. |  |
| ANS: | E |
| PTS: |  |
| CHAPTER: | 4 |
| MIX CHOICES: | Yes |

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| **QN=17** | (Level 2) Find the average value of the function f(x)=2x+3 on the interval [1,5]. |
| a. | 7 |
| b. | 14 |
| c. | 2 |
| d. | 4 |
| e. | 9 |
| f. |  |
| ANS: | E |
| PTS: |  |
| CHAPTER: | 4 |
| MIX CHOICES: | Yes |

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| **QN=18** | (Level 3) Suppose *f* is a function such that f(0)=-2, f’(0)=3, f(1)=3,  f’(1)=-2, f’’(0)=4, f’’(1)=17. Find |
| a. | None of the others. |
| b. | 3 |
| c. | 5 |
| d. | 13 |
| e. | -3 |
| f. | -5 |
| ANS: | F |
| PTS: |  |
| CHAPTER: | 4 |
| MIX CHOICES: | Yes |
| Level | 3 |

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| **QN=19** | (Level 2)Compute |
| a. | 0 |
| b. | (e2 +1)/4 |
| c. | ½ |
| d. | ¼ |
| e. | None of the others. |
| f. |  |
| ANS: | B |
| PTS: |  |
| CHAPTER: | 6 |
| MIX CHOICES: | Yes |

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| **QN=20** | (Level 2) Which of the following is (are) convergent? |
| a. |  |
| b. |  |
| c. |  |
| d. |  |
| e. |  |
| f. |  |
| ANS: | A |
| PTS: |  |
| CHAPTER: | 6 |
| MIX CHOICES: | Yes |

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| **QN=21** | (Level 3) Evaluate the integral. |
| a. |  |
| b. |  |
| c. |  |
| d. | None of the others. |
| e. | -1 |
| f. |  |
| ANS: | **A** |
| PTS: |  |
| CHAPTER: | 6 |
| MIX CHOICES: | Yes |

21. Casio nhập - ()=0

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| **QN=22** | (Level 2) Find the volume of the solid obtaine by rotating the region bounded by the curves y=x, y=x2 about x-axis. |
| a. |  |
| b. |  |
| c. |  |
| d. |  |
| e. | None of the others |
| f. |  |
| **ANS:** | **A** |
| PTS: |  |
| CHAPTER: | 7 |
| MIX CHOICES: | Yes |

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| **QN=23** | (Level 2) Find the area of the region bounded by the curves y=x+1, y=x2+1. |
| a. | **1/6** |
| b. | ½ |
| c. | 1/3 |
| d. | 1 |
| e. |  |
| f. |  |
| ANS: | **A** |
| PTS: |  |
| CHAPTER: | 7 |
| MIX CHOICES: | Yes |

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| QN=24 | (Level 3) Suppose s(x) is the arc length function for the curve y=ex taking (0,1) as the starting point. Find s’(x). |
| a. |  |
| b. |  |
| c. | 1+ex |
| d. | 1+e2x |
| e. | None of the others. |
| f. |  |
| ANS: | **B** |
| PTS: |  |
| CHAPTER: | 7 |
| MIX CHOICES: | Yes |

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| **QN=25** | (Level 2) dy/dt = ky + f(t) is a population model where y is the population at time t and f(t) is some function to describe the net effect on the population. Assume k = 0.02 and y = 10,000 when t = 0. Solve the differential equation of y when f(t) = 8t. |
| a. | y = -400t - 20,000 + 30,000e0.02t |
| b. | y = -400t - 20,000 + 30,000e-0.02t |
| c. | y = 400t + 20,000 + 30,000e-0.02t |
| d. | y = 400t + 20,000 + 30,000e-0.02t |
| e. | y = 400t - 20,000 + 30,000e-0.02t |
| f. |  |
| ANS: | **B** |
| PTS: |  |
| CHAPTER: | 7 |
| MIX CHOICES: | Yes |

Text, letter

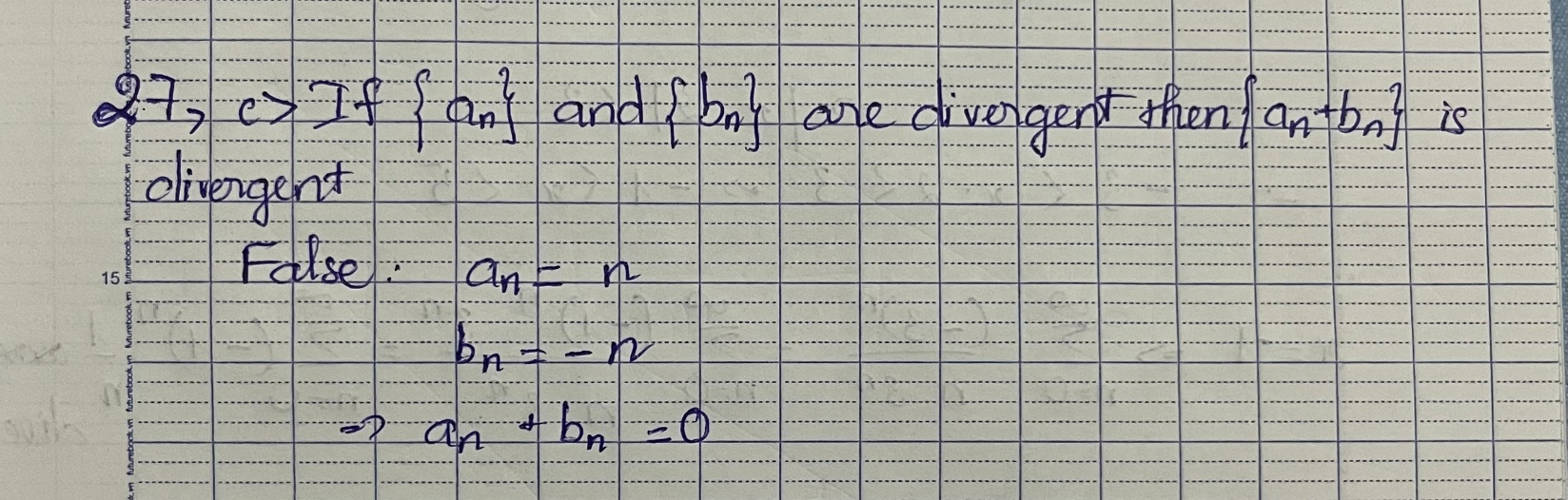
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| **QN=26** | (Level 2) A sequence {an} is defined by a1=0, an+1=2/(an+1) for n>0. Assuming that {an} is convergent, find its limit. |
| a. | 1 |
| b. | -2 |
| c. | 1 and -2 |
| d. | 0 |
| e. | None of the others. |
| f. |  |
| ANS: | **A** |
| PTS: |  |
| CHAPTER: | 8 |
| MIX CHOICES: | Yes |

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| **QN=27** | (Level 2) Choose the incorrect statements. |
| a. | If the series ∑an converges then liman=0. |
| b. | If 0<an for all n and then liman=0. |
| c. | If {an} and {bn} are divergent then {an+bn} is divergent. |
| d. | is not divergent |
| e. |  |
| f. |  |
| ANS: | **C** |
| PTS: |  |
| CHAPTER: | 8 |
| MIX CHOICES: | Yes |



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| QN=28 | (Level 3)Which of the following series(es) is (are) **not** convergent? |
| a. |  |
| b. |  |
| c. |  |
| d. |  |
| e. |  |
| f. |  |
| ANS: | **A** |
| PTS: |  |
| CHAPTER: | 8 |
| MIX CHOICES: | Yes |

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| QN=29 | (Level 3)By the ratio test, find the **interval of convergence** of the power series |
| a. | [-1,5) |
| b. | (-1,5] |
| c. | (-1,5) |
| d. | [-2,4] |
| e. |  |
| f. |  |
| ANS: | **A** |
| PTS: |  |
| CHAPTER: | 8 |
| MIX CHOICES: | Yes |

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| **QN=30** | (Level 2) Find |
| a. | ½ |
| b. | 0 |
| c. | 1 |
| d. | ∞ |
| e. | Does not exist. |
| f. |  |
| ANS: | **B** |
| PTS: |  |
| CHAPTER: | 8 |
| MIX CHOICES: | Yes |

Text, letter

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| **QN=31** | (Level 1) Solve the system of linear equations:  3x + y = 9  x – y = 3 |
| a. | x = 6, y = 3 |
| b. | x = 0, y = –3 |
| c. | x = 3, y = 0 |
| d. | x = 1, y = 1 |
| e. | None of the others |
| f. |  |
| ANS: | **C** |
| PTS: |  |
| CHAPTER: | 1p2 |
| MIX CHOICES: | Yes |

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| **QN=32** | (Level 2) Consider a homogeneous system of 5 linear equations in 6 unknowns. Which of the following  is true? |
| a. | The system can have no solution. |
| b. | The system has between 0 and 5 solutions. |
| c. | The system always has infinitely many solutions. |
| d. | The system has only the trivial solution. |
| e. | The system has either the trivial solution only or infinitely many solutions. |
| f. |  |
| ANS: | **C** |
| PTS: |  |
| CHAPTER: | 1p2 |
| MIX CHOICES: | Yes |

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| **QN=33** | (Level 2)There are nickels, dimes and pennies in a bowl, 10 coins in all, at least one of each type. Ifthe total value of the coins is 31 cents, determine (*p*; *n*; *d*) where there are *p* pennies, *n* nickelsand *d* dimes. (Note that p; n and d are integers! 1 penny = 1 cent; 1 nickel = 5 cents; 1 dime = 10 cents) |
| a. | (p; n; d) = (5; 2; 1) |
| b. | (p; n; d) = (6; 3; 1) |
| c. | (p; n; d) = (5; 2; 3) |
| d. | None of the others |
| e. |  |
| f. |  |
| ANS: | **B** |
| PTS: |  |
| CHAPTER: | 1p2 |
| MIX CHOICES: | Yes |

33. 6.1+3.5+1.10=31

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| **QN=34** | (Level 2)Suppose A ia a 3x3 matrix with rank(A)=3. Are we able to obtained a matrix B from A by one elementary operation such that rank(B)=0? |
| a. | Yes, by interchanging two rows |
| b. | Yes, by multiplyingthe first row of A by 0 |
| c. | By adding a multiple of one row to another row of A. |
| d. | No, we aren’t. |
| e. |  |
| f. |  |
| ANS: | **D** |
| PTS: |  |
| CHAPTER: | 1p2 |
| MIX CHOICES: | Yes |

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| **QN=35** | (Level 2)The director of a trust fund has $100.000 to invest. The rules of the trust state that both a certificate of deposit (CD) and a long – term bond must be used. The director’s goal is to have the trust yield $7800 on its investments for the year. The CD chosen returns 5% per annum and the bond 9%. Determine the amount x to invest in the CD and the amount y to invest in the bond. |
| a. | x=30.000; y=70.000 |
| b. | x=50.000; y=70.000 |
| c. | x=50.000; y=60.000 |
| d. | x=30.000; y=40.000 |
| e. | x=30.000; y=80.000 |
| f. |  |
| ANS: | **A** |
| PTS: |  |
| CHAPTER: | 1p2 |
| MIX CHOICES: | Yes |

35. x + y = 100.000

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| **QN=36** | (Level 3)Find the possible equilibrium price structures when the input-output matrix is  A picture containing text  Description automatically generated |
| a. |  |
| b. |  |
| c. |  |
| d. |  |
| e. |  |
| f. |  |
| ANS: | **B** |
| PTS: |  |
| CHAPTER: | 2p2 |
| MIX CHOICES: | Yes |

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| **QN=37** | (Level 1)The (2; 1)-entry of the product is: |
| a. | 2 |
| b. | 6 |
| c. | 0 |
| d. | 4 |
| e. | None of the others |
| f. |  |
| ANS: | **B** |
| PTS: |  |
| CHAPTER: | 2p2 |
| MIX CHOICES: | Yes |

37. sử dụng casio tính tích vô hướng 2 ma trận ta được

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| QN=38 | (Level 2)If an *n* × *n* matrix A satisfies A2 – 6 A + 5 I*n* = 0, then A-1 |
| a. | does not exist |
| b. | is (6 I*n* – A)/5 |
| c. | is (A – 6 I*n*)/5 |
| d. | exists, but there is not enough information to determine it |
| e. | exists only if *n* < 6 |
| f. |  |
| ANS: | **B** |
| PTS: |  |
| CHAPTER: | 2p2 |
| MIX CHOICES: | Yes |

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| **QN=39** | (Level 2)Only two of the following statements are true. Which two?  (i) Matrix addition and matrix multiplication are associative.  (ii) Matrix addition is associative but matrix multiplication is not.  (iii) Matrix addition and matrix multiplication are commutative.  (iv) Matrix multiplication is commutative but matrix addition is not.  (v) If the matrix product AB = 0; it does not follow that A or B is a zero matrix. |
| a. | (i) and (iii) |
| b. | (iv) and (v) |
| c. | (ii) and (iii) |
| d. | (i) and (v) |
| e. | (ii) and (iv) |
| f. |  |
| ANS: | **D** |
| PTS: |  |
| CHAPTER: | 2p2 |
| MIX CHOICES: | Yes |

39.

(i) Phép cộng ma trận và phép nhân ma trận có tính chất kết hợp. (đúng)

(iii) ) Phép cộng ma trận và phép nhân ma trận có tính chất giao hoán.(phép nhân không có tính chất giao hoán)

-> đáp án D

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| **QN=40** | (Level 1)  Let  Find A+B-C |
| a. |  |
| b. |  |
| c. |  |
| d. |  |
| e. |  |
| f. |  |
| ANS: | **A** |
| PTS: |  |
| CHAPTER: | 2p2 |
| MIX CHOICES: | Yes |

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| **QN=41** | (Level 1)  Find ? |
| a. | 4 |
| b. | 8 |
| c. | -4 |
| d. | -8 |
| e. | 0 |
| f. |  |
| ANS: | **C** |
| PTS: |  |
| CHAPTER: | 3p2 |
| MIX CHOICES: | Yes |

41. 2 . 2 – (4 . 2) = -4

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| **QN=42** | (Level 2)  The (3, 1)-cofactor of is: |
| a. | 2 |
| b. | 5 |
| c. | 3 |
| d. | -9 |
| e. | 7 |
| f. |  |
| ANS: | **A** |
| PTS: |  |
| CHAPTER: | 3p2 |
| MIX CHOICES: | Yes |

42. 1 . (1.5)-(1.3)=2

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| **QN=43** | (Level 2)Suppose A and B are 3x3 matrix with detA=2, detB=5. What is det(2AB)? |
| a. | 20 |
| b. | 14 |
| c. | 80 |
| d. | 60 |
| e. | None of the others |
| f. |  |
| ANS: | **C** |
| PTS: |  |
| CHAPTER: | 3p2 |
| MIX CHOICES: | Yes |

43. det(2AB) = 2ndet(AB) = 2ndet(A)det(B)=23.2.5=40

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| **QN=44** | (Level 2)The characteristic polynomial of A = is: |
| a. | (x-2)(x+1) |
| b. | x2-3x+2 |
| c. | (x+2)(x+1) |
| d. | 3x2 |
| e. | 0 |
| f. |  |
| ANS: | **B** |
| PTS: |  |
| CHAPTER: | 3p2 |
| MIX CHOICES: | Yes |

44. f(x) = x2-(3+0)x+(3.0-(-2.1)= x2-3x+2

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| **QN=45** | (Level 2)Find all values of a such that [a 1]T is an eigenvector of matrix . |
| a. | 1 or 0 |
| b. | -1 or 0 |
| c. | 1 or -1 |
| d. | 2 or -2 |
| e. | None of the others |
| f. |  |
| ANS: | **C** |
| PTS: |  |
| CHAPTER: | 3p2 |
| MIX CHOICES: | Yes |

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| **QN=46** | (Level 2)Find the value of *t* for which (4, 6, *t*) is a linear combination of (1, 3, 1), (2, 8,–1) and (–1,–5, 2). |
| a. | 0 |
| b. | 4 |
| c. | 7 |
| d. | 11 |
| e. | 13 |
| f. |  |
| ANS: | **E** |
| PTS: |  |
| CHAPTER: | 5p2 |
| MIX CHOICES: | Yes |

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| **QN=47** | (Level 2) Which of these sets: U = {(x, y, x – y) | x, y are real numbers}; and V = {(x, y, xy) | x, y are real numbers} are subspaces of **R**3? |
| a. | Both U and V |
| b. | U only |
| c. | V only |
| d. | None of the others |
| e. |  |
| f. |  |
| ANS: | **B** |
| PTS: |  |
| CHAPTER: | 5p2 |
| MIX CHOICES: | Yes |

|  |  |
| --- | --- |
| **QN=48** | (Level 2)Find all [*a b c d*]*T* in *R4*such that the given set is orthogonal.  {[1 2 1 0]*T,* [2 1 -1 -3]*T, [a b c d]T*}. |
| a. |  |
| b. |  |
| c. |  |
| d. |  |
| e. |  |
| f. |  |
| ANS: | **C** |
| PTS: |  |
| CHAPTER: | 5p2 |
| MIX CHOICES: | Yes |

A piece of paper with writing on it

Description automatically generated

|  |  |
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| QN=49 | (Level 2)Let **u** = (1, 1, 1), **v** = (1, 2, 3), **w** = (1, 3, 7) and **x** = (0,–3,–10). Which of the following statements is true?  (i) {**u**, **v**, **w**, **x**} is linearly dependent.  (ii) dim(span{**u**, **v**, **w**, **x**}) = 3. |
| a. | Only (i) |
| b. | Only (ii) |
| c. | Both is true |
| d. | None is true |
| e. |  |
| f. |  |
| ANS: | **C** |
| PTS: |  |
| CHAPTER: | 5p2 |
| MIX CHOICES: | Yes |

|  |  |
| --- | --- |
| **QN=50** | (Level 2)Find rank of . |
| a. | 0 |
| b. | 1 |
| c. | 2 |
| d. | 3 |
| e. |  |
| f. |  |
| ANS: | **D** |
| PTS: |  |
| CHAPTER: | 5p2 |
| MIX CHOICES: | Yes |

50. det(3) của ma trận = 1 khác 0 -> không có hàng nào bằng 0, rank của ma trận là 3