

S.V.K.P & Dr. K.S.RAJU ARTS & SCIENCE COLLEGE (A), PENUGONDA

SEMESTER-I

COURSE-I

ESSENTIALS AND APPLICATIONS OF MATHEMATICS, PHYSICAL AND CHEMICAL SCIENCE

[PAPER CODE – 23MSC11]

(w.e.f 2023-2024 admitted batch)

MODEL PAPER

I. Multiple Choice Questions

Choose the correct Answer

1. The value of i power 108 is []
a) 0 b) 1 c) i d) $-i$ []
2. The conjugate complex of $(3+4i)(2-3i)$ is []
a) $18-i$ b) $18+i$ c) $\sqrt{18+i}$ d) $\sqrt{18-i}$ []
3. The modulus of $(3-4i)(4+3i)$ is []
a) 15 b) 20 c) 25 d) 30 []
4. Which of the following is not defined []
a) $\cos 0$ b) $\tan 45$ c) $\sec 90$ d) $\sin 90$
5. Given that $\sin \alpha = 1/2$ and $\cos \beta = 1/2$ then the value of $\alpha + \beta$ is []
a) 0 b) 90 c) 30 d) 60 []
6. The value of $\sin(45^\circ + \theta) - \cos(45^\circ - \theta)$ is []
A) $2\cos \theta$ b) $2\sin \theta$ c) 1 d) 0 []
7. The position vector of the point (1, 0, 2) is []
a) $\hat{i} + \hat{j} + 2\hat{k}$ b) $\hat{i} + 2\hat{j}$ c) $\hat{i} + 3\hat{k}$ d) $\hat{i} + 2\hat{k}$ []
8. The value of $|\hat{i} + 2\hat{j} + 3\hat{k}|$ is []
a) 14 b) 6 c) 1 d) $\sqrt{14}$ []
9. The arithmetic mean of 1, 2, 3, ..., n is []
a) $n-2/2$ b) $n+1/2$ c) $n/2$ d) $n/2+1$ []
10. The mass –energy relations is given by []
a) $E = mc^2$ b) $F = ma$ c) $P = mv$ d) $w = F.s$
11. Debroglie wavelength of a moving electron is given by equation []
a) $\lambda = h / p$ b) $\lambda = hmv$ c) $\lambda = h / mv$ d) $\lambda = hc / \lambda$ []
12. What is the charge of an up quark []
a) $+2/3 e$ b) $1/3 e$ c) $-1/3 e$ d) $-2/3 e$
13. Lidar technology used in []
a) Noise monitoring b) sensors c) water quality monitoring d) none of the above
14. SPC is termed as []
a) Standard protocol compressor b) statistical process control
c) Super progressive conductor d) all of the above

30. An asymmetric-key (or public-key) cipher uses
a) 2 Key b) 4 Key c) 3 Key d) 1 Key

[]

II. FILL IN THE BLANKS

31. The multiplicative inverse of $(1+i)$ is _____
32. Strong force between quarks is associated with the _____
33. N D T termed as _____
34. Write the electronic configuration of Na _____
35. While moving down in a group, the metallic character _____
36. The only carbohydrate which does not have any chiral carbon atoms is _____
37. Aspirin is -----drug.
38. What is another term for green chemistry _____
39. _____ is the science and art of transforming messages to make them secure and immune to attacks
40. A network of networks is known as _____

III. ANSWER THE VERY SHORT ANSWER QUESTIONS

41. Convert $(\sqrt{3}+i)$ in the (mod-amp) form?
Ans:
42. What is the value of $(\sin 30^\circ + \cos 60^\circ) + (\sin 60^\circ + \cos 30^\circ)$?
Ans:
43. For what value of the λ are the vectors $a=3i+j-2k$ and $b = i+ \lambda j + 3k$ are perpendicular
Ans:
44. What are fundamental units ?
Ans:
45. Define inertial frame of reference ?
Ans:
46. What is meant by lidar ?
Ans:

47. Why do all the elements of the same group have similar properties?

Ans:

48. What is the full form of pharma?

Ans:

49. What is DNS

Ans:

50. What is fire wall ?

Ans:

IV. MATCH THE FOLLOWING

51. Match the Following

Physical Quantity

- | | |
|-----------------------|---------|
| a) Force | () |
| b) Resistance | () |
| c) Angle | () |
| d) Luminous intensity | () |
| e) Current | () |

S.I UNITS

1. Candela
2. Radian
3. Ampere
4. Newton
5. Ohm

52. Match the Following

- | | |
|---------------|---------|
| a) 17-Group | () |
| b) Vitamin B2 | () |
| c) Vitamin C | () |
| d) Element | () |
| e) Fats | () |

1. Pure Substance
2. Biomolecules
3. Halogens
4. Riboflavin
5. Ascorbic Acid

V. ANSWER THE TRUE (OR) FALSE QUESTIONS.

53. 2 is a complex number T / F

54. The arithmetic mean can be computed even if an observation of the series is missing T / F

55. After Evaluate $\tan 60 \operatorname{cosec} 45 + \sec 60 \tan 45$ we get $4 + 2\sqrt{3}$ T / F

56. E lector magnetic waves carry momentum and can exert pressure on surface. T / F

57. Sugars which differ from each other only around a single carbon atom are called epimers. T / F

58. HTTP is a Markup Language T / F

59. Cyber criminals only target large companies. T / F

60. Pv4 uses hierarchical addressing scheme. T / F

61. Network Security provides authentication and access control for resources. T / F

62. The plain text encrypts to different cipher text with different keys T / F

S.V.K.P & Dr K.S RAJU ARTS & SCIENCE COLLEGE(A),PENUGONDA
SEMESTER-I
Course2-ADVANCES OF MATHEMATICAL,PHYSICAL AND CHEMICAL
SCIENCES-23MSC12
(w.e.f 2023-24 admitted batch)
MODEL PAPER

Time: 3 Hrs

Max Marks:70.

I) Multiple Choice Questions:

Choose the correct Answer.

1. The point (-4,2,5) lies in which octant []
a)I b)II c)III d)IV
2. The equation of the straight line passing through the pt(3,2) and perpendicular to the line y=x is []
a)x-5=0 b)x+y=5 c)x+y=1 d)x-y=1
3. $\lim_{x \rightarrow 0} \frac{1 - \cos 2x}{x^2}$ []
a) 0 b)1 c)2 d)4
4. $\frac{d}{dx} \frac{2^x}{3^x}$ []
a) $\frac{2}{3}$ b) 1 c) xy d) x+y
5. $\int \frac{f'(x)}{f(x)} dx$ []
a)log|f(x)|+c b)|f(x)|+c c)log|f(x)|²+c d)None
6. $\int \sin 2x \, dx$ []
a) $2 \cos 2x + C$ b) $\frac{\cos 2x}{2} + C$ c) $-\frac{\cos 2x}{2} + C$ d)None
7. The value of the determinant $\begin{vmatrix} 1 & 2 & 4 \\ -1 & 3 & 0 \\ 4 & 1 & 0 \end{vmatrix}$ is []
a) 13 b) -13 c) 52 d) -52
8. Which energy source contribute the most total primary energy production in India []
a)hydro power b)coal c)nuclear d)Natural gas
9. Quantum dots emits light at very specific wavelengths, results in []
a)broad emission spectra b)low quantum efficiency
c)narrow emission spectra d)unpredictable emission colors
10. Which field of medicine is nanotechnology most commonly used to create novel Technologies and improve diagnostics and treatments ? []
a)Neurology b)Oncology c)Cardiology d)Opthamology
11. Which type of shape memory materials is made up of lengthy chains of repeating Units ? []
a)Shape memory alloys b)Nickel and titanium alloys
c)Shape memory polymers d)Brain spatula
12. Which quantum protocol enables secure key distribution between two parties Over an insecure quantum channel ? []
a)Quantum entanglement b)Quantum key distribution
c)Quantum network d)Quantum relaying
13. Which method is used to determine 3-D structure of crystal lattice []
a)MRI b)X-RAY crystallography c)Electron microscopy d)Fluorescence microscopy

14. Which of the following are renewable energies []
 a)Solar b)Wind c)Tidal d)All of the above
- 15.115. FLIM stands for []
 a)Fluorescence life time imaging b)Fluorescence limited imaging
 c)Fluorescence imagination d)None of the above
16. Applications of CAAD []
 a) Molecular modeling b)Virtual screening
 c)Fragment based drug design d)All The above
17. Which component are not used in Nan sensors []
 a)Analyte b)Sensor c) Magnet d) Detector
18. Chemical biology incorporating the discipline of []
 a) Bio organic chemistry b) Bio chemistry & cell biology
 c) Both A & B d) None of the above
19. Effects of duplication of Ozone layer []
 a) Ageing of skin b) Cataracts c) Skin cancer d) All the above
20. Which gas is reasoning for Bhopal gas disaster []
 a) MIC b) Carbon dioxide c) nitrogen dioxide d) Chlorine
21. Which is not industrial waste []
 a) Plastic b) Glass c) Bags d) Vegetables
22. Sources of waste can be broadly classified into []
 a) 2 types b) 3 types c) 4 types d) 5 types
23. Types of waste commonly classified into []
 a) Bio-degradable b) Non bio degradable c) Both a,b d) None of the above
24. Identify types of green technology from the given below []
 a) Alternative energy b) Sustainable agriculture c) Recycling d) All the above
25. Binary Number 1011 is equal to octal number []
 a)16 b) 15 c)11 d)13
26. Which type of Number System represent the base 16. []
 a)Decimal b) binary c)octal d) Hexadecimal
27. Which of these is not a guided media. []
 a) Fiber optical cable b) Wireless LAN c) Copper wire d) Coaxial cable
28. Which transmission media has the highest transmission speed in a network? []
 a) electrical cable b) optical fiber c) coaxial cable d) twisted pair cable
29. HTTP refers to? []
 a) Hyper Text Transmission Protocol b) Hyper Text Transfer Protocol
 c) Hyper Text Tie Protocol d) None of these answers
30. Which of the following is the popular technique for error detection []
 a)Cyclic Redundancy Check b) Checksum c) Simple Parity Check d)All of the above

II. FILL IN THE BLANKS

31. The line which cuts of equal intersect from the axes and pass through the point(1,-2) is -----
32. It is a matrix of order 3X3, then the number of minors in determinant of A are -----
33. -----Type of shape memory materials is made up of lengthy chains of repeating units.
34. -----provides information of metabolism, blood flow and receptors binding.
35. -----Protocol developed by Charles Bennett.
36. -----Percent of global electricity is generated from renewable energies.
37. Full form of CAAD _____

38. Example for commercial waste _____
39. Two's complement of binary number 1110010 _____
40. The binary equivalent of the decimal number 10 is _____

III. ANSWER THE FOLLOWING VERY SHORT ANSWER QUESTIONS.

41. $\int \log x \, dx =$

Ans:

42. $\lim_{x \rightarrow -a} \frac{x^7 + a^7}{x + a} =$

Ans:

43. What is renewable energy ?

Ans:

44. What is the principle of Quantum communication ?

Ans:

45. Define grid integration ?

Ans:

46. Write the uses of virtual screening.

Ans:

47. Write the example for enzymatic catalysis.

Ans:

48. Write two principles of industrial waste water treatment.

Ans:

49. What is internet?

Ans:

50. What is Modem?

Ans:

IV)MATCHING

51. Match the following

- | | | |
|-------------------|-----|------------------------|
| (a) Satellite | () | 1. Work station |
| (b) Server | () | 2. Set of rules |
| (c) Node | () | 3. Main Computer |
| (d) Protocol | () | 4. Communication Media |
| (e) Coaxial Cable | () | 5. Un-guided media |

52. Match the following

- | | | |
|---|-----|--|
| (a) $\frac{d}{dx} [-4\log(1+x)]$ | () | 1. $\frac{x}{2} - \frac{\sin 2x}{4} + C$ |
| (b) $\lim_{x \rightarrow 0} \frac{\sin 5x}{3x}$ | () | 2. $-xe^{-x} + C$ |
| (c) $\int \sqrt{1+\cos 2x} dx$ | () | 3. $-\frac{4}{1+x}$ |
| (d) $\int \sin^2 x dx$ | () | 4. $-\sqrt{2}\cos x + c$ |
| (e) $\int (x-1)e^{-x} dx$ | () | 5. $\frac{5}{3}$ |

III. ANSWER THE FOLLOWING TRUE/ FALSE QUESTIONS.

- | | | |
|---|-------|-----|
| 53. Tidal energy produced from rise and fall of tides | T / F | [] |
| 54. Smart thermostats automatically adjust indoor temperature | T / F | [] |
| 55. M R I gives the detailed information of metabolism | T / F | [] |
| 56. Electron microscopy gives the low resolution images | T / F | [] |
| 57. Photo detectors to convert light into electrical signals | T / F | [] |
| 58. Virtual screening is used to identify potential candidates for large databases of compounds | T / F | [] |
| 59. Detecting various chemicals in gases for pollution monitoring is application of nanosensor | T / F | [] |
| 60. Carbon dioxide is green gas | T / F | [] |
| 61. Normal filtration is a best method for industrial water effluent treatment | T / F | [] |
| 62. Green technology reduce human impacts on the natural environment | T / F | [] |

S. V. K. P. & Dr K. S. Raju Arts & Science College(A), Penugonda

SEMESTER-II MATHEMATICS MODEL PAPER

DIFFERENTIAL EQUATIONS (23MAT21)

(Common for B.Sc. honors Mathematics Major 1/ Mathematics Minor)

w.e.f 2023-24 admitted batch

Time: 3Hrs

Max.Marks:70

PART-1

Answer any five questions choosing at least two from each section.

Each question carries 10 marks

5X10=50M

SECTION-A

- 1) Solve $(y^4 + 2y)dx + (xy^3 + 2y^4 - 4x)dy = 0$.
- 2) Solve $\frac{dy}{dx} + \frac{y}{x} = y^2 x \sin x$
- 3) Solve $p^2 + 2py \cot x = y^2$
- 4) Find the orthogonal trajectories of the family of curves $x^{2/3} + y^{2/3} = a^{2/3}$ where a is the parameter.
- 5) Solve $y'' + 4y = \cos x \cdot \cos 3x$.

SECTION-B

- 6) Solve $(D^2 - 4)y = e^x + \sin 2x + \cos^2$
- 7) Solve $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 13y = 8e^{3x} \sin 2x$
- 8) Solve $(D^2 + 3D + 2)y = xe^x \sin x$
- 9) Apply the method of variation of parameters to solve $\frac{d^2y}{dx^2} + 4x = 4 \tan 2x$
- 10) Solve $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} - 3y = x^2 \log x$

PART-2

Answer any five questions. Each question carries 4 marks.

5x4=20 M

- 11) Solve $y \frac{dy}{dx} = xe^{x^2+y^2}$
- 12) Solve $2xy dy - (x^2 + y^2 + 1)dx = 0$
- 13) Obtain the equation of the curve whose differential equation is $(1 + x^2) \frac{dy}{dx} + 2xy - 4x^2 = 0$ and passing through the origin
- 14) Solve $y^2 \log y = xpy + p^2$.
- 15) Solve $(D^2 - 3D + 2)y = \cosh x$.
- 16) Solve $(D^2 - 4D + 4)y = x^3$
- 17) Solve $(D^2 - 2D)y = e^x \sin x$
- 18) Solve $x^2 \frac{d^2y}{dx^2} + 4x \frac{dy}{dx} + 2y = e^x$.

S. V. K. P. & Dr K. S. Raju Arts & Science College(A), Penugonda

SEMESTER-II MATHEMATICS MODEL PAPER

ANALYTICAL SOLID GEOMETRY(23MAT22)

(B.Sc. honors Mathematics Major 2)

w.e.f 2023-24 admitted batch

Time: 3Hrs

Max.Marks:70

PART-1

Answer any five questions choosing at least two from each section.

Each question carries 10 marks

5X10=50M

SECTION-A

- 1) A variable plane is at a constant distance $3p$ from the origin and meets the axes in A, B, C. Show that the locus of the centroid of the ΔABC is $x^{-2} + y^{-2} + z^{-2} = p^{-2}$.
- 2) Find the bisecting plane of the acute angle between the planes $3x-2y+6z+2=0$, $-2x+y-2z-2=0$
- 3) Find the image of the line $\frac{x-1}{9} = \frac{y-2}{1} = \frac{z+3}{-3}$ in the plane $3x-3y+10z-26=0$
- 4) Find the length and equations of S.D between the lines $x/1 = y/2 = z/1$, $x+y+2z-3=0$, $2x+3y+3z-4=0$
- 5) Find the centre and the radius of the circle $x^2 + y^2 + z^2 + 2x - 2y - 4z - 19=0$, $x+2y+2z+7=0$

SECTION-B

- 6) Find the pole of the plane $x+2y+3z=7$ with respect to the sphere $x^2 + y^2 + z^2 - 2x - 4y + 6z + 11=0$
- 7) Find the equation of the sphere which touches the plane $3x+2y-z+2=0$ at $(1,-2,1)$ and cuts orthogonally the sphere $x^2 + y^2 + z^2 - 4x + 6y + 4=0$
- 8) Find the limiting points of the coaxial system defined by spheres $x^2 + y^2 + z^2 + 4x - 2y + 2z + 6=0$ and $x^2 + y^2 + z^2 + 2x - 4y - 2z + 6 = 0$.
- 9) Find the angle between the lines of intersection of the plane $x-3y+z=0$ and the cone $x^2 - 5y^2 + z^2=0$.
- 10) Find the vertex of the cone $7x^2 + 2y^2 + 2z^2 - 10zx + 10xy + 26x - 2y + 2z - 17 = 0$.

PART-2

Answer any five questions. Each question carries 4 marks

5X4=20 M

- 11) Find the equation of the plane through $(4, 4, 0)$ and perpendicular to the planes $x+2y+2z=5$ and $3x+3y+2z-8=0$.
- 12) Find the equation to the plane to the line of intersection of $x-y+3z+5=0$ and $2x+y-2z+6=0$ and passing through the point $(-3,1,1)$.
- 13) Find the equation of the line through $(1,2,3)$ and parallel to the planes $2x+3y+4z=11$ and $3x+4y+5z=12$.
- 14) Find the perpendicular distance of the point $(-2,1,5)$ from the line $\frac{x-2}{-2} = \frac{y-3}{3} = \frac{z-5}{-6}$
- 15) Find the equation of the sphere through the points $(1,-4,3)$, $(1,-5,2)$, $(1,-3,0)$ and whose centre lies on the plane $x+y+z=0$.
- 16) Find the equation of the sphere for which the circle $x^2+y^2+z^2+7y-2z+2=0$, $2x+3y+4z=8$ is a great circle.
- 17) Show that the spheres $x^2+y^2+z^2+6y+2z+8=0$, $x^2+y^2+z^2+6x+8y+4z+20=0$ are orthogonal
- 18) Find the enveloping cone of the sphere $x^2 + y^2 + z^2 + 2x - 2y - 2 = 0$ with its vertex at $(1,1,1)$.
