NOORUL ISLAM CENTRE FOR HIGHER EDUCATION

NOORUL ISLAM UNIVERSITY

(Declared as Deemed-to-be university u/s 3 of UGC Act 1956)

KUMARACOIL, THUCKALAY, KANYAKUMARI DISTRICT. TAMILNADU

MODEL QUESTION PAPER

NIAEE– 2013

PROGRAMME : B.E./B.Tech.

Time: 2 hours Marks : 100

INSTRUCTION TO THE CANDIDATES

1. Use only Pencil to indicate your answers. Use Ball-Point Pen only for writing Name, Register Number and Signature.
2. Darken the square completely. Mark your answers like this [1] [2] [3] [4]

Name of the Student: …… Programme Applied: ……..	Register Number Exam Center Seal
Signature of the student	Signature of the invigilator

1. If $A = \begin{pmatrix} 2 & 0 & 1 \end{pmatrix}$ then the rank of A A^T is

   a) 2 b) 4 c)3 d) 0

2. For any non singular matrix A, $\left(A^T\right)^{-1}$ is equal to

   a) inverse of A

   b) transpose of A^{-1}

   c) transpose of A

   d) none of these

3. If A is a scalar matrix with scalar $k \neq 0$, of order 3 then A^{-1} is

   a) $\frac{1}{k^2}$ I b) $\frac{1}{k^3}$ I

   c) $\frac{1}{k}$ I d) kI

4. If A is a square matrix of order n then (adj A) is

   a) $|A|^2$ b)) $|A|^n$

   c) $|A|^{n-1}$ d) |A|

5. If A and B are any two matrices such that AB = 0 and A is nonsingular, then

   a) B =0 b) B is singular

   c) B is non singular d)B= A

6. If $A = \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$ then (adj A)A=

   a) $\begin{bmatrix} \frac{1}{5} & 0 \\ 0 & \frac{1}{5} \end{bmatrix}$ b) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

   c) $\begin{bmatrix} 5 & 0 \\ 0 & -5 \end{bmatrix}$ d) $\begin{bmatrix} 5 & 0 \\ 0 & 5 \end{bmatrix}$

7. If $A = \begin{bmatrix} 0 & 0 \\ 0 & 5 \end{bmatrix}$ then A^{12} is

   a) $\begin{bmatrix} 0 & 0 \\ 0 & 60 \end{bmatrix}$ b) $\begin{bmatrix} 0 & 0 \\ 0 & 5^{12} \end{bmatrix}$

   c) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ d) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

8. In a system of three linear non homogeneous equation with linear unknowns, If $\Delta = 0; \Delta_x = 0; \Delta_y = 0$ and $\Delta_z = 0$, then the system has

   a)unique solutions

   b) two solutions

   c)infinitely many solutions

   d) no solutions

9. If I is the unit matrix of order 'n', where $k \neq 0$ is a constant, then adj(kI)=

   a) k^n (adj I) b)k(adj I)

   c) k^2 (adj I) d) k^{n-1} (adj I)

10. If A and B are any non singular matrixes of the same order then $(AB)^{-1}$ is

a) $A^{-1}B^{-1}$ b) $\frac{1}{AB}$

c) $B^{-1}A^{-1}$ d) $\frac{A^{-1}}{B^{-1}}$

11. The gradient of the curve $y = -2x^3 + 3x + 5$ at x=2 is

a)-20 b)27

c)-16 d)-21

12. The parametric equations of the curve $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$ are

a) $x = a\sin^3\theta \quad y = a\cos^3\theta$

b) $x = a\cos^3\theta \quad y = a\sin^3\theta$

c) $x = a^3\sin\theta \quad y = a^3\cos\theta$

d) $x = a^3\cos\theta \quad y = a^3\sin\theta$

13. The equation of the tangent to the curve $y = \frac{x^2}{5}$ at the point $\left(-1, \frac{-1}{5}\right)$ is

a)5y+3x=2 b)5y-3x=2

c)3x-5y=2 d)3x+3y=2

14. The slope of the normals to the curve $y = 3x^2$ at the point where x coordinate is 2 is

a) $\frac{1}{13}$ b) $\frac{1}{14}$

c) $\frac{-1}{12}$ d) $\frac{1}{12}$

15. The angle between the parabola $y^2 = x$ and $x^2 = y$ at the origin is

a) $2\tan^{-1}\left(\frac{3}{4}\right)$ b) $\frac{\pi}{2}$

c) $2\tan^{-1}\left(\frac{4}{3}\right)$ d) $\frac{\pi}{4}$

16. The value of 'a' so that the curves $y = 3e^x$ and $y = \frac{a}{3}e^{-x}$ interest orthogonally is

a)-1 b)1

c) $-\frac{1}{3}$ d)3

17. If $s = t^3 - 4t^2 + 7$, the velocity where the acceleration is zero is

a) $\frac{32}{3}m/\sec$ b) $\frac{-16}{3}m/\sec$

c) $\frac{16}{3}m/\sec$ d) $\frac{-32}{3}m/\sec$

18. The function f(x)= x^2 is decreasing

a) $(-\infty, \infty)$ b) $(-\infty, 0)$

c) $(0, \infty)$ d) $(-2, -\infty)$

19. The value of c of Lagranges Mean value Theorem for f(x)=$\sqrt{x}$ when a=1 and b-4 is

a) $\frac{9}{4}$ b) $\frac{3}{2}$

c) $\frac{1}{2}$ d) $\frac{1}{4}$

20. $\lim_{x\to 0}\frac{a^x-b^x}{c^x-d^x}$

(a) ∞ (b) 0

(c) $\frac{ab}{cd}$ (d) $\frac{\log\left(\frac{a}{b}\right)}{\log\left(\frac{c}{d}\right)}$

21. If $\vec{a}=2\vec{i}+2\vec{j}-\vec{k}$, $\vec{b}=6\vec{i}-3\vec{j}+2\vec{k}$ then $\vec{a}\cdot\vec{b}$ is

(a). 3 (b). 5 (c). 4 (d). 1

22. If $\vec{a}$ and $\vec{b}$ are two vectors such that $|\vec{a}|=4$ and $|\vec{b}|=3$ and $\vec{a}\cdot\vec{b}=6$ then the angle between $\vec{a}$ and $\vec{b}$ is

(a). π (b). $\frac{\pi}{3}$

(c). $\frac{\pi}{2}$ (d). $\frac{\pi}{4}$

23. If $|\vec{a}+\vec{b}|=|\vec{a}-\vec{b}|$ then

(a). $\vec{a}$ is parallel to $\vec{b}$

(b). $\vec{a}$ is perpendicular to $\vec{b}$

(c). $|\vec{a}|=|\vec{b}|$

(d). $\vec{a}$ and $\vec{b}$ are unit vectors

24. If $\vec{d}_1$ and $\vec{d}_2$ are diagonals of a parallelogram, then its area is

(a). $\frac{1}{2}\vec{d}_1\times\vec{d}_2$ (b).$|\vec{d}_1\times\vec{d}_2|$

(c). $\frac{1}{2}|\vec{d}_1\times\vec{d}_2|$ (d). $\vec{d}_1\times\vec{d}_2$

25. The value of $\left[\vec{i}+\vec{j},\ \vec{j}+\vec{k},\ \vec{k}+\vec{j}\right]$ is equal to

(a).0 (b). 1 (c). 2 (d). 4

26. The direction cosines of the line joining (2, -3, 1) and (3, 1, -2) are

(a).(1, 4, -3)

(b).$\left(\frac{1}{\sqrt{26}},\frac{4}{\sqrt{26}},\frac{-3}{\sqrt{26}}\right)$

(c).(-1, -4, 3)

(d). $\left(\frac{5}{\sqrt{26}},\frac{-2}{\sqrt{26}},\frac{3}{\sqrt{26}}\right)$

27. The unit normal vectors to the plane $2x - y + 2z = 5$ is

(a). $\frac{2\vec{i}+\vec{j}+3\vec{k}}{3}$

(b). $\frac{2\vec{i}-\vec{j}+2\vec{k}}{3}$

(c). $\frac{\vec{i}+\vec{j}+\vec{k}}{\sqrt{2}}$

(d). $\frac{\vec{i}-\vec{j}-\vec{k}}{2}$

28. If $\vec{a}$ and $\vec{b}$ are perpendicular then $|\vec{a}\times\vec{b}|$ is equal to

(a).$|\vec{a}||\vec{b}|$ (b).0

(c).1 (d). $|\vec{a}|^2|\vec{b}|^2$

29. If $\left[\vec{a}\times\vec{b}, \vec{b}\times\vec{c}, \vec{c}\times\vec{a}\right] = 64$ then $\left[\vec{a}, \vec{b}, \vec{c}\right]$ is

(a).32 (b).8 (c).128 (d). 0

30. The area of the parallelogram having a diagonal $3\vec{i}+\vec{j}-\vec{k}$ and a side $\vec{i}-3\vec{j}+4\vec{k}$ is

(a).$10\sqrt{3}$ (b). $6\sqrt{30}$

(c). $\frac{3}{2}\sqrt{30}$ (d). $3\sqrt{30}$

31. The commercially known compound gammexane is

(a) Freon

(b) chloral

(c) 2-phenyl ethanol

(d) hexachlorocyclohexane

32. The bond order of oxygen molecule is

(a) 2.5 (b) 1 (c) 3 (d) 2

33. An element which was burnt in limited supply of air to give oxide **A** which on treatment with water gives an acid **B**. Acid **B** on heating gives acid **C** which gives yellow precipitate with $AgNO_3$ solution **A** is

(a) SO_2 (b) NO_2

(c) P_2O_3 (d) SO_3

34. The electronic configuration of chromium is

(a) $3d^6\,4s^0$ (b) $3d^5\,4s^1$

(c) $3d^4\,4s^2$ (d) $3d^3\,4s^2\,4p^1$

35. The geometry of $[Ni(CN)_4]^{2-}$ is

(a) Tetrahedral (b) Square planar

(c) Triangular (d) Octahedral

36. The type of isomerism found in the complexes $[Co(NO_2)(NH_3)_5]SO_4$ and $[Co(SO_4)(NH_3)_5]NO_2$

(a) Hydrate isomerism

(b) Coordination isomerism
(c) Linkage isomerism
(d) Ionisation

37. Which of the following is used as neutron absorber in the nuclear reactor?
(a) Water
(b) Deuterium
(c) Some compound of uranium
(d) Cadmium

38. All the naturally occurring processes proceed spontaneously in a direction which leads to
(a) decrease of entropy
(b) increase in enthalpy
(c) increase in free energy
(d) decrease of free energy

39. For the second order reaction $t_{1/2}$ α
a) 1/a b) 1/a2
c) constant d) a

40. The half life period of a first order reaction is 10 min. Then its rate constant is
a) 6.93×10^{2} min^{-1}
b) 0.693×10^{-2} min^{-1}
c) 6.932×10^{-2} min^{-1}
d) 69.3×10^{-1} min^{-1}

41. The migration of colloidal particles under the influences of an electric field is known as
a) electroosmosis b) cataphoresis
c) electrodialysis d) electrophoresis

42. When one coulomb of electricity is passed through an electrolytic solution, the mass deposited on the electrode is equal to
a) equivalent weight
b) molecular weight
c) electrochemical equivalent
d) one gram

43. The feasibility of a redox reaction can be predicted with the help of
a) Electronegativity
b) Electrochemical series
c) Electron affinity
d) Equivalent conductance

44. Which among the following exhibit geometrical isomerism?
a) isobutyraldehyde
b) 1-butene
c) 1,1-dichloroethylene
d) 1-chloro-2-bromo ethylene

45. When ethyl iodide is treated with dry silver oxide it forms
a) Ethyl alcohol
b) diethylether
c) silver ethoxide
d) ethyl methyl ether

46. Methyl ketones are usually characterized by
a) Fehlings solution
b) iodoform test
c) Schiff's test
d) Tollen's reagent

47. Nitration of nitrobenzene results in
a) o-dinitrobenzene
b) 1,3,5-trinitrobenzene
c) p-dinitrobenzene
d) m-dinitrobenzene

48. Alkaline hydrolysis of cooking oil gives
a) soap b) glycerol
c) fatty acids d) both (a) and (b)

49. Which will not answer cannizaro reaction
(a)Formaldehyde
(b)Benzaldehyde
(c)Trimethyl acetaldehyde
(d)Methyl acetaldehyde

50. Which will give an yellow precipate of iodoform when treated with I2&NaOH
(a)CH_3COCH_3
(b)CH_3COOH
(c)$CH_3CH_2CH_2OH$
(d)None of these

51. Number of stable isomers for the compound with the formula C_7H_8O
(a)5 (b)3 (c)4 (d)1

52. Petrol contains mainly
(a)Methane (b)Butane
(c)Decane (d)Benzene

53. A substance which can function both as an analgesic & antipyretic
(a)Aspirin (b)Acetamide
(c)Methylsalicylate (d)Quinine

54. Acid rain is caused by the oxides of
(a)Metals (b)S&N
(c)P&N (d)P&S

55. Tartaric acid is present in
(a)Rubber (b)Tamarind
(c)Rice (d)Banana fruit

56. An example of a thermosetting plastic is
(a)PVC (b)Polyethylene
(c)Bakelite (d)Nylon

57. The indicator used for titrating oxalic acid against NaOH
(a)Methyl orange
(b)Phenolphthalein
(c)Both (a)&(b)
(d)None

58. Lunar caustic is
(a) NaOH (b) $AgNO_3$
(c) HNO_3 (d) KOH

59. Which is not a transition metal
(a)Ag (b)Pt
(c)Pb (d)Au

60. The no of unpaired electrons an atom of Ni(28) is
(a)3 (b)0
(c)2 (d)5

61. A constant volume gas thermometer works on ----------
a) Archimedes principle
b) Boyle's law
c) Pascal's law
d) Charles's law

62. The average distance traveled by a molecule between two successive collisions is called----------

a) Wavelength

b) mean free path

c) free path

d) Molecular diameter

63. The value of (RT/PV) for a gas obeying Vander Waal's equation is----------

a) 8/3 b) 3/8

c) 1 d) 0.5

64. The Photosphere is surrounded by a gaseous envelope called the _____ whose temperature is about 6000K.

a) telluric lines

b) chromospheres

c) fraunhofer lines

d) none

65. It is impossible to construct a device which, operating in a cycle, has the sole effect of extracting heat from a reservoir and performing an equivalent amount of work.This statement is called ----------

a) Maxwell statement

b) Kelvin- Plank statement

c) Clausius statement

d) Heisenberg statement

66. In a grand canonical ensemble, a system A of fixed volume is in contact with a large reservoir B. Then----------

a) A can exchange only energy with B

b) A can exchange only particles with B

c) A can exchange neither energy nor particles with B

d) A can exchange both energy and particles with B

67. According to Debye's theory of specific heat at low temperature specific heat is proportional to----------

a) T b) T^2

c) T^3 d) Independent of T

68. Maxwelll- Botzman statistics deals with particles ----------

a) that have zero spin

b) that have integral spin

c) that are indistinguishable

d) that are distinguishable

69. The Gibbs energy is a function of ---------- ----------

a) P and T b) P and V

c) V and T d) T and S

70. The statistics that deals with free electrons----------

a) Maxwell – Boltzman

b) Bose – Einstein

c) Fermin – Dirac

d) None of the above

71. The exclusion principle states that no two electrons in an atom can have the same

a) mass

b) orbital

c) spin

d) set of quantum numbers

72. The operation of laser is based on which or more of the following?

a) the uncertainity principle

b) exclusion principle

c) induced emission of radiation

d) none

73. Wave behavior is exhibited by----------

a) only particle at rest

b) only moving particles

c) only charged particles

d) all particles

74. An hydrogen atom is in its ground state when its electron is ----------

a) at rest

b) inside the nucleus

c) in its lowest energy level

d) in its highest energy level

75. The Compton wavelength is ----------

a) dependent on incident wavelength

b) independent on incident wavelength

c) a very large quantity

d) a variable parameter

76. A long, straight wire carries a current of 1.2A. The magnetic field 8.0 mm from the wire is ----------

a) 3.0×10^{-8} T b) 3.0×10^{-5} T

c) 3.6×10^{-5} T d) 1.9×10^{-4} T

77. A 200 – turn solenoid is 40 mm long. If the magnetic field insides it is to be 0.010 T, the current it carries should be ----------

a) 1. 6 A b) 251 A

c) 1.6×10^{3} A d) 4×10^{7} A

78. A magnetic force of 0.08 N acts on each cm of a wire that carries a 20- A current in an electric motor. If the wire is perpendicular to the magnetic field in the motor, the magnitude of the field is ----------

a) 0.004 T b) 0.016 T

c) 0.4 T d) 40 T

79. Two parallel wires 800 cm long are 5 cm apart and carry currents of 20 A each in the same direction. Each wire exerts a force on the other of ----------

a) 1.6×10^{-3} N, attractive

b) 1.3×10^{-2} N, attractive

c) 1.6×10^{-3} N, repulsive

d) 1.3×10^{-2} N, repulsive

80. The self induced emf in a .01- H coil in which the current is changing at 200 A/s is ----------

a) 10 V b) 20 V

c) .01 k V d) 2 k V

81. The energy stored in the magnetic field of a 12 – mH coil in which the current is 5 A is ----------

a) 1.8 mJ b) 30mJ

c) 0.15 J d) 0.3 J

82. Nearly all the volume occupied by matter consists of ----------

a) electrons b) protons

c) neutrons d) empty space

83. The atomic number of an element is the number of ----------

a) protons in its nucleus

b) neutrons in its nucleus

c) protons and neutrons in its nucleus

d) electrons in its nucleus

84. The weakest of the four fundamental interactions is the ----------

a) gravitational

b) electromagnetic

c) strong

d) weak

85. The isotopes of an element all have the same ----------

a) atomic number

b) mass number

c) binding energy

d) half -life

86. Each nucleus of the nitrogen isotope $^{16}_{7}N$ contains ----------

a) 7 neutrons b) 9 neutrons

c) 16 neutrons d) 23 neutrons

87. Nuclear fusion and fission reactions give off energy because----------

a) the binding energy per nucleon is least for nuclei of intermediate size

b) the binding energy per nucleon is most for nuclei of intermediate size

c) they liberate neutrons

d) they liberate protons

88. In a chain reactions----------

a) protons and neutrons join to form atomic nuclei

b) light nuclei join to form heavy ones

c) neutrons emitted during the fission of heavy nuclei induces fissions in other nuclei

c) uranium is burned in a type of furnace called a reactor

89. The energy that heats the sun has its origin in ----------

a) radioactivity

b) nuclear fission

c) the production of helium from hydrogen

d) the production of hydrogen from helium

90. An alpha particle consists of ----------

a) 2 protons

b) 2 protons and 2 electrons

c) 2 protons and 2 neutrons

d) 2 protons, 2 electrons and 2 neutrons

91. In which country of the world the largest Buddhist temple located?

a) Japan b) Indonesia

c) China d) India

92. Five-Year Plans in India are finally approved by the

a) Union Cabinet

b) President on the advice of Prime Minister

c) National Development Council

d) Planning Commission

93. Who among the following is the author of the book "My Country, My Life"?

a) A.P.J. Abdul Kalam

b) Atal Bihari Vajpayee

c) L.K. Advani

d) Shashi Tharoor

94. Tipu Sultan died fighting the English forces under

a) Lord Cornwallis

b) Lord Wellesley

c) Lord Dalhousie

d) Lord Hastings

95. Who amongst the following Peshwas was popularly known as Nana Saheb?

a) Balaji Viswanath

b) Baji Rao

c) Balaji Baji Rao

d) Madhav Rao I

96. Who was responsible for the introduction of the Vernacular Press Act of 1878?

a) Lord Mayo b) Lord Lytton

c) Lord Ripon d) Lord Curzon

97. The first two digits from the left of pincode indicate

a) Post Office b) Postal Zone

c) District d) State

98. Which of the following countries refused to ratify the "Lisbon Treaty", a very crucial agreement for reforms in the constitution of the European Union?

a) Russia b) Poland

c) Germany d) France

99. Milk, Cheese, and Eggs are the source of

a) Vitamin C & A

b) Vitamin A & D

c) Vitamin C & D

d) Vitamin B& C

100. Simon Commission was appointed to look into the working of the

a) Indian Councils Act, 1892

b) Government of India Act, 1909

c) Government of India Act, 1919

d) Government of India Act, 1935