PULEET - 2012

Code No.: 210112

Important: *Please consult your Admit Card/Roll No. slip before filling your Roll Number on the Test Booklet and Answer Sheet.*

Roll No. *In Figure* | | | | | | | *In Words* _____

O.M.R. Answer Sheet Serial No | | | | | | |

Signature of the Candidate _____

Time: 90 minutes **Number of Questions: 75** **Maximum Marks : 75**

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

INSTRUCTIONS

1. Write your roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Code No. of Question Booklet on the OMR answer Sheet. Darken the corresponding bubbles with **Black Ball Point/Black Gel Pen.**
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. To open the Question Booklet remove the seal gently when asked to do so.
5. Please check that this Question Booklet contains 75 questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of test.
6. Each question has four alternative answer (A, B, C, D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point/Black Gel Pen.** There shall be negative marking for wrong answers.
7. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Sheet. No marks will be deducted in such cases.
8. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the questions given in the Question Booklet.
9. If you want to change an already marked answer, erase the shade in the darkened bubble completely.
10. For rough work only the blank sheet at the end of the Question Booklet be used.
11. The Answer Sheet is designed for computer evaluation. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. Any **resultant loss to the candidate on the above account, i.e. not following the instructions completely, shall be of the candidate only.**
12. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
13. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/ noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so would be expelled from the examination.
14. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistance or found giving or receiving assistance or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent/Observer whose decision shall be final.
15. **Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculators is not allowed.**

1. The sum of odd integers from 1 to 2001 is

(A) 1002000 (B) 1002001 (C) 1002002 (D) 1002003

2. The rank of the matrix $A = \begin{bmatrix} -1 & 2 & 3 & -2 \\ 2 & -5 & 1 & 2 \\ 3 & -8 & 5 & 2 \\ 5 & -12 & -1 & 6 \end{bmatrix}$ is

(A) 1 (B) 2 (C) 3 (D) 4

3. If $\sin(P+Q) = \frac{\sqrt{3}}{2}$, $\cos(P-Q) = \frac{\sqrt{3}}{2}$, then the values of P and Q if they lie in the first quadrant are

(A) $P = 15^\circ, Q = 45^\circ$ (B) $P = 30^\circ, Q = 30^\circ$

(C) $P = 30^\circ, Q = 45^\circ$ (D) $P = 45^\circ, Q = 15^\circ$

4. The straight lines: $x + y = 0$, $3x + y - 4 = 0$, $x + 3y - 4 = 0$ form a triangle which is

(A) Isosceles (B) equilateral (C) right angled (D) none of these

5. The Taylor series expansion of $\frac{\sin x}{x - \pi}$ at $x = \pi$ is given by

(A) $1 + \frac{(x-\pi)^2}{\angle 3} + - - -$ (B) $-1 - \frac{(x-\pi)^2}{\angle 3} + - - -$

(C) $1 - \frac{(x-\pi)^2}{\angle 3} + - - -$ (D) $-1 + \frac{(x-\pi)^2}{\angle 3} + - - -$

6. The radius of curvature for the curve $y = e^x$ at $(0,1)$ is

(A) $\sqrt{2}$ (B) $2\sqrt{2}$ (C) $\frac{1}{\sqrt{2}}$ (D) $\frac{1}{2\sqrt{2}}$

7. The value of the $\lim_{(x,\,y)\to(0,\,0)} \frac{x^2 - xy}{\sqrt{x} - \sqrt{y}}$ is

(A) 0 (B) 1 (C) $\frac{1}{2}$ (D) 2

8. If $x = uv$ and $y = \frac{u+v}{u-v}$, then $\frac{\partial(u,v)}{\partial(x,y)}$ is

(A) $\frac{(u-v)}{2uv}$ (B) $\frac{(u-v)}{4uv}$ (C) $\frac{(u-v)^2}{2uv}$ (D) $\frac{(u-v)^2}{4uv}$

9. For what value of λ, the differential equation: $(xy^2 + \lambda x^2 y)dx + (x + y)x^2\, dy = 0$ is exact

(A) 1 (B) 2 (C) 3 (D) 4

10. The integrating factor for the differential equation: $(y^4 + 2y)dx + (xy^3 + 2y^4 - 4x)\, dy = 0$ is

(A) $\frac{1}{y}$ (B) $\frac{1}{y^2}$ (C) $\frac{1}{y^3}$ (D) $\frac{1}{y^4}$

11. The value of the integral $\int_0^{\frac{\pi}{2}} \sin^5 x \cos^6 x\, dx$ is

(A) $\frac{8}{693}$ (B) $\frac{6}{693}$ (C) $\frac{7}{693}$ (D) $\frac{5}{693}$

12. The volume of solid obtained by revolving the area under $y = e^{-2x}$ about the $x-axis$ is

(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{6}$ (D) $\frac{\pi}{8}$

13. The value of the double integral $\int_0^{\infty}\int_0^{x} x e^{-\frac{x^2}{y}} dy\, dx$ is

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) $\frac{3}{2}$

14. If $\vec{A} = (bx + 4y^2 z)\hat{i} + (x^3 \sin z - 3y)\hat{j} - (e^x + 4\cos^2 xy)\hat{k}$ is solenoidal, then the constant b is

(A) 0 (B) 1 (C) 2 (D) 3

15. If $\vec{F} = ax\,\hat{i} + by\,\hat{j} + cz\,\hat{k}$, a, b, c are constants, then $\iint_S \vec{F}.\hat{n}\, ds$, where S is the surface of a unit sphere is

(A) $\frac{\pi}{3}(a+b+c)$ (B) $\frac{4\pi}{3}(a+b+c)$

(C) $2\pi(a+b+c)$ (D) $\pi(a+b+c)$

16. A particle moves in a circular path of radius R. Its speed v is not constant. The components of acceleration (i) a_{rad}, that is directed towards the centre of circle and perpendicular to velocity v, and (ii) a_{par} that is parallel to path, are given by

(A) $a_{rad} = \frac{v^2}{R}$; $a_{par} = \frac{dv}{dt}$

(B) $a_{rad} = \frac{v}{R}$; $a_{par} = \frac{v^2}{R}$

(C) $a_{rad} = \frac{dv}{dR}$; $a_{par} = \frac{v^2}{R}$

(D) $a_{rad} = \frac{v^2}{R}$; $a_{par} = \frac{dv}{dR}$

17. A block is projected along a rough horizontal surface to slide with a speed of 10 m/s. The coefficient of kinetic friction is 0.10. Before coming to rest, the block will travel a distance of

(A) 5 m

(B) 30 m

(C) 100 m

(D) 50 m

18. A body makes angular simple harmonic motion of amplitude $\pi/10$ radians and time period of 0.05 sec. At time t = 0, the body is at a displacement of $\pi/10$ radians. The equation representing the angular displacement, θ, is given by

(A) $\theta = \frac{\pi}{10} Cos[40\pi t]$ radians

(B) $\theta = \frac{\pi}{10} Sin[40\pi t]$ radians

(C) $\theta = \frac{\pi}{10} Cos\left[40\pi t + \frac{\pi}{10}\right]$ radians

(D) $\theta = \frac{\pi}{10} Sin[40\pi t] + \frac{\pi}{10}$ radians

19. A 600 nm laser light is passed through a narrow slit of width 0.2 mm. The diffraction pattern is observed on a screen placed 6 m away from the slit. The distance on the screen between the centres of the first minima outside the central bright fringe is

(A) 18 mm

(B) 36 mm

(C) 3.6 mm

(D) 1.8 mm

20. A converging lens is consisting of flint glass. The focal length for the lens are f_V and f_R for violet and red light, respectively. Then

(A) $f_V > f_R$

(B) $f_V = f_R$

(C) $f_V < f_R$

(D) f_V can be equal to, greater than or smaller than f_R depending on the position of the object.

21. In the He-Ne laser, which of the following is true?

(A) the laser transition occurs in He atom.

(B) the metastable state occurs only in Ne atoms.

(C) the Ne atoms help to achieve a population inversion in the He atoms.

(D) the metastable state occur in both the He and Ne atoms.

22. A copper wire (resistivity = 1.7×10^{-8} Ω-m) of diameter 1.0 mm carries current of 1.7 The magnitude of electric field in the wire is

(A) ~ 3.5 kV

(B) ~ 35 V/m

(C) ~ 0.035 V/m

(D) ~ 0.35 V/m

23. A steam engine intakes 100 g of steam at 100°C per minute and cools it down to 20°C. Given the latent heat of vaporization of steam = 540 cal/g and specific heat of water = 1 cal/g-°C. The heat rejected by the steam engine per minute is

(A) 62,000 cals

(B) 8,000 cals

(C) 54,000 cals

(D) 90,00 cals

24. The average energy of a molecule of *HCl* gas exhibiting translation, rotation and vibration motion is (k is Boltzmann constant and T is temperature)

(A) 3/2 kT

(B) 5/2 kT

(C) 7/2 kT

(D) 9/2 kT

25. An isolated metallic solid sphere of diameter 90 cm is given a charge of 0.5 μC. The potential of the sphere is [Given $(4\pi\varepsilon_o)^{-1} = 9\times10^9\ m/F$]

(A) 4500 V

(B) 2700 V

(C) 100,000 V

(D) 10,000 V

26. A uniform wire of resistance 10 Ω is bent to form a complete circle. The resistance between two adjoining quarter points on the diameter of circle is

(A) 5 Ω

(B) 2.19 Ω

(C) 1.87 Ω

(D) 6.25 Ω

27. A proton and an alpha particle moving with equal kinetic energy enter perpendicularly into a magnetic field. The ratio of the respective radii, R_P and R_A, their circular paths will be

(A) 1

(B) 2

(C) $\sqrt{2}$

(D) $\frac{1}{\sqrt{2}}$

28. The density of the ^{14}C nucleus (atomic number = 6) is

(Given 1 atomic mass unit = 1.66×10^{-27} kg)

(A) ~ 2.4×10^{17} kg/m^3

(B) ~ 2.4×10^{10} kg/m^3

(C) ~ 1.2×10^{14} kg/m^3

(D) ~ 1.7×10^{15} kg/m^3

29. Number of atoms per unit cell in case of body-centred cubic is

(A) 4

(B) 3

(C) 2

(D) 12

30. Electron microscope is based on

(A) negative charge of electron

(B) negative beta decay of radioisotopes

(C) photoelectric effect

(D) wave nature of electrons

31. A capacitor with no initial charge at t= ∞ acts as
    A) short circuit
    B) open circuit
    C) current source
    D) voltage source

32. The instantaneous voltage e=346.4sin314t volts is given to the circuit having resistance R= 10Ω. The current flowing will be
    A) 1A
    B) 10A
    C) 24.5A
    D) 34.6A

33. A transformer has hysteresis loss of 30 W at 240 V, 60 Hz. The hysteresis loss at 200 V, 50 Hz will be
    A) 28W
    B) 25 W
    C) 30 W
    D) 36W

34. Two coupled coils of L1 = 0.8 H and L2 = 0.2H have a coupling coefficient k=0.9. The mutual inductance M is
    A) 0.144 H
    B) 0.23 H
    C) 0.36 H
    D) 0.43 H

35. If the ceiling fan, when switched on runs at slow speed in the reverse direction, it can be concluded that
    A) Winding has burnt out
    B) Bearing are worn out
    C) Capacitor is ineffective
    D) None of the above

36. A choke which is purely inductive is subjected to avoltage of 50V,50Hz and takes a current of 1 ampere. The frequency is increased to 500 Hz keeping the voltage same. The current
    A) Will fall to 0.1 A
    B) Will fall to less than 0.1A
    C) Will rise
    D) Will remain at 1.0 A

37. A 400/200V transformer has its l.v. resistance of 0.02 per unit. The resistance when referred to h.v. side is
    A) 0.02 p.u.
    B) 0.04 p.u.
    C) 0.01 p.u.
    D) 0.08 p.u.

38. The direction of rotation of dc shunt motor can be reversed by interchanging
    A) The supply terminals
    B) The field terminals only
    C) The armature terminals only
    D) Either field or armature terminals

39. Compared to a resistor split phase motor a capacitor start motor has
    A) High starting torque
    B) lower starting torque
    C) High running torque
    D) Lower running torque

40. A 400Kw, 3-phase, 440 V, 50 Hz induction motor has a speed of 950 rpm on full load. The machine has 6 poles. The slip of the machine will be
    A) 0.06
    B) 0.05
    C) 0.04
    D) 0.02

41. The range of an ammeter and a voltmeter can be extended respectively by
    A) reducing the spring tension of the deflecting system
    B) using shunt and multiplier
    C) using multiplier and shunt
    D) using series capacitor and inductor.

42. Superheterodyne receiver converts all incoming signals to
    A) a lower intermediate signal
    B) A higher frequency signal
    C) a stronger signal
    D) a resonant signal

43. Connecting the inverters at all inputs of an AND gate produces a
    A) NAND
    B) NOR
    C) OR
    D) EXOR

44. Conduction in a BJT takes place due to
    A) electrons
    B) holes
    C) both electrons and holes
    D) majority carriers only.

45. In the output characteristics of JFET, the constant-current region is obtained
    A) after pinch-off voltage
    B) before pinch-off voltage
    C) depends on gate voltage
    D) does no depend on pinch-off voltage

46. Which of the following is best suitable for higher frequency generation
    A) R-C oscillator
    B) L-C oscillator
    C) crystal oscilator
    D) all of above.

47. Which of the following diode can be used for electronic tuning of an oscillator
    A) Light-emitting diode
    B) zener diode
    C) tunnel diode
    D) varactor diode

48. The open-loop gain of an Op-amp is 10000. If Rf = 24 KOhm and R1 = 1 KOhm, then its closed loop gain will be
    A) 24.94
    B) 49.75
    C) 99.01
    D) 29.44

49. To convert a square wave into a triangular wave, the Op-amp should be used as
    A) a phase shifter
    B) a scale changer
    C) a differentiator
    D) an integrator.

50. Strain gauge is used for converting mechanical displacement into a change in
    (A) temperature
    (B) resistance
    (C) inductance
    (D) capacitance.

51. What number will z in the sample code given below contain?

```
int z, x=5, y=-10, a=4, b=2 ;
z = x++ - --y * b / a ;
```

    A) 5
    B) 6
    C) 10
    D) 11

52. What value does testarray[2][1][0] in the sample code below contain?

```
int testarray[3][2][2] = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12};
```

    A) 3
    B) 5
    C) 7
    D) 11

53. What value will x contain in the sample code below?
int x = 2 * 3 + 4 * 5;
A) 22
B) 26
C) 46
D) 70

54. Which keyword indicates that the actual storage and initial value of a variable, or body of a function, is defined elsewhere, usually in a separate source code module?
A) Register.
B) Auto
C) Extern
D) Static

55. Which one of the following will read a character from the keyboard and will store it in the variable c?
A) c = getc();
B) c = getchar();
C) c = getchar(stdin);
D) getchar(&c);

56. What is the maximum number that can be printed using printf("%d\n", x), assuming that x is initialized as shown below?
short int x; /* assume x is 16 bits in size */
A) 127
B) 128
C) 65,536
D) 32,767

57. What will be the output of the following statements?
int a=5,b=6,c=9,d; d=(ac?1:2):(c>b?6:8)); printf("%d",d);
A) Error
B) 2
C) 6
D) 8

58. What will be output if you will compile and execute the following c code?

```
#include<stdio.h>
int main(){
int i=4,x;
x=++i + ++i + ++i;
printf("%d",x);
return 0;
}
```

A) 21
B) 18
C) 12
D) Compiler error

59. What is the function of the sticky bit?

A) It prevents files from being deleted by anyone

B) It prevents files from being deleted by nonowners except root

C) It marks files for archive

D) It prevents files from being deleted by nonowners including root.

60. What is the Difference between struct and class in terms of Access Modifier?

A) By default all the struct members are private while by default class members are pub

B) By default all the struct members are protected while by default class members are private

C) By default all the struct members are public while by default class members are priv

D) By default all the struct members are public while by default class members are protected.

61 One reversible heat engine operates between 1600K and T_2K and another reversible engine operates between T_2K and 400K. If both the engines have the same heat input output, then temperature T_2 is equal to

A) 800K B) 1000K C) 1200K D) 1400K

62 An error of 1% in measuring head over the crest of the notch will produce an error in discharge over a triangular notch of

A) 1% B) 1.5% C) 2.% D) 2.5%

63 The efficiency of Diesel cycle approaches to Otto cycle efficiency when

A) cut-off is increased

C) cut-off is decreased

B) cut-off is zero

D) cut-off is constant

64 The flow in a pipe or channel is said to be non-uniform when

A) the liquid particles at all sections have the same velocities

B) the liquid particles at different sections have different velocities

C) the quantity of liquid flowing per second is constant

D) each particle has a definite path

65 A jet of water discharging from a 40mm diameter orifice has a diameter of 32mm at vena-contracta. The coefficient of contraction is

A) 0.46 B) 0.64 C) 0.78 D) 0.87

66 A rod is enclosed centrally in a tube and assembly is tightened by rigid washers. If th assembly is subjected to a compressive load, then

A) Rod is under compression

B) tube is under compression

C) both rod and tube are under compression

D) tube is under tension and rod is under compression

67 A body is subjected to direct tensile stress of 300MPa in one plane accompanied by a simple shear stress of 200MPa. The maximum normal stress will be

A) -100MPa B) 250MPa C) 300MPa D) 400MPa

68 A square beam and a circular beam have the same length, same allowable stress and the same bending moment. The ratio of weights of square beam to circular beam is

A) ½ B) 1 C) 1/1.12 D) $1/\sqrt{2}$

69 A tensile test is performed on a round bar. After fracture, it has been found that the diameter remains approximately same at fracture. The material under test was

A) Mild steel B) cast iron C) glass D) copper

70 The product of the tangential force acting on the shaft and its distance from the axis of the shaft is known as

A) Bending moment B) twisting moment C) torsional rigidity D) flexural rigidity

71. An area of wet soil, plants & air constitute :

A) Semi terrestrial eco system
B) Macro-eco system
C) Mesoecosystem
D) Mega – eco system

72. Herbivores are eaten up by carnivores, hence they are called as

A) Primary consumers
B) Secondary consumers
C) Tertiary consumers
D) Primary producers

73. Forest resource is a major supplier of

A) Wood
B) Mineral
C) Aquatic culture
D) Water

74. What is the percentage of salty water on the whole earth

A) 75% B) 30% C) 85% D) 97%

75. Which of the following is a non-renewable source of energy

A) Solar energy
B) Wind energy
C) Fossil fuels
D) Water power

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