Booklet Series: **A** *Question Booklet Serial No.* 100502

PULEET – 2017

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 Candidate: _____ *Signature of Invigilator:* _____

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 Questions Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Question Booklet Serial No. 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. 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.
5. 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 answer, ¼ of the marks of the question will be deducted for every wrong answer.**
6. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Booklet. No marks will be deducted in such cases.
7. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the question given in the Question Booklet.
8. If you want to change an already marked answer, erase the shade in the darkened bubble completely.
9. For rough work only the blank sheet at the end of the Question Booklet be used.
10. The University will provide logarithmic tables. Borrowing of log table or other material is not allowed.
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 assistant or found giving or receiving assistant 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. **Communication equipment such as mobile phones, pager, wireless set, scanner, camera or any electronic/digital gadget etc., is not permitted inside the examination hall. Use of calculators is not allowed.**
16. The candidates will not be allowed to leave the Examination Hall/Room before the expiry of the allotted time.

1. The value of the integral $\iint_S \vec{F}.\hat{n}\, d\sigma$ for the field $\vec{F} = x\,\hat{\imath} + y\,\hat{\jmath} + z\,\hat{k}$ over the sphere $S: x^2 + y^2 + z^2 = a^2$ is
   A) 32 B) 3π C) $4\pi a^3$ D) $4\pi a^2$

2. The value of the integral $\oint_C (6y + x)dx + (y + 2x)dy$, where $C: (x-2)^2 + (y-3)^2 = 4$, is
   A) 16π B) -16π C) 0 D) 1

3. The value of the integral $\iint_D e^{x^2+y^2}\, dy\, dx$ where D is the semicircular region bounded by the x-axis and the curve $y = \sqrt{1-x^2}$ is
   A) 3π B) 23 C) $4(e-1)$ D) $\frac{\pi(e-1)}{2}$

4. Find the minimum value of x+y, subject to the constraints xy=16, x>0, y>0.
   A) 8 B) 9 C) 10 D) 11

5. Find the derivative of $f(x,y,z) = xy + yz + zx$ at the point (1,-1,2) in the direction of the vector $\vec{A} = 3\,\hat{\imath} + 6\,\hat{\jmath} - 2\,\hat{k}$.
   A) -3 B) 2 C) 3 D) 1

6. Find the torsion for the space curve $\overrightarrow{r(t)} = t^3\,\hat{\imath} + t^2\,\hat{\jmath}$, t>0 at the point t=1.
   A) 2 B) 3 C) -1 D) 0

7. If a, b, c are Harmonic progression.; b, c, d are in Geometric progression and c, d, e are in arithmetic progression, then the value of e is
   A) $ab^2/(2a-b)^2$ B) $ab/(2a-b)^2$
   C) $a^2b^2/(2a-b)^2$ D) $ab^2/(2a+b)^2$

8. The value of $\tan^{-1}(1) + \cos^{-1}\left(-\frac{1}{2}\right) + \sin^{-1}\left(-\frac{1}{2}\right)$ is equal to
   A) 2π B) $3\pi/2$ C) $\pi/4$ D) $3\pi/4$

9. The straight lines x+2y-9=0, 3x+5y-5=0 and ax+by-1=0 are concurrent if the straight line 35x-22y+1=0 passes through the point
   A) (-a,-b) B) (a,-b) C) (-a,b) D) (a,b)

10. If $\Delta = \begin{vmatrix} 1+x_1 & 1+x_1x & 1+x_1x^2 \\ 1+x_2 & 1+x_2x & 1+x_2x^2 \\ 1+x_3 & 1+x_3x & 1+x_3x^2 \end{vmatrix}$, then
    A) Δ is independent of x B) $\Delta = (x-x_1)(x-x_2)(x-x_3)$
    C) $\Delta = (x+x_1)(x+x_2)(x+x_3)$ D) $\Delta = x\,x_1x_2x_3$

11. A body acted on by no net force
    A) Moves with constant acceleration B) Moves with constant velocity
    C) Decelerates slowly D) Gains angular momentum

12. In Simple Harmonic motion the restoring force is
    A) Directly proportional to the displacement from the mean position
    B) Inversely proportional to the displacement from the mean position
    C) Directly proportional to the square of the displacement from the mean position
    D) Inversely proportional to the square of the displacement from the mean position

13. Angular momentum of a rigid body with moment of inertia I, rotating around a symmetry axis with angular velocity ω is given as
A) $L = I\omega^2$ B) $L = I^2\omega$ C) $L = I\omega$ D) $L = I/\omega$

14. The critical angle for Total Internal Reflection, when light propagating within glass(index of refraction = 1.52) encounters a glass-air interface, is
A) 35° B) 45° C) 41° D) 57°

15. If f_1 is the focal length of the objective and f_2 is focal length of eye piece, the angular magnification of the telescope is give as
A) $-f_2/f_1$ B) $-f_1/f_2$ C) $-f_1f_2$ D) $-(f_1f_2)^2$

16. Heat requires to change 1Kg of ice at 0°C to 1Kg of water, at normal atmospheric pressure, is known as the
A) Latent heat of vaporization
B) Heat capacity
C) Latent heat of fusion
D) Coefficient of thermal conductivity

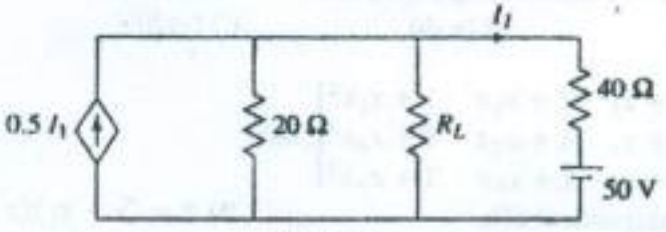
17. The potential energy of a magnetic dipole having dipole moment p, placed in magnetic field B is minimum when
A) p is perpendicular to B
B) p is parallel to B
C) p is antiparallel to B
D) p is inclined to B

18. Two parallel conducting wires, carrying current in the same direction
A) Attract each other
B) Repel each other
C) Neither attract nor repel each other
D) May attract or repel each other depending on the magnitude of the current

19. The magnitude of the momentum of a photon of red light (λ=650nm) is of the order of
A) 10^{-30} Kg.m/s B) 10^{-34} Kg.m/s C) 10^{-22} Kg.m/s D) 10^{-27} Kg.m/s

20. The most efficient packing of spheres is
A) Hexagonal close packing
B) Tetragonal cubic packing
C) Cubic close packing
D) Both Hexagonal and cubic close packing

21. The maximum power is delivered to R_L in figure if its value is
A) 16 Ω B) (40/3) Ω C) 60 Ω D) 20 Ω



Figure

22. From the two voltage equations $e_A = E_m\sin(100\pi t)$ and $e_B = E_m\sin(100\pi t + \pi/6)$, it is obvious that
A) A leads B by 30°
B) B achieves its maximum value 1/600 seconds before A does
C) B lags behind A
D) A achieves its zero value 1/600 seconds before B

23. In a series RLC circuit at resonance, the magnitude of the voltage developed across the capacitor
A) Is always zero
B) Can never be greater than the input voltage
C) Can be greater than the input voltage, however, it is 90° out of phase with the input voltage
D) Can be greater than input voltage, and in phase with the input voltage

24. As compared to shunt and compound DC motors, the series DC motor will have the highest torque because of its comparatively _____ at the start.
A) Lower armature resistance
B) Stronger series field.
C) Fewer series turns
D) Larger armature current

25. In two wattmeters method of measuring three phase power the reading of one of the wattmeters can be negative when the power factor angle ϕ is.
A) $\phi > 60^{\circ}$ B) $\phi < 60^{\circ}$ C) $\phi = 0^{\circ}$ D) $\phi = 90^{\circ}$

26. Permeability in a magnetic circuit corresponds to _____ in an electric circuit.
A) Resistance B) Resistivity C) Conductivity D) Conductance

27. In order to minimize loss due to hysteresis, the magnetic material should have
A) High resistivity
B) Low hysteresis coefficient
C) Large B-H loop area
D) High retentivity

28. A transformer transforms
A) Voltage B) Current C) Voltage and current D) Power

29. While conducting short circuit test on a single phase transformer, the following side is short circuited.
A) H.V. side B) L.V. side C) Primary side D) Secondary side

30. Reduction in the capacitance of capacitor-start motor, results in reduces
A) Noise B) Speed C) Starting torque D) Armature reaction

31. What does a high resistance reading in both forward-bias and reverse-bias directions indicate?
A) A good diode
B) An open diode
C) A shorted diode
D) Ideal diode

32. The breakdown mechanism in a lightly doped p-n junction under reverse biased condition is called
A) Avalanche breakdown
B) Zener breakdown.
C) High voltage breakdown
D) Breakdown by tunnelling

33. If the PIV rating of a diode is exceeded, the diode .....
A) conducts poorly
B) behaves like a zener diode
C) is destroyed
D) becomes amplifier

34. Which of the following expressions represents the DC current gain of a bipolar transistor?

A) I_C/I_B B) dI_C/dV_{BE} C) dI_C/dI_B D) I_C/V_{BE}

35. The large signal bandwidth of an OPAMP is limited by its

A) Input frequency
B) Slew rate
C) Output impedance
D) Loop gain

36. The frequency of oscillation of a tunnel-collector oscillator having L= 30μH and C = 300pf is nearby

A) 267 kHz B) 1677 kHz C) 1.68 kHz D) 2.67 MHz

37. A J-K flip-flop has two control inputs. What happens to the Q output on the active edge of the clock if both control inputs are asserted simultaneously?

A) The Q output remains unchanged
B) The Q output is reset to 0
C) The Q output toggles to the other state
D) The Q output is set to 1

38. An FM signal has an intelligence frequency of 2 kHz and a maximum deviation of 10 kHz. If its carrier frequency is set at 162.4 MHz, what is its index of modulation?

A) 10 B) 5 C) 162.5 D) 20

39. Lissajous figure is used in CRO for:

A) Frequency measurement
B) Amplitude measurement
C) Phase measurement
D) DC measurement

40. With the increase in the intensity of light, the resistance of a photovoltaic cell

A) Increases B) Remains same C) Gets double D) Decreases

41. What will be the output of following program?

```
#include<stdio.h>
#define x 5+2
int main()
{
int z;
z=x*x*x;
printf("%d", z);
return 0;
}
```

A) 27 B) 343 C) 133 D) 187

42. What will be the output of following program?

```
#include<stdio.h>
 int main()
{
int array[]={10,20,30,40};
printf("%d", -2[array]);
return 0;  }
```

A) 60 B) -30 C) 20 D) 40

43. Identify the correct sequence of steps to run a program

A) Link, load, code, compile, execute
B) Code, compile, link, execute, load
C) Code, compile, link, load, execute
D) Compile, code, link, load, execute

44. Which is correct sequence of statements to swap values of two variables?

A) a=a+b; a=a-b; b=a-b;
B) a=a+b; b=a-b; a=a-b;
C) a=a-b; a=a+b; b=b-a;
D) a=a+b; b=a+b; a=b-a;

45. What will be the output of following program?

```
#include<stdio.h>
int* m()
{    int x=15;  int *p;
p=&x;
return p;
}
 void main()
{
 int *k = m();
printf("%d", ++*k);
 }
```

A) Program will report error at printf statement in main function
B) Program will print 15
C) Program will print garbage value
D) Program will print 16

46. How many times will main function be called by statement after if condition-

```
#include<stdio.h>
void main()
{
static int x;
 if (x++ < 2)
main();
}
```

A) Infinite calls to main
B) main will be called once
C) main will be called twice
D) Program will not compile correctly

47. Automatic variables are allocated memory in?

A) Heap B) Data segment C) Code segment D) Stack

48. Which symbol can be used to define member of a class externally?

A) :
B) ::
C) #
D) Class members cannot be defined outside the class

49. What do various characters in 'ab+' stand for in the following operation?

```
FILE *fp;
fp = fopen("Random.txt", "ab+");
```

A) a =Append, b=binary, + = update
B) a=Add, b=binary, +=update
C) a =Append, b=binary, +=write-only
D) a=Assign, b=binary,+=Addition

50. Which of the following is a mechanism by which an object acquires the properties of another object?

A) Encapsulation B) Abstraction C) Inheritance D) Polymorphism

51. A thermal engine has a heat source temperature of 500°C and the sink temperature is 50°C. The maximum attainable efficiency will be:

A) 90% B) 75% C) 87% D) 58%

52. The second moment of circular area with diameter 4 mm is:

A) 10.25 mm^4 B) 12.57 mm^4 C) 13.85 mm^4 D) 15.95 mm^4

53. Turbulent flow takes place because of the following reason

A) Cross currents and eddies formation
B) Fluctuating components of velocity
C) Large value of Reynolds number
D) All the above

54. The ratio of lateral strain to linear strain is called

A) Fatigue limit
B) Modulus of elasticity
C) Failure ratio
D) Poisson's ratio

55. The temperatures on inner and outer sides of a wall are 650°C and 500°C, respectively and the thermal conductivity of the wall material is 0.20 kCal/m^2-hr. If thickness of the wall is 30 cm, then heat flux will be

A) 100 kCal/m^2-hr B) 120 kCal/m^2-hr C) 140 kCal/m^2-hr D) 150 kCal/m^2-hr

56. If one kilogram of steam sample contains 0.6 kg of dry steam, then the volume of dryness fraction is

A) 0.2 B) 0.4 C) 0.6 D) 0.8

57. A polytropic process pv^n = constant with n= 1 is called

A) Isothermal B) Adiabatic C) Isochoric D) Isobaric

58. Which of the following instruments is used to measure flow on the application of Bernoulli's theorem?

A) Nozzle B) Pitot tube C) Orifice plate D) All the above

59. Stress value at neutral axis of a beam is

A) Maximum compressive
B) Minimum tensile
C) Zero
D) Minimum tensile

60. Compression ratio of an engine is

A) (Stroke volume + Clearance volume)/Stroke volume
B) Total volume/Clearance volume
C) Suction pressure/Discharge pressure
D) Final pressure/Initial pressure

61. The unit of kinematic viscosity is

A) gm/cm-sec^2 B) dyne-sec/cm^2 C) gm/cm^2-sec D) cm^2/sec

62. If the forbearing bearing of a line AB is 35° and that of line BC 15°, then the included angle between the lines is

A) 20° B) 50° C) 160° D) 230°

63. For supplying water to rabi crop, kharif crop and sugarcane, the channel is designed for a capacity equal to the greater of the water requirement of

A) Rabi or kharif
B) Rabi and kharif or sugarcane
C) Rabi and sugarcane or kharif and sugarcane
D) Rabi or kharif or sugarcane

64. The aggregates required for one kilometre length of water bound macadam road per metre width and for 10mm thickness is

A) 8 Cubic metre
B) 10 cubic metre
C) 12 cubic metre
D) 15 cubic metre

65. The relationship between water content (w%)and number of blow (N) in soils, as obtained from Casagrande's liquid limit device is given by

$W=20 - \log_{10}N$

The liquid limit of the soil is

A) 15.6% B) 16.6% C) 17.6% D) 18.6%

66. Number of vertical joints in a stretcher course is x times the number of joints in the header course, where x is equal to

A) ½ B) 1 C) 2 D) ¼

67. The split tensile strength of M15 grade concrete when expressed as a percentage of its compressive strength is

A) 10 to 15% B) 15 to 20% C) 20 to 25% D) 25 to 30%

68. For complete hydration of cement the w/c ratio needed is

A) Less than 0.25
B) More than 0.25 but less than 0.35
C) More than 0.35 but less than 0.6
D) More than 0.60

69. A sudden jump anywhere on the Bending moment diagram of a beam is caused by

A) Couple acting at that point
B) Couple acting at some other point
C) Concentrated load at the point
D) Uniformly distributed load or uniformly varying load on the beam

70. The reduction coefficient of a reinforced concrete column with an effective length of 4.8m and size 250mm x 300mm is

A) 0.80 B) 0.85 C) 0.90 D) 0.95

71. A land is known as waterlogged

A) When the permanent wilting point is reached
B) When gravity drainage has ceased
C) Capillary fringe reaches the root zone of plants
D) When permeability of soil reached the maximum limits

72. Select the primary air pollutants among the following

A) Sulphur dioxide and nitrogen oxides
B) Ozone and carbon monoxide
C) Sulphur dioxide and ozone
D) Nitrogen oxide and ozone

73. Major consumer of wood from forest is

A) Thermal Power Plants
B) Paper Industry
C) Chemical Industry
D) Nuclear Power Plants

74. All forms of water that comes down on Earth, including rain, snow, hail etc. is known as

A) Calcification B) Fixation C) Precipitation D) Accumulation

75. Extensive planting of trees to increase forest cover is called

A) Afforestation B) Agroforestry C) Deforestation D) Social forestry

x-x-x