F.E./SEM II (CBSGS)/Applied Maths / MAY 2018

Q. P. Code : 22296

Duration – 3 Hours **Total Marks : 80**

(1) N.B.:- Question no 1 is compulsory.

(2) Attempt any THREE questions out of remaining FIVE questions.

Q.1) a) Solve $\frac{dy}{dx} = \frac{y+1}{(2+y)e^{y} - x}$ (4)

b) *Solve* $(D^2+1)^3 y = 0$ (3)

c) Evaluate $\int_0^4 x^2 \sqrt{4x - x^2}\, dx$ (3)

d) Express the following integral in polar co-ordinate **(4)**

$$\int_0^a \int_0^x f(x,y)\, dx\, dy$$

e) Prove that $E \nabla = \nabla E$ (3)

f) Evaluate $I = \int_0^{\pi/4} \int_0^{\sqrt{\cos 2\theta}} \frac{r}{(1+r^2)^2}\, dr\, d\theta$ **(3)**

Q.2 a) Solve $x\frac{dy}{dx} + y = y^2(\log x)$ (6)

b) Change the order of integration and evaluate $I = \int_0^1 \int_{x^2}^{2-x} yx\, dy\, dx$. (6)

c) Evaluate $\int_0^{\pi/2} \frac{dx}{1 + a\sin^2 x}$ and hence deduce that **(8)**

$$\int_0^{\pi/2} \frac{\sin^2 x}{(3+\sin^2 x)^2}\, dx = \frac{\pi\sqrt{3}}{96}$$

Q.3 a) Evaluate $I = \int_0^1 \int_{y^2}^1 \int_0^{1-x} x\, dz\, dx\, dy$ (6)

b) Find the mass of a plate in the form of a cardiode $r = a(1 - \cos\theta)$ if the density at any point of the plate varies as square of its distance from the plate. (6)

c) Solve $(3x+1)^2 \frac{d^2y}{dx^2} - 3(3x+1)\frac{dy}{dx} - 12y = 9x$ **(8)**

Q. 4 a) Show that the length of the curve $x = a e^{\theta} \sin\theta \quad y = a e^{\theta} \cos\theta$ from $\theta = 0$ to $\theta = \pi/2$ (6)

b) *Solve* $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 13y = 8e^{3x} \sin 4x + 2^x$ (6)

c) Using fourth order Runge-Kutta method, solve numerically, the differential equation $\frac{dy}{dx} = x^2 + y^2$ with the given condition x = 1, y = 1.5 in the interval (1, 1.2) with h = 0.1 **(8)**

Q. 5 a) Use method of variation of parameters to solve (6)

$$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 5y = 4e^{-x} \tan 2x + 5e^{-x}$$

b) Using Taylor's series method, obtain the solution of (6)

$\frac{dy}{dx} = y - xy, \quad y(0) = 2.$ Find the value of y for x = 0.1 correct to four decimal places

c) Evaluate $\int_0^1 \frac{dx}{1+x}$ by using (i) Trapezoidal Rule, (ii) Simpson's $(1/3)^{rd}$ Rule and (iii) Simpson's $(3/8)^{th}$ Rule. Compare the result with exact solution. **(8)**

Q. 6 a) In a circuit of resistance R, self inductance L, the current i is given by by $L\frac{di}{dt} + Ri = E\cos pt$ where E and p are constants. Find the current i at time 't' (6)

b) Find the area between the circles $r = \sin\theta$ and $r = 2\sin\theta$ (6)

c) Find the volume of the paraboloid $x^2 + y^2 = 4z$ cut off by the plane $z = 4$ **(8)**

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E / SEM II (CBSGS) / Applied Physics / MAY 2018

Q. P. Code: 25643

Time: 2 hours Marks: 60

N. B. 1) Question no 1 is compulsory

2) Attempt any three questions from remaining three questions.

3) Assume suitable data wherever required

4) Figures on the right indicates marks

1 Attempt **any five** 15

a In Newton's ring experiment the diameter of 4th dark ring is 0.4cm, calculate the diameter of 20th dark ring.

b What is meant by absent spectra? Write the condition of absent spectra.

c A fiber cable has an acceptance angle of 30^0 and a core refractive index is 1.4. Calculate the refractive index of cladding.

d What is resonance cavity? Explain its importance in Lasers

e What is wave function of matter wave? Explain its physical significance

f How do you measure phase difference between two A.C. signals by CRO?

g Define superconductivity and critical current. Plot the variation of resistance versus temperature in case of superconducting material.

2 a For Newton's ring, prove that diameter of n^{th} dark ring is directly proportional to the square root of natural number. 5

If the diameter of n^{th} and $(n+8)^{th}$ Newton's dark ring are 4mm and 7mm respectively. Determine the wavelength of light used if the radius of curvature is 2 m. 3

b Differentiate between Step Index and graded Index optical fiber and derive an expression for numerical aperture of step index optical fiber. 7

3 a How are lasers different than that of ordinary source of light? With neat diagram explain the construction and working of He- Ne Laser. 8

b Why are the fringes in the interference pattern by wedge shaped film straight? Derive the expression for fringe width. 7

4 a What is grating element? A monochromatic light of wavelength 6.56×10^{-5} cm falls normally on a grating of 2cm wide. The first order maxima is produced at 18^0 14' from the normal. What are the total no of lines on the grating? 5

b What is Heisenberg's uncertainty principle? Prove it with single slit electron diffraction. 5

c What is critical temperature and critical magnetic field of superconducting material? The transition temperature for Pb is 7.2 k. At 5 k it losses the superconducting property if subjected to magnetic field of 3.3×10^4A/m. Find the critical field at 0k. 5

5 a For plane transmission grating, prove that the condition of diffraction maximum is $d\sin\Theta=n\lambda$, n=0, 1, 2, 3..... 5

b Derive one dimensional time dependent Schrodinger wave equation. 5

c With neat diagram, explain the construction and working of Scanning electron microscope. 5

6 a An electron has momentum of 5.4×10^{-14} kg-m/s with an accuracy of 0.05%. Find the minimum uncertainty in the location of electron. 5

b With neat diagram explain the construction and working of Cathode Ray Tube. 5

c What are Nano materials? Explain one of the methods of its production in detail. 5

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FE | SEM-II | CBSGS | MAY 2018 | Applied chemistry-I

Q.P. Code :38691

[Time: 2 Hours] **[Marks: 60]**

Please check whether you have got the right question paper.

N.B:
1. Question No.1 is Compulsory.
2. Attempt any **three** questions from remaining **five** questions.
3. Figures to the right indicate Full marks.
4. All questions carry equal marks.
5. Atomic weights: - H=1, C=12, N=14, O=16, S=32, CI=35.5, Ba=137.3, Ca=40. Mg=24, Na=23.

1. Answer **any five** from the following:- **15**

a) Galvanization of iron articles is preferred to tinning. Give reason.
b) What are Fuels? Give characteristics of good fuels.
c) Give Composition, Properties and Uses of **Woods Metal**.
d) What are composite materials? Define matrix and dispersed phase.
e) Explain the principal of green chemistry 'Prevention of waste'.
f) Mention three important constituents of paints with their function.
g) 1.85 g of the same coal sample in a Bomb-calorimeter experiment gave 0.28 g $BaSO_4$. Calculate percentage of S in the coal sample.

2. a) Explain the mechanism of following types of corrosion:- **06**
i) Waterline corrosion ii) Pitting corrosion
b) What is Cracking of hydrocarbons? Explain Fixed bed catalytic cracking. **05**
c) Calculate % Atom Economy for the following reaction with respect to toluene **04**

$C_6H_6 + CH_3Cl \xrightarrow{AlCl_3} C_6H_5CH_3 + HCl$

Benzene Methyl Chloride Toluene

3. a) A fuel sample has the following composition: H_2=60%, C_2H_2=10%, CO=8%, CO_2 = 1 %, and rest is nitrogen. Calculate the volume of oxygen and air required for complete combustion of $5m^3$ of fuel. **06**
b) Explain Conventional and Greener route for synthesis of Adipic acid. Mention the green Chemistry principle involved. **05**
c) How do the following factors related to nature of environment affect corrosion? **04**
i) P^H of medium ii) Moisture

4. a) What are alloys? Explain the purpose of making alloys. **06**
b) What is the principle of cathodic protection? Explain impressed current protection method. **05**
c) Explain laminar composites with example. **04**

Turn Over

5. a) Write informative note on Biodiesel. **06**

b) What is powder metallurgy? Discuss any two methods for manufacturing metal powders. **05**

c) Write a note on dispersed phase of composite materials. **04**

6. a) What are the methods of metal coatings? Explain electroplating of metals in detail. **05**

b) A coal sample contains, C=78%, O=12%, H=4%, S=0.5%, and Ash= 5.5%. Calculate the GCV and NCV of given coal sample. **05**

c) What is compaction in powder metallurgy? Explain cold pressing and roll pressing methods in detail. **05**

FE/SEM II (CBSGS)/Structed Programming/ MAY 2018

Q. P. Code: 40226

Max. Marks: 80 **Time : 3 Hrs**

N.B:
1. **Question No.1 is compulsory**
2. **Answer any three out of remaining five questions**

Q.1	a.	Define algorithm. Write algorithm to calculate Fibonacci series.	04
	b.	Explain conditional operator with example.	04
	c.	Differentiate between structure and union.	04
	d.	Explain strcmp, strcat functions from string.h	04
	e.	Compare if-else ladder and switch control structure.	04
Q.2	a.	Write a program to sort elements of array in descending order.	10
	b.	Explain parameter passing with the help of call by value and call by reference. Give example.	10
Q.3	a.	Explain in detail the concept of structured programming. Define flowchart. Draw flowchart to check given number is prime number or not.	08
	b.	Write a program to calculate GCD and LCM of given number.	07
	c.	Explain concept of recursion with example.	05
Q.4	a.	Write a program to count vowels, consonants and blank spaces in a given string.	08
	b.	Explain all bitwise operators in C.	06
	c.	Write a program to print following pattern.	06

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        A
    A   B
A   B   C
A   B   C   D
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Q.5	a.	Explain different storage classes in C.	10
	b.	Write a program to create a user defined functions to read matrix, to perform matrix multiplication and to display result matrix.	10
Q.6	a.	Explain structures in C. Write a program to create structure for cricket player to store his name, number of matches played, number of runs, strike rate. Write a program to store records of 10 cricketers. Display the records according to their runs in ascending order.	10
	b.	Explain different file handling functions in C.	05
	c.	Write a program to reverse a given string.	05

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FE | Sem-II (CBSGS) / Engineering Drawing / May-18.

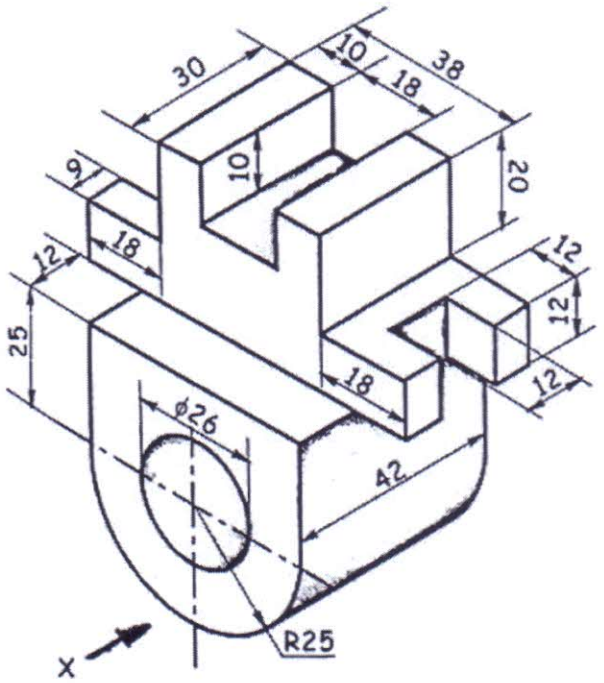
Q. P. Code : 50062

(3 Hours) **[Total Marks: 60]**

N.B. - 1. *Question* ***No. 1*** *is* ***compulsory.***
2. *Attempt any three questions out of remaining five questions.*
3. ***Use first angle method of projection****, unless mentioned otherwise.*
4. *Write all answers on drawing sheets only & use both the sides of the sheets.*
5. ***Use your own judgment for any unspecified dimension.***
6. *Retain construction lines.*
7. *All dimensions are in mm.*

Q1 (a) One end of an inelastic string, 130 mm long is attached to the circumference of a circular disc of 50 mm diameter. The free end of the string is wound around the disc, keeping always tight. Draw the locus of the free end and name the curve. *(06)*

(b) For the object shown in figure draw the following views -
(i) Front view in the direction of arrow. *(05)*
(ii) Top view. *(04)*



TURN OVER

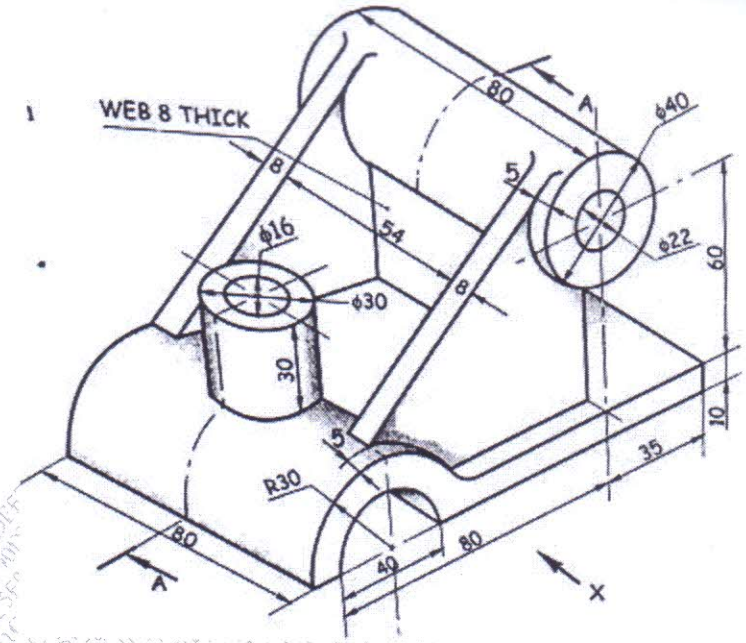
Q. 2 For the object shown in figure draw the following views –

(i) Sectional front view from X direction section along A-A. *(04)*

(ii) Side view from left *(04)*

(iii) Top view *(05)*

(iv) Insert the major dimensions *(02)*

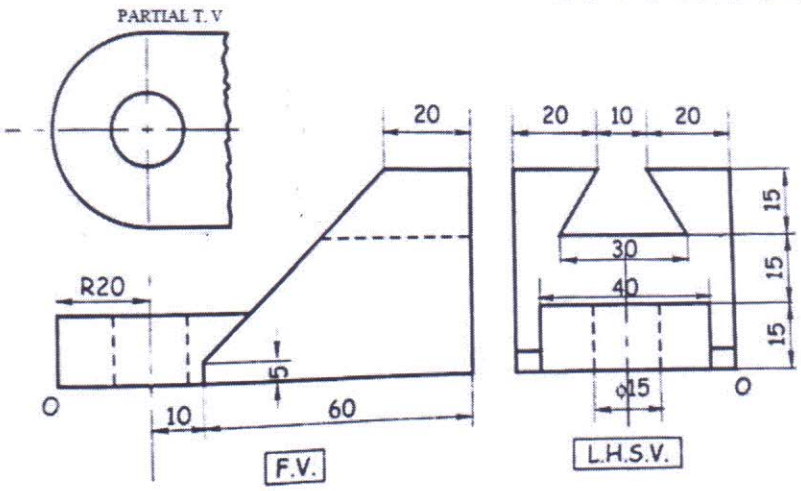


Q. 3 A hexagonal pyramid of 30 mm side of base and slant edges 65 mm long is lying on one of its triangular surface in the VP, so that its axis is inclined at an angle of 45⁰ to the HP, Draw its projection if apex is nearer to the observer. *(15)*

Q. 4 (a) A cylinder of 50 mm diameter of base and 70 mm length of an axis has resting on one point of the circumference in VP. Draw its projections if axis is inclined at 30⁰ to VP and parallel to HP. *(06)*

TURN OVER

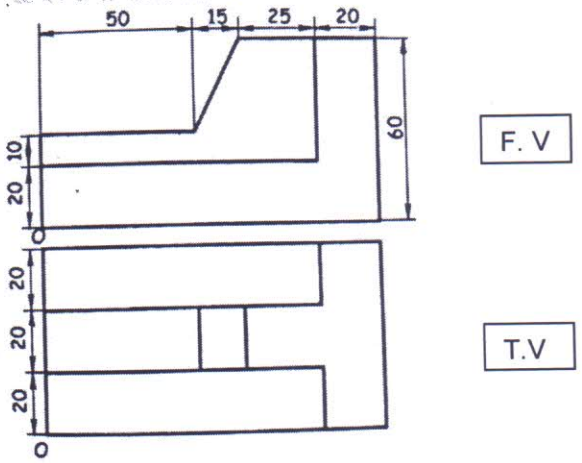
Q.4 (b) Figure shows three views of an object. Draw its isometric view with 'O' as origin. *(09)*



Q.5 A cone of base diameter 60 mm and axis height 75 mm is resting on HP on one of its generators with axis parallel to the VP. It is cut by A.I.P. such that the true shape of the section will be a parabola with the axis length equal to 60 mm. Draw the projection of cut solid & D.L.S. of cone removing the apex. *(15)*

Q.6 (a) The End P of straight line PQ 30mm above HP 40mm in front of VP. The line is inclined at 30° to the HP and 40° with the VP. The Distance between the ends projection measures parallel to XY line is 60mm. Draw the projection if point "Q" is in second quadrant. Find out the true length of the line. *(09)*

(b) Figure shows two views of an object. Draw its isometric view with 'O' as origin. *(06)*



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