FE (All branches) Sem II
(R-2012 CBGS)

Q.P. Code: 18634

[Time: Three 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 out of remaining five questions.
3. Write all answers on drawing sheets only & use both the sides of the sheets.
4. Use your own judgment for any unspecified dimension.
5. Retain construction lines.
6. All dimensions are in mm.

Q.1 **(a)** A circle of diameter 50 mm rolls without slipping along a straight horizontal line for half revolution; it slips for 25 mm and stops. Draw locus of point on the circle which is initially in contact with the directing line. Name the curve. **[6]**

(b) Figure-1 shows the pictorial view of an object. Draw the following views using first angle method of projection

(i) Draw front view in the X direction **[4]**

(ii) Top view **[4]**

(iii) Insert all major dimensions **[1]**

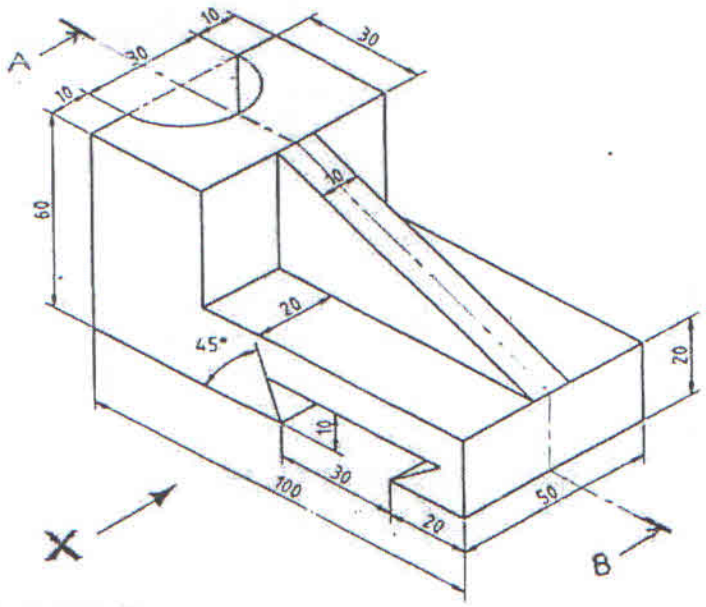

Figure-1

Q.2 Figure-2 shows a pictorial view of machine part. Draw the following views. [5]
(a) Sectional FV (Sect. along B-B) [4]
(b) LHSV [4]
(c) TV. [2]
Insert all major dimensions

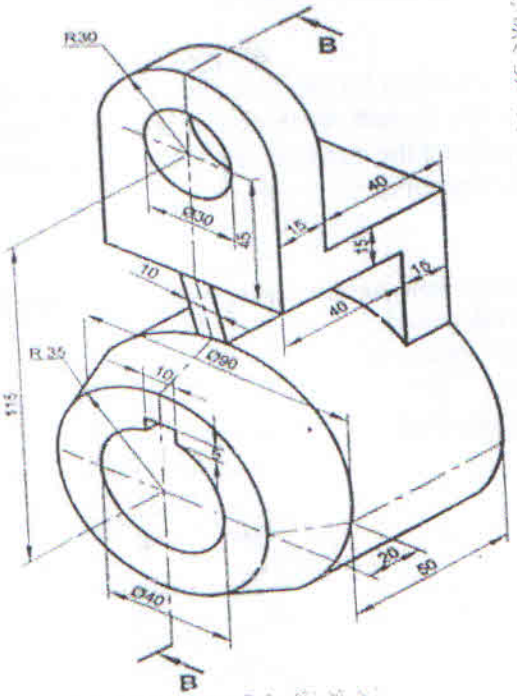

Figure-2

Q.3 A pentagonal pyramid of 30 mm side of base and axis 60 mm long is lying on one of its triangular surface on the HP, so that top view of its axis is inclined at an angle of 45^0 to the VP, 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 is resting on one of the points of the circumference in VP. Draw its projections if one of the generators is inclined at 30^0 to VP. [6]

(b) Draw the Isometric view of object of which orthographic views are as shown in Figure.-3. [9]

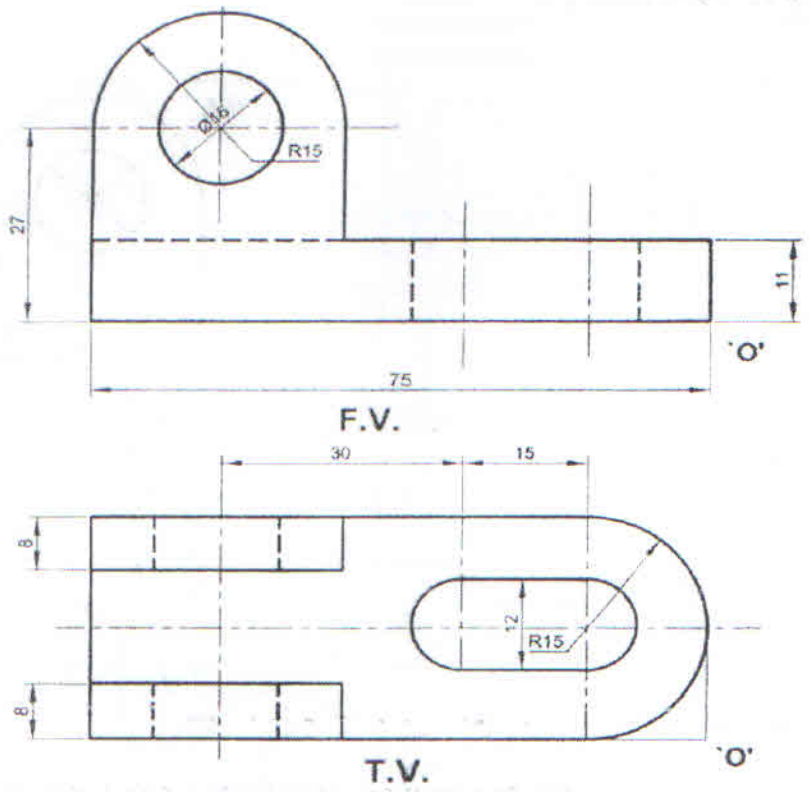

Figure-3

Q.5 A cone of base diameter 50 mm and axis height 65 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 is a parabola with the axis length equal to 60 mm. Draw the projections of cut solid & also draw development of lateral surface of remaining part of the cone (apex is removed). [15]

Q.6 (a) A line AB 70 mm long is inclined at 30^0 to H.P. and 60^0 to V.P. Draw its projections if end A is in both HP & VP. Determine distance of end B from both the reference planes. Assume any quadrant for end B. [9]

(b) Draw isometric projection using natural scale of object of which orthographic views are as shown in Figure.-4. [6]

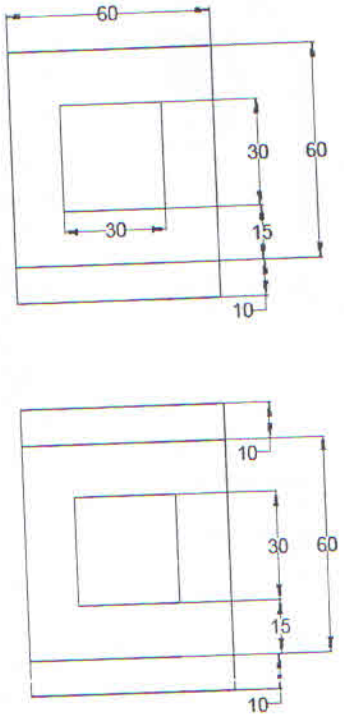

Figure-4

FE-Sem-II
CBGS All Branches
23/05/17

T0122 / T0378 APPLIED PHYSICS II.

Q. P. Code: 11965

Time: 2 Hours

Marks: 60

N.B. 1) **Question No.1** is compulsory.

2) Attempt **any three** questions from **Q. No. 2 to 6.**

3) Figures to the right indicate **full marks.**

Q.1 Attempt any **FIVE.** 15

a) Why does an excessively thin film appear to be perfectly dark when illuminated?

b) A grating has 620 rulings /mm & is 5.05 mm wide. What is the smallest wavelength interval that can be resolved in the third order at λ = 481 nm?

c) Why would you recommend use of optical fibre in communication system?

d) An electron is bound in a one dimensional potential well of width 2 A^0 but of infinite height. Find its energy values in the ground state and first excited state?

e) Explain the measurement of frequency of AC signal using Cathode Ray Oscilloscope?

f) Distinguish between spontaneous emission & stimulated emission?

g) Define superconductivity, critical temperature & critical magnetic field.

Q.2 a) How is Newton's ring experiment used to determine wavelength of a monochromatic source of light? In Newton's rings experiment the diameter of n^{th} & $(n+8)^{th}$ bright rings are 4.2 mm & 7 mm respectively. Radius of curvature of the lower surface of lens is 2m. Determine the wavelength of light? 8

b) An optical fibre has core diameter of 6 μ m and its core refractive index 1.45. The critical angle is 87^0. Calculate I) refractive index of cladding ii) acceptance angle iii) the number of modes propagating through fibre when wavelength of light is 1 μ m. 7

Q.3 a) With neat energy level diagram explain principle, construction & working of He- Ne laser? 8

b) Derive condition for maxima & minima of the light reflected from a thin transparent film of uniform thickness. A parallel beam of sodium light strikes a film of oil floating on water. When viewed at an angle of 30^0 from normal, 9^{th} dark band is seen. Determine the thickness of the film. Refractive index of oil is 1.46, λ=5890 A^0. 7

Q.4 a) Explain experimental method to determine the wavelength of spectral line using diffraction grating? 5

b) Show that an electron cannot pre-exist in free state in a nucleus. 5

c) Distinguish between type I & type II superconductor? 5

Q.5 a) A diffraction grating used at normal incidence gives a yellow line (λ =6000 A^0) in a certain spectral order superimposed on a blue line(λ = 4800 A^0) of next higher order if the angle of diffraction is $\sin^{-1}(3/4)$, calculate the grating element? 5

b) Derive one dimensional time dependent Schrodinger's equation for matter waves? 5

c) With neat diagram explain construction & working of Scanning Electron Microscope. 5

Q.6 a) Find the de Broglie wavelength & velocity of an α particle of energy 1 keV. Given Mass of α particle = 6.68×10^{-27} kg. 5

b) Derive Bethe's law for electron refraction? 5

c) What are Carbon Nano tubes? Explain properties of Nano tubes? 5

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SEM-II - AE A11 (CBGS) 17/5/17

App. Mathematics-II.

Q.P. Code: 16067

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

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

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

1) a) Solve $(1+e^{x/y})dx+e^{x/y}\left(1-\frac{x}{y}\right)dy=0$ (4)

b) *Solve* $\frac{d^4y}{dx^4}+5\frac{d^2y}{dx^2}-36y=0$ (3)

c) Evaluate $\int_0^\infty e^{-x^4}dx$ (3)

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

$I=\int_0^a \int_{\sqrt{ax-x^2}}^{\sqrt{a^2-x^2}} f(x,y)dxdy$

e) Prove that Prove that $\left(\frac{E^4-1}{\Delta}\right)y_0 = y_0+y_1+y_2+y_3$. (3)

f) Evaluate $I=\int_0^{\pi/2}\int_{\pi/2}^{\pi}\cos(x+y)dx\,dy$ (3)

2 a) Solve $\frac{dy}{dx}-\frac{\tan y}{1+x}=(1+x)e^x\sin y$. (6)

b) Change the order of integration and evaluate $I=\int_0^1\int_{4y}^4 e^{x^2}\,dxdy$ (6)

c) Evaluate $\int_0^\pi \frac{dx}{a+b\cos x}$ $a>0$, $|b|<a$ and hence deduce that (8)

$\int_0^\pi \frac{dx}{(a+b\cos x)^2}=\frac{\pi a}{\left(a^2-b^2\right)^{3/2}}$ and $\int_0^\pi \frac{\cos x\,dx}{(a+b\cos x)^2}=\frac{-\pi a}{\left(a^2-b^2\right)^{3/2}}$

3 a) Evaluate $I=\int_0^{\log 2}\int_0^x\int_0^{x+y} e^{x+y+z}dxdydz$ (6)

b) The density at any point of a cardioide $r=a(1+\cos\theta)$ varies as the square of its distance from its axis of symmetry. Find its mass. (6)

c) Solve $(5+2x)^2\frac{d^2y}{dx^2}-6(5+2x)\frac{dy}{dx}+8y=6x$ (8)

4 a) Show that the length of the arc of the curve $y = \log\left(\frac{e^x - 1}{e^x + 1}\right)$ from x=1 to x=2 is $\log\left(e + \frac{1}{e}\right)$ (6)

b) Solve $(D^3 - 2D^2 + D)y = x^2 + x$ (6)

c) Use Runge-Kutta method of fourth order to compute $y(0.1)$ & $y(0.2)$, given $y' = xy + y^2, y(0) = 1$ (8)

5 a) Use method of variation of parameters to solve $\frac{d^2y}{dx^2} + y = \frac{1}{1+\sin x}$ (6)

b) Using Taylor's series method, find $y(1.1)$ correct to four decimal places, given $y' = xy^{1/3}$ and $y(1) = 1$. (6)

c) Find the value of the integral $\int_0^1 \frac{x^2}{1+x^3}\,dx$ by taking h= 0.2 , using (8)

(i) Trapezoidal Rule (ii) Simpson's 1/3 Rule.

Compare the errors with the exact value of the integral

6 a) The equation of an L-R circuit is given by $L\frac{di}{dt} + Ri = 10\sin t$, if i = 0 at t = 0, express i as a function of t. (6)

b) Evaluate $\iiint (x^2y^2 + y^2z^2 + z^2x^2)\,dx\,dy\,dz$ over the volume of the sphere $x^2 + y^2 + z^2 = a^2$ (6)

c) Find the volume cut off from the paraboloid $x^2 + \frac{1}{4}y^2 + z = 1$ by the plane z = 0. (8)

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07

F.E-All Br. (CBSGS) Dt: 5.6.17

Q.P. Code :18550

(Time: 3 hours) **[Total Marks : 80]**

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) Assume **suitable data** wherever necessary.

(4) Figures in **right** indicate **full** marks.

1. (a) State any two functions in string.h along with its syntax and purpose. 04

(b) What do you mean by an algorithm and flowchart? Write an algorithm to find whether entered number is prime or not? 04

(c) What is type-casting? Explain with an example.

(d) Explain difference between call by value and call by reference. 04

(e) Explain the difference between while and do-while statement. 04

2. (a) What do you mean by recursion? Write a program to reverse a number using recursive function. 10

(b) Write a program to find largest and second largest element of an array. 10

3. (a) Write a program to calculate multiplication of two M x N matrices. 10

(b) Write a program to generate following patterns. 10

i> 1

101

0101

ii> A

C B

F E D

4. (a) Explain various storage classes used in c with example. 10

(b) (i) Write a program to find reverse of a given string without using library function. 05

(ii) Explain nested structure with example. 05

5. (a) Explain bitwise operators in c with proper example. 05

(b) Write a program to check whether entered no. is Palindrome or not. 05

092EF8E177DD96EBE279CFD3C5E88DA5

(c) Write a program to create an array of structure to store the details of 50 students and sort and display the information of students in descending order of their percentage. Student details include i> Roll-no. ii> Student name iii> Percentage 10

6. (a) Explain syntax of switch case. What is the need of break statement in switch case? 05

(b) Write a program to find GCD and LCM of two numbers. 05

(c) What is a file? Explain different modes with syntax in which file can be opened. Explain various functions to read and write to a file. 10

29/5/17

FE Sem II (BGS)

Q.P. Code :16303

[Time: Two 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 mark.
4. All questions carry equal mark.
5. Atomic weights :- H = 1, C = 12, N = 14, O = 16, S = 32, Cl = 35.5, Ba = 137.3 Ca = 40, Mg = 24, Na = 23

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

a) Why impure metal corrodes faster than pure metal under identical conditions?
b) What is HCV and LCV? Mention their units.
c) Give composition, properties and use of Wood's metal.
d) Define the terms: -
   i. Composite materials
   ii. Matrix phase
   iii. Dispersed phase
e) Explain 'Use Catalyst, not stoichiometric reagents' principle in green chemistry.
f) State characteristics of good paints.
g) 2.2 gm coal was heated in Kjeldahl's flask and ammonia gas evolved was absorbed in 45ml of N/5 H_2SO_4. The excess acid required 35ml N/5 KOH for neutralization calculate % of Nitrogen.

Q.2 a) Explain the mechanism of following types of corrosion:- **06**
   i. Pitting corrosion
   ii. Galvanic corrosion.
b) With neat labelled diagram, explain fractional distillation of crude oil. **05**
c) Calculate % Atom Economy for the following reaction with respect to Allylchoride. **04**

$$CH_3 - CH = CH_2 + Cl_2 \rightarrow Cl - CH_2 - = CH_2 + HCl$$

Q.3 a) A fuel sample has the following composition: $H_2 = 50\%$, $C_2H_2 = 20\%$, $CO = 8\%$, $CO_2 = 1\%$ 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 Indigo dye. Mention the green Chemistry principle involved. **05**
c) Discuss any four factors influencing rate of corrosion. **04**

Q.4 a) What are alloy steels? Explain heat and corrosion resisting steels. **06**
b) What is the principle of cathodic protection? Explain sacrificial anodic protection method. **05**
c) Explain Sandwich panel composites with suitable diagram. **04**

Q.5 a) Write informative note on Biodiesel. **06**
b) What is powder metallurgy? Explain any two methods for production of Metal powders. **05**
c) Mention important applications of composite materials? **04**

[P.T.O]

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Q.P. Code :16303

Q.6 a) What are metal coatings? Mention the names of various methods of application of metallic coatings. 05

b) A coal sample contains, C = 80%, O = 3%, H = 7%, S = 3.5%, N = 2.1% and Ash = 4.4%. Calculate the GCV and NCV of given coal sample. 05

c) Write a note on 05

i. Atomization

ii. Sintering
