Total No. of Printed Pages:3

SUBJECT CODE NO:- K-01
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E. Examination Oct/Nov 2016
Engineering Mathematics-II
(Old)

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
i. Question No. 1 and 6 are compulsory.
ii. Attempt any two questions from remaining questions from each section.
iii. Figures to the right- indicate full marks.
iv. Assume suitable data if necessary.

Section A

Q.1 Solve any five from the following: 10

a) Evaluate $\int_0^{\pi/10} \cos^4 5t \sin^3 10t \, dt$

b) Evaluate $\int_0^3 x^3\sqrt{3-x}\, dx$

c) Find the mean value of x^2e^x from $x = 1 \; to \; x = 3$

d) Evaluate $\int_0^1 \int_{y^2}^{y} (1+xy^2) dxdy$

e) Change the order of integration $\int_0^2 \int_0^{x^3} f(x,y) dydx$.

f) Evaluate $\int_1^2 \int_0^{logr} e^{-\theta} \, d\theta dr$.

g) Find the volume generated by the curve $y = 5x - x^2$ about x-axis and between the lines given by x=0 and x=5.

h) The surface area of the solid generated by the revolution of the area bounded by the curve $y = f(x)$, the x-axis and the ordinate x = a and x = b, about the x- axis is.....

Q.2 a) Evaluate $\int_0^{\infty} \sqrt[3]{x^2} \, . e^{-3\sqrt{x}} \, dx$. 05

b) Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} 4xy \; e^{x^2} \, dydx$. 05

c) Find the area of the surface generated by revolving the curve with parametric equation $x = 3t\,(t-2), y = 8t^{3/2}$ with $0 \le t \le 1$ about y-axis. 05

Q.3 a) Evaluate $\int_0^1 \frac{x^2+x^3}{(1+x)^7} \, dx$ 05

b) Evaluate $\iint_R xy\,(x-1) dxdy$, over the region bounded by the rectangular hyperbola $xy = 4$, the lines $y = 0, x = 1, x = 4$ and x- axis. 05

c) Find the area bounded by the lines $y = 2 + x$, $y = 2 - x$ and $x = 5$ 05

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Q.4 a) Evaluate $\int_0^\infty \frac{\sqrt{x}}{a^2+2ax+x^2}\,dx$ 05

b) Change the order of integration and evaluate $\int_0^1 dx \int_1^\infty e^{-y} y^x \log y\, dy$ 05

c) Find the volume in the first octant bounded by the circular cylinder $x^2 + y^2 = 2$ and planes $z = x + y,\ y = x,\ z = 0,\ x = 0.$ 05

Q.5 a) Evaluate $\int_0^1 \int_0^1 \int_{\sqrt{x^2+y^2}}^2 xyz\, dxdydz$ 05

b) Change to polar co-ordinate and evaluate $\int_0^1 \int_0^{\sqrt{2-x^2}} \frac{x}{\sqrt{x^2+y^2}}\, dydx$ 05

c) Find the RMS value for one complete period of the function $f(t) = \frac{1}{2} + cost$ 05

Section B

Q.6 Solve any five from the following: 10

a) Find the value of Fourier coefficient a_n, if $f(x) = \frac{3x^2-6x\pi+2\pi^2}{12}$ in the interval $(0, 2\pi)$

b) If $f(x) = x^3$ in the interval (-1,1), then find the Fourier coefficients,

c) If $f(x) = mx,\ 0 \le x \le \pi$
$= -mx + 2m\pi,\ \pi \le x \le 2\pi$, then find a_0

d) Define the Fourier series and Fourier coefficients in the interval (-L, L), if f(x) is an odd function.

e) Apply Cayley – Hamilton theorem to $A = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$ and deduce that $A^8 = 625I$.

f) If the characteristic equation for the matrix A is $\lambda^3 - 18\lambda^2 + 99\lambda - 162 = 0$, then find Eigen values of the matrix A.

g) Find the rank of $A = \begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix}$

h) Examine whether the following vectors are linearly independent or dependent.
$x_1 = [1, 2, 4]^T,\ x_2 = [3, 7, 10]^T$

Q.7 a) Expand f(x) as a Fourier series, if $f(x) = sinx,\ 0 < x < \pi$ 05
$= 0,\ \pi < x < 2\pi$

b) Find Half-range sine series for the function $f(x) = (x-1)^2$ in the interval $0 < x < 1$. 05

c) Find the rank of the matrix. 05

$$A = \begin{bmatrix} 1 & -1 & 2 & -3 \\ 4 & 1 & 0 & 2 \\ 0 & 3 & 1 & 4 \\ 0 & 1 & 0 & 2 \end{bmatrix}$$

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Q.8

a) Find the Fourier series for the function $f(x) = 2 - \frac{x^2}{2}, \quad 0 \leq x \leq 2$ 05

b) Obtain Fourier series expansion of $x\ cox\ x\ in\ (-\pi,\ \pi)$ 05

c) Test for consistency and hence solve the system. 05
$x + y + z = 6,\ x - y + 2z = 5,\ 3x + y + z = 8,\ 2x - 2y + 3z = 7$

Q.9

a) Find the Fourier series of $f(x) = a^2 - x^2$ in $-a < x < a$ 05

b) Solve the following system of equations. 05
$3x - y - z = 0,\ x + y + 2z = 0,\ 5x + y + 3z = 0$

c) Find the Eigen values and Eigen vector for highest Eigen value of the matrix. 05
$A = \begin{bmatrix} -2 & 5 & 4 \\ 5 & 7 & 5 \\ 4 & 5 & -2 \end{bmatrix}$

Q.10

a) Find Half- range cosine series for the function $f(x) = x,\ 0 < x < \frac{\pi}{2}$ 05
$= \pi - x, \frac{\pi}{2} < x < \pi$

b) Verify cayley –Hamilton theorem for the matrix $A = \begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$ and use it to find A^{-1}. 05

c) Examine whether the following vectors are linearly independent or dependent. 05
$[1, 1, -1],\ [2, 3, -5],\ [2, -1, 4]$

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Total No. of Printed Pages:2

SUBJECT CODE NO:- K-22
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E.[online +theory Exam] Examination Oct/Nov 2016
Engineering Mechanics
(Old)

[Time: Two Hours] **[Max.Marks:40]**

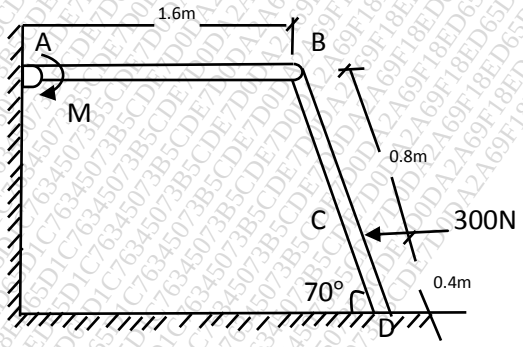
Please check whether you have got the right question paper.

N.B
i. Questions number 1. Is compulsory.
ii. Attempt any two questions from the remaining.
iii. Figures to the right indicate full marks.
iv. Assume suitable data if required.

Q.1 Answer any five from the following 10
i) State and explain law of parallelogram of force.
ii) Composition of forces.
iii) Moment of couple.
iv) The resultant of system of parallel forces is zero. What does it signify?
v) Types of loads.
vi) Equilibrium and equilibrant.

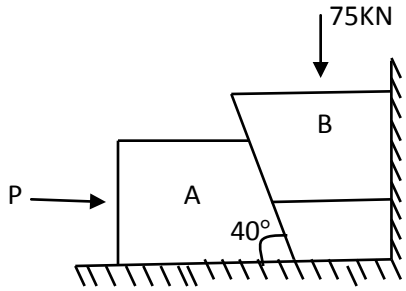
Q.2 a) Find the magnitude of forces F_1 and F_2 if they act at right angle and their resultant is $\sqrt{34}\ N$. If they act at an angle 60° and their resultant is 7N. 07

b) A horizontal force 300 N is applied to the sloping bar BCD whose bottom rests on a horizontal plane as shown in fig. Its upper end is pinned at B to the horizontal bar AB which has the pinned support at A. what couple M must be applied to AB to hold the system in equilibrium? What is the magnitude of the pin reaction at B. Assume the bars to be weightless & pins at A and B to be smooth. 08

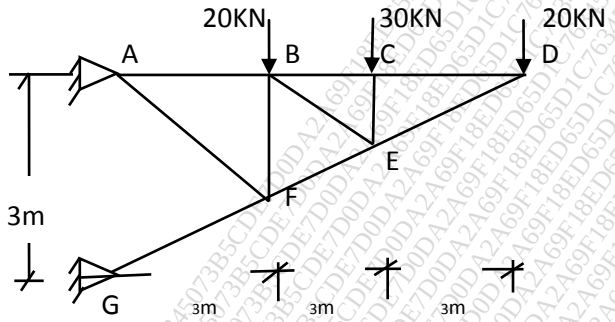


Q.3 a) What are the laws of friction? 03

b) Block A weighs 25 KN and block B is 18KN as shown in fig. μ for all surfaces is 0.11.For what range of values of p will the system be equilibrium. 12



Q.4 a) A truss is loaded and supported as shown in fig. Find the forces in all the members. 10



b) State and explain the parallel axis theorem for product of inertia. 05

Q.5 a) Explain the following terms. 06

i) Virtual work
ii) Perfect frame & imperfect frame.
iii) Angle of friction

b) Derive an expression for the M.I. of a triangular section about an axis passing through the C.G of the section and parallel to the base. 09

Total No. of Printed Pages:1

SUBJECT CODE NO:- K-51

FACULTY OF ENGINEERING AND TECHNOLOGY

F. E. [Online +Theory Exam] Examination Oct/Nov 2016

Elements of Mechanical Engineering

(Old)

[Time:Two Hours] **[Max. Marks:40]**

Please check whether you have got the right question paper.

N.B i) Q.No.1 is compulsory.
ii) Attempt any two questions from the remaining.
iii) Assume suitable data wherever necessary
iv) figure to right indicates full marks
v) use of non programmable calculator is allowed

Q.1 Solve any five of the following 10

a) Explain the zeroth law of thermodynamics
b) Define thermodynamics system with example
c) What is PMM-Ist kind?
d) State any four advantages of solar power plants
e) What is two stroke and four stroke engines?
f) State the function of spark plug and carburetor
g) What is ideal gas? Give its examples
h) What is steady flow energy equation

Q.2 a) Differentiate between open system and closed system 07

b) Explain with neat sketch the construction and working of two stroke petrol engine 08

Q.3 a) Write short on "Joules' experiment" for 1st law of thermodynamics 08

b) Explain difference between two stroke and four stroke engines 07

Q.4 a) Explain with neat sketch the construction and working of single acting reciprocating air compressor 10

b) Differentiate between renewable and non renewable energy sources 05

Q.5 a) What is thermodynamics equilibrium? Explain 05

b) What are limitations of nuclear power plants 05

c) Explain PMM-I 05

Total No. of Printed Pages:1

SUBJECT CODE NO:- K-82

FACULTY OF ENGINEERING AND TECHNOLOGY

F. E.[online + theory exam] Examination Oct/Nov 2016

Elements of Electronics & Comp. Engg.

(Old)

[Time: Two Hours] **[Max. Marks:40]**

Please check whether you have got the right question paper.

N.B i) Q. No. 1 is compulsory.
ii) Solve any two questions from remaining questions.
iii) Assume suitable data wherever necessary.

Q.1 Solve any five 10

a) List different types of inductors
b) Enlist the features of IC 79XX.
c) State any two Boolean laws.
d) Draw the symbol and truth table of EX-OR and EX-NOR gates.
e) What is the use of optocouplel?
f) Define
   i) Ripple factor
   ii) PIV
g) Draw the symbols of
   1) IGBT
   2) SCR
   3) N- channel depletion MOSFET
   4) LED
h) Write 2's complement of 10101101.

Q.2 a) Define voltage regulator. Explain the construction and working of transistorized series voltage regulator with neat circuit diagram. 07

b) Compare and contrast 08
   1) LED and LCD
   2) BJT and FET

Q.3 a) Explain with the help of circuit diagram and input/ output waveforms of bridge rectifier. State its advent ages. 08

b) Explain the construction and working of P-channel enhancement MOSFET. 07

Q.4 a) Perform the following conversion 08
   1) $(427)_{10} = (\ \ )_2 = (\ \ )_8$
   2) $(27)_8 = \ \ (\ \ )_2 = (\ \ )_{16}$

b) Perform following operations using 2's complement 07
   1) $(9)_{10} - (6)_{10}$
   2) $(6)_{10} - (8)_{10}$

Q.5 Write a short note on (any three) 15

a) Demorgan's theorems
b) IC 7432 and 7404
c) DIAC
d) Diode
e) Zener diode as a voltage regulator.

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Total No. of Printed Pages:1

SUBJECT CODE NO:- K-149
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E.[online + theory exam] Examination Oct/Nov 2016
Engineering Physics
(Old)

[Time: Two Hours] **[Max. Marks:40]**

Please check whether you have got the right question paper.

N.B
i) Attempt Q.No.1 which is compulsory.
ii) Solve any two questions from the remaining question.
iii) Figures to the right indicate full marks.
iv) Use of non-programmable calculator is allowed.

Q.1 Attempt the following questions (any five) 10

a) What are positive rays? How they are produced?
b) Draw a neat diagram CRT.
c) Write industrial application of X-rays.
d) State Campton's effect
e) What is interference of light?
f) Distinguish between Fresnel's & Fraunhofer's diffraction.
g) What is QWP?
h) Define i) critical temperature ii) critical magnetic field.
i) Define i) nuclear fission ii) Nuclear fusion

Q.2 a) Explain principle, construction, working and theory of Aston's mass spectrograph. 08
b) Derive the necessary expression for Campton shift in wavelength. 07

Q.3 a) Explain appearance of Newton's rings by reflected light. 05
b) Explain the construction and working of Michelson's interferometer. 05
c) Explain theory of plane transmission grating. 05

Q.4 a) Explain type I and type II superconductor. 05
b) Explain liquid drop model of nucleus. 05
c) Explain the construction & working of betatron. 05

Q.5 Write short note on the following; 15

a) Bragg's X ray spectrometer
b) Laurent's half shade polar meter
c) Nuclear reactor and its uses

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Total No. of Printed Pages:2

SUBJECT CODE NO:- K-170
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. Examination Oct/Nov 2016
Engineering Mathematics - I
(Old)

[Time:Three Hours] **[Max. Marks:80]**

Please check whether you have got the right question paper.

N.B
i) Q.No.1 & Q.No.6 are compulsory.
ii) Solve any two questions from Q.No.2, 3, 4 and 5.
iii) Solve any two questions from Q.No.7, 8, 9 and 10.
iv) Figures to the right indicate full marks.
v) Assume suitable data, if necessary.

Section A

Q.1 Solve any five of the following. (Each question carry equal marks.) 10

a) Express $\frac{2+3i}{3-i}$ in the form $a + ib$.
b) Find the general value of $\log(-\sqrt{3})$.
c) Find the nth derivative of $e^x \sin^2 x$.
d) Evaluate $\lim_{x\to 0} x \log x$.
e) Obtain the expansion of $tanhx$
f) State Cauchy's nth root test.
g) Check whether the given differential equation $\left(\frac{2xy+1}{y}\right)dx + \left(\frac{y-x}{y^2}\right)dy = 0$ is exact or not.
h) Reduce $\cos x \frac{dy}{dx} + ysin\, x = \sqrt{y\, secx}$ to Leibnitz's linear differential equation.

Q.2 a) Prove that 05
$(1 + \cos\theta + i\sin\theta)^n + (1 + \cos\theta - i\sin\theta)^n = 2^{n+1}\cos^n\frac{\theta}{2}\, cos\frac{n\theta}{2}$

b) If $Y = \frac{x}{x^2+a^2}$ them find y_n. 05

c) Solve 05
$[5x^4 + 3x^2y^2 - 2xy^3]dx + [2x^3y - 3x^2y^2 - 5y^4]dy = 0$

Q.3 a) Solve the equation $x^5 + 1 = 0$. Using complex number. 05
b) Calculate the value of $\sqrt{10}$ correct up to four decimal places using Taylor's theorem. 05
c) Solve 05
$x\log x\frac{dy}{dx} + y = 2\log x$

Q.4 a) Expand $\sin^5\theta$ in series of sines of multiples of θ. 05
b) Evaluate 05

$$\lim_{x\to y} \frac{x^y - y^x}{x^x - y^y}$$

c) A coil having resistance of 20 ohms and an inductance of 10 Henry is connected to 100 volts supply. Determine the value of current after two seconds. 05

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Q.5

a) Simplify $\frac{(\cos 3\theta+i\, sin3\theta)^4(\cos 5\theta-isin\, 5\theta)^{\frac{4}{5}}}{(\cos\frac{3}{2}\theta+isin\,\frac{3}{2}\theta)^{2/9}\left(\cos\frac{4}{5}\theta-isin\frac{4}{5}\theta\right)^{10}}$ 05

Using De-Moivre's theorem.

b) Test the convergence of the series $\sum_{n=1}^{\infty}\frac{3^n n!}{n^n}$ 05

c) Find the orthogonal trajectory of the curve $y^2 = 4ax$ 05

Section B

Q.6 Solve <u>any five</u> of the following. (Each question carries equal marks.) 10

a) Find the equation of asymptotes of the curve $y^2(2a-x) = x^3$.

b) The curve $x = a(\theta - sin\theta), y = a(1-\cos\theta)$ is symmetric about ----------.

c) The length of the curve $\theta = f(r)$ between $r = r_1\ and\ r = r_2$is given by --------.

d) If $z = e^{xy}, x = t\ cos\ t, y = tsint$ find $\frac{dz}{dt}$ at $t = \frac{\pi}{2}$.

e) Find the value of $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ if $u = \frac{1}{x^2}+\frac{1}{xy}+\frac{\log x-\log y}{x^2}$.

f) If $x = r\cos\theta, y = r\sin\theta$ then find $\frac{\partial(x,y)}{\partial(r,\theta)}$

g) Find stationary points of the function $xy(a-x-y)$

h) $f(x,y)$ has a maximum value at (a, b) if ----------.

Q.7

a) Trace the curve $a^2x^2 = y^2(x^2+a^2)$ with full justification. 05

b) If $u = \log(tanx + \tan y + \tan z)$ then prove that 05

$sin2x\ \frac{\partial u}{\partial x} + sin2y\frac{\partial u}{\partial y} + sin2z\frac{\partial u}{\partial z} = 2$

c) If $x = rcos\theta, y = rsin\,\theta, z = z$ then evaluate $\frac{\partial(x,y,z)}{\partial(r,Q,z)}$ 05

Q.8

a) Trace the curve $r = a\cos 2\theta$ with full justification. 05

b) If $u = \tan^{-1}(\frac{x^3+y^3}{x-y})$ prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \sin 2u$ 05

c) Find total length of perimeter of cardioid $r = a(1+cos\theta)$ 05

Q.9

a) Trace the curve $x^{2/3} + y^{2/3} = a^{2/3}$ with full justification 05

b) If $u = f(x-y, y-z, z+x)$ prove that $\frac{\partial u}{\partial x}+\frac{\partial u}{\partial y}+\frac{\partial u}{\partial z} = 0$ 05

c) Find the stationary value of $f(x,y) = x^3 + y^3 - 3axy$ 05

Q.10

a) Show that in the catenary $y = c.\cosh(\frac{x}{c})$the length of an arc from vertex to any point is $S = C.\sinh(\frac{x}{c})$. 05

b) Find the minimum value of $f = x^2y^2z^4$ subject to the condition $x+y+z = 5$. 05

c) Find the length of an arc of the curve $x = \log[\sec t + \tan t] - sint, y = cost$ between t=0 and $t = \alpha$. 05

2016

Total No. of Printed Pages:2

SUBJECT CODE NO:- K-171
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (P-2016) Examination Oct/Nov 2016
Engineering Mathematics - I
(Revised)

[Time:Three Hours] **[Max. Marks:80]**

Please check whether you have got the right question paper.

N.B i) Question Numbers 1 and 6 are compulsory.
ii) Solve any two questions from Q.Nos.2, 3, 4 and 5.
iii) Solve any two questions from Q.Nos.7, 8, 9 and 10.
iv) Assume suitable data if necessary.

Section A

Q.1 Attempt the following.(Any five) 10

a) Find the rank of AB, $if\ A=\begin{bmatrix}-1 & 2\\ 3 & 2\end{bmatrix} and\ B=\begin{bmatrix}-1 & 1\\ 2 & 0\end{bmatrix}$.
b) State the condition for infinite solution of homogeneous system of linear equations.
c) State Cayley-Hamilton theorem.
d) Is $A=\begin{bmatrix}1 & 4\\ 2 & 8\end{bmatrix}$ Orthogonal? If so find A^{-1}.
e) Find the locus of $z\ if\ |z-1|=|z-3|$.
f) Solve $x^4-1=0$.
g) If $logi^{1+i}=a+ib$ then find real part a and imagnary part b.
h) Find $sinh^{-1}\frac{3}{4}\ and\ sinh^{-1}1$.

Q.2 a) Find the rank of matrix by reducing it to normal form. 05

$$A=\begin{bmatrix}2 & -1 & 1\\ 3 & -1 & 1\\ 4 & -1 & 2\\ -1 & 1 & -1\end{bmatrix}$$

b) Find the Eigen values and corresponding Eigen vectors for the largest Eigen value of the matrix. 05

$$\begin{bmatrix}1 & 2 & 2\\ 0 & 2 & 1\\ -1 & 2 & 2\end{bmatrix}$$

c) If $\arg(z+1)=\frac{\pi}{6}$ and $\arg(z-1)=\frac{2\pi}{3}$ then find z. 05

Q.3 a) Test the consistency and solve if possible. 05

$$3x+y+2z=3;$$
$$2x-3y-z=-3$$
$$x+2y+z=4$$

b) Verify Cayley-Hamilton theorem and find A^{-1} for the matrix $A=\begin{bmatrix}1 & 2 & 1\\ 0 & 1 & -1\\ 3 & -1 & 1\end{bmatrix}$ 05

c) Prove that $(x+iy)^{\frac{m}{n}}+(x-iy)^{\frac{m}{n}}=2(x^2+y^2)^{\frac{m}{2n}}\cos\left[\frac{m}{n}tan^{-1}\frac{y}{x}\right]$ 05

Q.4 a) Solve. 05

$$2x-y+3z=0$$
$$3x+2y+2z=0$$
$$x-4y+5z=0$$

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b) Find the different values of $(1+i)^{\frac{1}{5}}$. 05

c) If $\sin(\alpha+i\beta)=R(cos\theta+isin\theta)$ then prove that $R^2=\frac{1}{2}[cosh2\beta-cos2\alpha]$ 05

Q.5

a) Given the transformation $y=\begin{bmatrix}1 & 1 & 2\\ 2 & -1 & 1\\ 3 & 1 & -1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix}$ Find the coordinates (x_1,x_2,x_3) corresponds to $(3,0,8)$ in Y. 05

b) Prove that $sinh^{-1}x=\log(x+\sqrt{x^2+1})$ 05

c) Prove that $ilog\left(\frac{x-i}{x+i}\right)=\pi-2tan^{-1}x$ 05

Section B

Q.6 Attempt the following. (Any five) 10

a) If $y=\frac{1}{x^2-x}$ then find y_n.

b) Expand $f(x)=x^3$ in Taylor's series with $h=1$.

c) Evaluate $\lim_{x\to 0}\frac{\sin^2 x+xtanx}{x^2}$.

d) Discuss the convergence for the series $\sum_{n=1}^{\infty}\frac{1}{n!}$.

e) If $u=\sin(xy)+e^{xy}$ then find $\frac{\partial u}{\partial x}$ and $\frac{\partial u}{\partial y}$.

f) If $u=x^2tan^{-1}\left(\frac{y}{x}\right)$ then find $x^2\frac{\partial^2 u}{\partial x^2}+2xy\frac{\partial^2 u}{\partial x\partial y}+y^2\frac{\partial^2 u}{\partial y^2}$.

g) If $u=e^x, v=sin^{-1}(y)$ then find J'.

h) State the condition for maximum and minimum value of f(x, y) at (a, b,).

Q.7

a) If $y=\sin^3 x\cos^2 x$ then find y_n. 05

b) If $u=\log(tanx+tany+tanz)$ then prove that $sin2x\frac{\partial u}{\partial x}+sin2y\frac{\partial u}{\partial y}+sin2z\frac{\partial u}{\partial z}=2$ 05

c) If $x+y+z=u, y+z=uv, z=uvw$ then prove that $\frac{\partial(x,y,z)}{\partial(u,v,w)}=u^2v$ 05

Q.8

a) Evaluate $\lim_{x\to 0}[\frac{a}{x}-cotx]$. 05

b) If $u=\log(x^3+y^3-x^2y-xy^2)$ Prove that $x^2\frac{\partial^2 u}{\partial x^2}+2xy\frac{\partial^2 u}{\partial x\partial y}+y^2\frac{\partial^2 u}{\partial y^2}=3$ 05

c) If $x=uv, y=\frac{u}{v}$ show that $JJ'=1$. 05

Q.9

a) Calculate the value of $\sqrt{25.15}$ correct up to four decimal places using Taylor's theorem. 05

b) Prove that $\log(1+e^x)=log2+\frac{x}{2}+\frac{x^2}{8}-\frac{1}{192}x^4+$ ---------- 05

c) If $u=f\left(\frac{x}{y}+\frac{y}{z}+\frac{z}{x}\right)$ then prove that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}+z\frac{\partial u}{\partial z}=0$ 05

Q.10

a) Prove that $tan^{-1}x=x-\frac{x^3}{3}+\frac{x^5}{5}-----$ 05

b) Test the convergences of $\sum_{n=1}^{\infty}\frac{1}{\left(1+\frac{1}{n}\right)^{n^2}}$ 05

c) Examine for maximum and minimum values of $sinx+siny+\sin(x+y)$ 05

2016

Total No. of Printed Pages:3

SUBJECT CODE NO:- K-195
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. Examination Oct/Nov 2016
Engineering Graphics
(Old)

[Time:Four Hours] **[Max. Marks:80]**

Please check whether you have got the right question paper.

N.B i) Solve any three questions from each section.
ii) Assume suitable data if necessary and mention it clearly.
iii) Figures to the right indicate full marks.

Section A

Q.1 The end A of line AB is in Hp and 15mm in front of VP. The end B is 50mm behind VP and 40mm below HP. The distance between end projectors is 50mm. Draw the projections of AB and determine its true length and true inclinations with the two planes. 13

Q.2 A 90mm long line PQ is inclined at 45^0 to HP and 30^0 to VP. The end P is 20mm above HP and in VP. Draw its projections and locate the traces. 13

Q.3 A regular pentagonal plane ABCDE of side 40mm is resting on one side AB on HP. Its surface is inclined to HP such that, the corner opposite to the resting side is 50mm above HP. Draw the projections of the plane when the side AB is 30^0 inclined to VP. Also find inclinations of surface with HP. 13

Q.4 A pentagonal pyramid with side of base 25mm and height of axis 70mm is resting on one of its base edge on HP which is 30^0 inclined to VP. White the triangular face containing that edges makes an angle of 45^0 with HP. Draw the projections of the pyramid. 14

Q.5 A cone, base diameter 60mm and axis 75mm long, is resting on its base on HP. It is cut by a section plane perpendicular to VP. and 45^0 inclined to HP and cutting the axis at a point 35mm from the base. Draw its front view, sectional top view and true shape of the section. 13

Section B

Q.6 A Hexagonal prism, side of base 25mm and height 70mm is resting on its base in HP with one of its rectangular faces parallel to VP. A hole of diameter 50mm is cut in it. The axis of the hole is perpendicular to VP and 10mm away from the axis of the prism. Develop the lateral surface of the prism, when the axis of the hole is 35mm above HP. 13

Q.7 Draw the orthographic projections of the object shown in fig. 1. 14

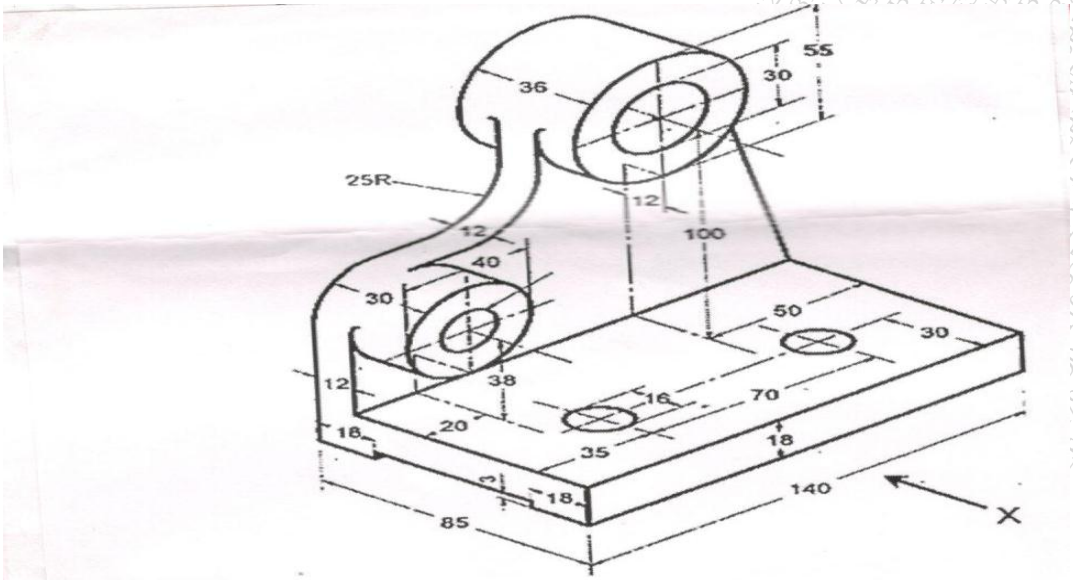

Fig. 1

Q.8 Two views of an object are given in fig. 2. 13

Draw

1. Sectional front view –section A-A
2. Right hand side view
3. Redraw top view

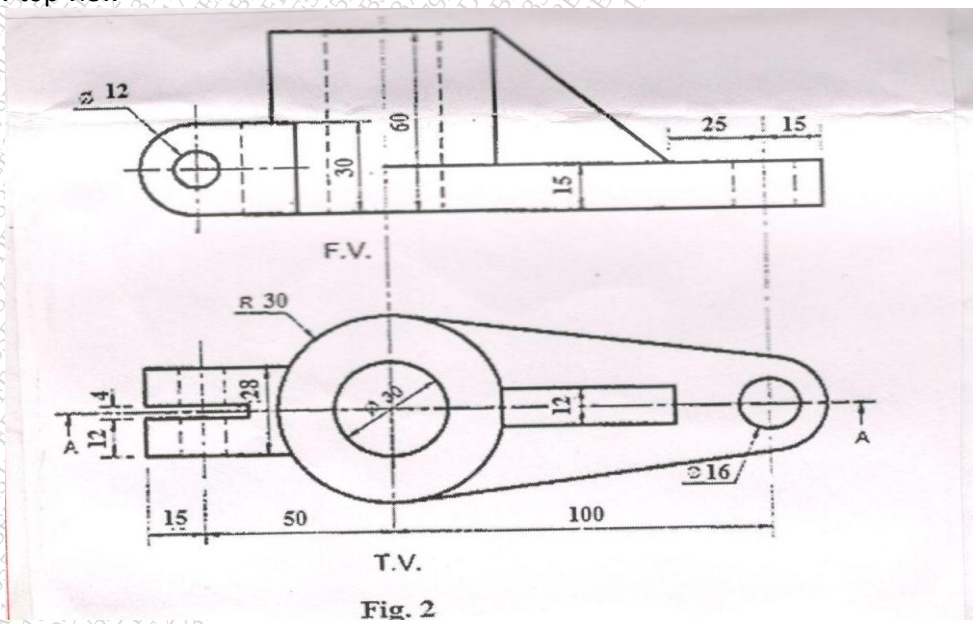

Fig. 2

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Q.9 Two views of an object are given in fig.3. draw its isometric view 13

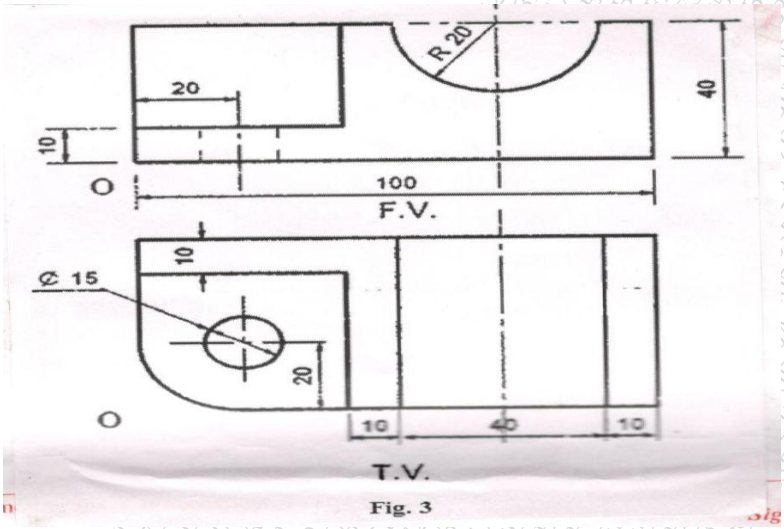

Fig. 3

Q.10 Draw freehand sketches of the following. (any three) 13

a. Hexagonal Nut
b. Woodruff Key
c. Buttress thread
d. Eye foundation Bolt
e. Single Riveted Lap Joint

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Total No. of Printed Pages:3

SUBJECT CODE NO:- K-196
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (P-2016) Examination Oct/Nov 2016
Engineering Graphics
(Revised)

[Time: Four Hours] **[Max. Marks:80]**

Please check whether you have got the right question paper.

N.B i) Solve any three questions from each section.
ii) Assume suitable data if necessary and mention it clearly.
iii) Figures to right indicate full marks.

Section A

Q.1 The F.V. and T.V. of line MN measures 50 mm and 60 mm respectively. The line is 70 mm long. Its end M is 10 mm above H.P. and 20 mm in front of V.P. Draw the projections of line MN and finds its inclination with both reference planes. Assume line to be in first quadrant. 13

Q.2 The distance between end projectors of line PQ is 55 mm & between projectors through HT & VT is 80 mm. The HT of line is 35 mm in front of VP & VT is 50mm above HP. The end P is 10 mm above HP. Draw the projections & find inclination with HP & VP. 13

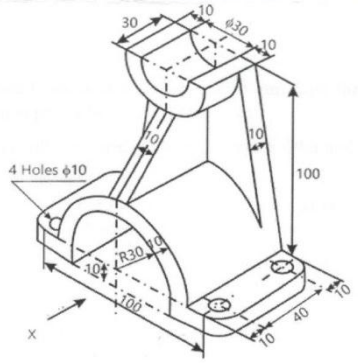
Q.3 A pentagonal plate of 60 mm side has its corner in V.P. and the side opposite to the corner is on H.P. at a distance of 60 mm in front of V.P. It has a central equilateral triangular hole of altitude 40 mm. The base of the triangle is parallel to the side of the plate. Draw the projection of the plate. 13

Q.4 A tetrahedron of sides 90 mm is resting on one of its edge in H.P. and inclined at 45^0 to V.P. while the face containing that edge is vertical. Draw the projection of tetrahedron. 14

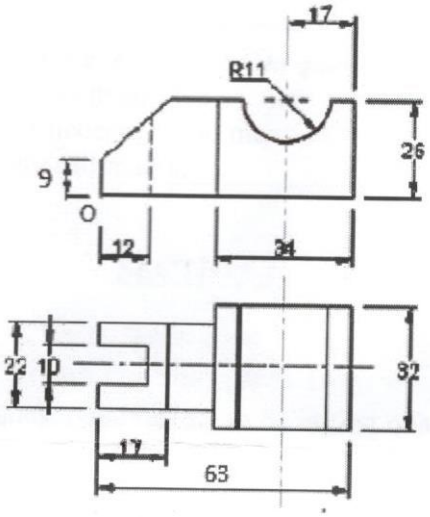
Q.5 A cylinder of 65 mm diameter and 90 mm height of axis is placed on its base on H.P. It is cut by a section plane perpendicular to V.P. and inclined to H.P such that the true shape is an ellipse of maximum size. Draw the front view, sectional top view and true shape of the section. 13

Section B

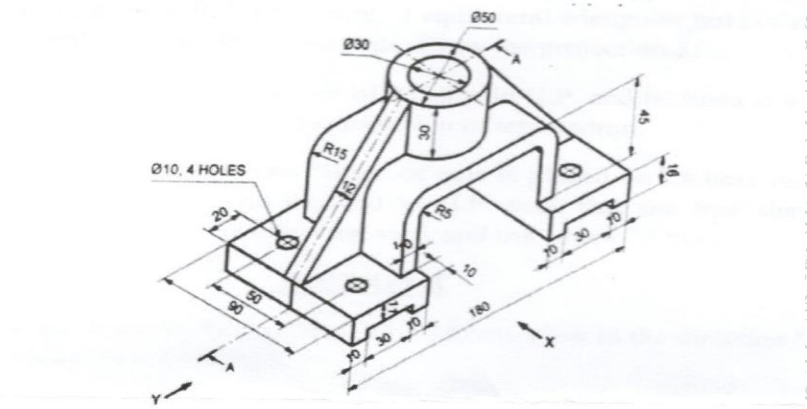
Q.6 Pictorial view of an object is shown in Fig. Draw its : (i) Front view in the direction 'X' (ii) Top View and (iii) Side view from right 13



Q.7 Fig shows the F.V. and T.V. of an Object, draw its Isometric view. 13



Q.8 Pictorial view of an object is shown in Fig. Draw its: (i) Sectional F.V. in the direction 'X' along A-A (ii) Top View and (iii) Side view 14



Q.9 Solve any two of the following: 13

(i) Construct a parabola whose focus is at distance of 40 mm from the directrix. Also draw a tangent and normal to the parabola at any point.

(ii) A coin of 30 mm diameter rolls in a straight line on a table. Plot and name the locus of a point lying on the circumference.

(iii) Draw and name the curve traced out by an end of a piece of string when unwound from a circle of diameter 30 mm. Draw a tangent and normal at any point of the curve.

Q.10 Draw free hand sketches of the following machine parts (Any three): 13

(i) Buttress thread

(ii) Rag foundation bolt

(iii) Square thread

(iv) Eye foundation bolt

(v) Hexagonal nut and bolt

Total No. of Printed Pages:1

SUBJECT CODE NO:- K-295
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. Examination Oct/Nov 2016
Engineering Chemistry & Environmental Sci.
(Old)

[Time: Two Hours] **[Max. Marks:40]**

Please check whether you have got the right question paper.

N.B
i) Q. No. 1 is compulsory.
ii) Solve any two questions from remaining questions.
iii) Figures to the right indicate full marks.
iv) Use of non-programmable calculator is allowed.

Q.1 Answer the following questions. (any five) 10

a) Explain carbonate conditioning used in internal treatment of water.
b) Define alkalinity. Give its unit.
c) Give two reactions of corrosions of boiler due to acids.
d) Give advantages of liquid fuels over solid fuels.
e) Coal containing 3 percentage hydrogen have HCV 7000.00. Calculate its NCV.
f) Why acid correction is subtracted in determination of calorific value by bomb calorimeter?
g) How polymers are classified based on thermal response?
h) Give two examples of condensation polymers.
i) Give any four names of common ingredients used in compounding of plastics?

Q.2
a) Explain with reactions deionization process of water softening. 06
b) Define priming and foaming. Give its disadvantage. 05
c) Water containing 4.75 mg $CaCl_2$ have total hardness 14.00ppm. Some other salts of bicarbonates are dissolved in water. Calculate hardness due to bicarbonates M. wt. of $CaCl_2$ is 111. 04

Q.3
a) Give types of analysis of coal. How is proximate analysis of coal done? 06
b) How fractions of crude oil are separated by fractional distillation process? 05
c) What are advantages of CNG? 04

Q.4
a) Give preparation, properties and uses of polyurathens. 06
b) How is rubber classified? How natural rubber is obtained? 05
c) Give applications of vulcanised rubbers. 04

Q.5
a) How desalination of brakish water is done by super filtration? 05
b) Give applications of calorimeter. 04
c) Explain carbonate theory of origin of petroleum oil. 03
d) Give applications of butyl rubber. 03

Total No. of Printed Pages:1

SUBJECT CODE NO:- K-296
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E. (P-2016) Examination Oct/Nov 2016
Computer Fundamentals - I
(Revised)

[Time: Two Hours] **[Max. Marks:40]**

Please check whether you have got the right question paper.

N.B i) Q.No.1 is compulsory and Solve any two Questions from the remaining.

Q.1 i) Explain any two logical operators. 10
ii) Write the syntax of nested if else statement.
iii) Define two dimensional array and it syntax in C.
iv) Describe the structure of C program.
v) Explain any two data types in C.

Q.2 a) What is the difference between variable and constant? State the rules to define variables in C. 05
b) Explain arithmetic operators in C with suitable examples. 05
c) State errors, if any in the following & write correct statements. 05
i) printf ('%d' , x);
ii) printf ('C Program');
iii) scanf ("%d", & file);
iv) scanf ("%f", n);
v) printf ("Aurangabad City" \n);

Q.3 a) Write a C program to read an array of 10 elements and display the largest number from the array. 08
b) What is the need of loop statements in C? Differentiate between while loop and do while loop with suitable examples. 07

Q.4 a) Distinguish between break and continue statements. 05
b) Write a C program to find whether the given number is even or odd number. 05
c) What is the output of the following? 05

```
# include < stdio.h >
main ( )
{
    int x = 7, y;
    for (y = 0; y < x; y+= 1)
    print f ("Hello");
}
```

Q.5 a) What is a recursive function? Explain it with suitable example. 07
b) Write a C program to perform arithmetic operations like addition, subtraction, Division, Modulus by using switch case statement. 08

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Total No. of Printed Pages:2

SUBJECT CODE NO:- K-359
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E. (P-2016) Examination Oct/Nov 2016
Engineering Physics
(Revised)

[Time: Three Hours] **[Max. Marks:80]**

Please check whether you have got the right question paper.

N.B
i) Attempt Q.No.1 from section A and Q.No.6 from section B are compulsory.
ii) Solve any two questions from the remaining questions from each Section A and B.
iii) Figures to the right indicate full marks.
iv) Use of non-programmable calculator is allowed.

Section A

Q.1 Attempt any five questions from the following. 10

a) What are positive rays? How they are produced?
b) Draw a block diagram of C.R.O.
c) Distinguish between characteristics and continuous X-ray spectrum.
d) Write few industrial application of X-ray.
e) What is interference of light?
f) What are the types of diffraction pattern? Define it.
g) Define the term
   i. Critical temperature
   ii. Critical magnetic field.
h) What is magnetic susceptibility?

Q.2
a) What is Compton Effect? Derive the necessary expression for Compton shift in wavelength. 07
b) With a neat diagram, describe the construction and working of Aston's mass spectrograph. Derive the condition of focusing. 08

Q.3
a) What is R.P. of diffraction grating? Obtain an expression for resolving power of diffraction grating. 06
b) Explain the appearance of Newton's rings by reflected light. 05
c) A plane grating has 15000 lines per inch. Find the angle of separation of the $5048A^0$ and $5016A^0$ lines of helium in the second order spectrum. 04

Q.4
a) Explain type-I and type-II super conductor. 06
b) State and explain Meissner effect. 05
c) Explain the different properties of diamagnetic materials. 04

Q.5 Write short notes on following; 15

a) Cathode Ray tube(CRT)
b) Laurentz's Half Shade Polari meter.
c) Magnetic Domain.

Section B

Q.6 Attempt any five questions from the following; 10

a) Define
   i. Fermi Energy
   ii. Energy band
b) Give the physical significance of wave function Ψ.
c) State the important properties of LASER.
d) What is population inversion and pumping mechanism?
e) What is NA? Give its significance.
f) Define the terms
   i. Reverberation
   ii. Reverberation time.
g) What do you understand by Nano? Express it in meters?
h) State the important properties of nanoparticles.

Q.7
a) Define Schrodinger's time independent and time dependent wave equation. 07
b) State and explain Heisenberg's uncertainty principle. 05
c) What is Hall Effect? Define Hall coefficient. 03

Q.8
a) Explain the construction and working of Helium-Neon gas Laser. 06
b) What are Ultrasonic Waves? Explain the production of Ultrasonic Waves by Piezo-Electric method. 06
c) A hall has a volume of 10,000 m^3 and a reverberation time of 2 seconds. Find the total absorption of sound in hall. 03

Q.9
a) Explain the mechanical Ball milling method for the Synthesis of nanoparticles. 05
b) Explain single-walled and multi-walled nanotube. 05
c) Explain the application of Nanotechnology in Electronics and Automobiles. 05

Q.10 Write short notes on following. 15

a) Zeeman Effect.
b) Types of optical fibre
c) Synthesis of nanoparticles by Laser vaporization method.

Total No. of Printed Pages:02

SUBJECT CODE NO:- K-367

FACULTY OF ENGINEERING AND TECHNOLOGY

F.E. (P-2016) Examination Oct/Nov 2016

Engineering Chemistry & Environmental Sci.

(Revised)

[Time: Three Hours] **[Max. Marks:80]**

Please check whether you have got the right question paper.

N.B
I. Question No.1 and Question No.6 are compulsory.
II. Solve any two questions from the remaining questions of each section-A and Section-B.
III. Figures to right indicate full marks.

Section A

Q.1 Answer the following questions (any five). 10

i) Write the monomers of Bakelite.
ii) Natural rubber needs vulcanization. Give reason.
iii) Plasticizer is used during manufacturing of plastic. Give reason.
iv) Write the composition of cement.
v) What are the advantages of using thermosetting adhesives?
vi) What is a abrasives?
vii) What is reverse osmosis?
viii) Why is water softened before using in boiler?
ix) What are the salts responsible for the temporary and permanent hardness of water?

Q.2
a) What is polymerization? Explain various types of polymerizations by giving suitable examples. 07
b) Bring out the differences between thermo softening and thermosetting plastics. 04
c) Write preparation and uses of BUNA-N. 04

Q.3
a) What is cement? What are the raw materials required for manufacturing cement? Describe any one process of cement manufacture. 07
b) What are the various physical factors influencing the adhesive strength. 04
c) Give the classification of abrasive with one example of each type. 04

Q.4
a) Describe the Zeolite process of softening of hard water. What are its advantages and disadvantages? 07
b) Write a brief note on caustic embrittlement. 04
c) Give the application of pH-meter. 04

Q.5
a) Describe the method of preparation properties and applications of PVC. 07
b) What are adhesives? Explain the bonding process by adhesives. 04
c) What are the disadvantages of Scale and Sludge formation in boiler? 04

Section B

Q.6 Answer the following questions (any five) 10

I. The rate of metallic corrosion increases with increase in temperature. Give reason.
II. Why are galvanized utensils not used?
III. Why is lubricants needed?
IV. Distinguish between gross and not colorific value of fuel.
V. Why is coke preferred to coal in metallurgical process?
VI. What is lead-acid accumulator?
VII. How is photochemical smog formed?
VIII. Name any two sources, which liberate carbon dioxide in bulk in air.
IX. What is soil pollution?

Q.7
a) What is corrosion of metal? Describe the mechanism of electrochemical corrosion by evolution of hydrogen and absorption of oxygen. 07
b) Write in brief anodic protection. 04
c) Define lubricant and lubrication. Give the classification lubricants with example. 04

Q.8
a) What are the characteristics of good fuel? Determine of the calorific value of a coal sample, given the following data. 07
Wt. of coal sample=0.996gm,
Water equivalent of colorimeter=440gm
Wt. of water =2560gm
Rise in temp =2.42° C,
Cooling correction=0.052° C,
Fuse wire correction=5 cal.
Acid correction =5 cal.
Calculate Gross and net calorific value if coal contain 8% of hydrogen and assume latent heat of Steam =601 Cal/gm.
b) Write a technical note on "octane number". 04
c) Outline the construction and working of Nickel-cadmium battery. 04

Q.9
a) Define the term pollution and pollutants. Describe in detail segments of environment. 07
b) Discuss briefly "Noise pollution". 04
c) What are the consequences of global warming? 04

Q.10
a) With neat diagram describe the fractional distillation of petroleum. List different fractions by distillation of crude oil. 07
b) Define: 04
i) Viscosity index.
ii) Flash print.
iii) Acid value.
iv) Pour point.
c) What are the common water pollutants? How do they affect on man and environment? 04

Total No. of Printed Pages:2

SUBJECT CODE NO:- K-227
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E.[online + Theory Exam] Examination Oct/Nov 2016
Elements of Electrical Engineering
(Old)

[Time:Two Hours] **[Max. Marks:40]**

Please check whether you have got the right question paper.

N.B i) Q.No.1 is compulsory.
ii) Attempt any two questions from the remaining questions.
iii) Assume suitable data, if necessary.

Q.1 Solve any five. 10

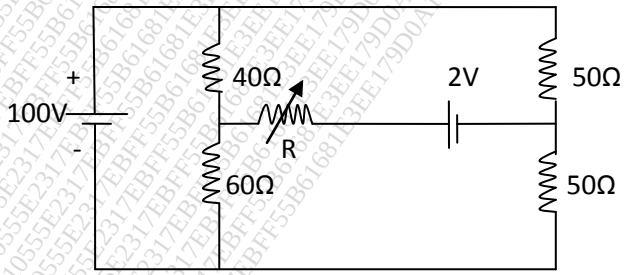
a) Derive the expression for resistance at t^0c.
b) Define Resistivity and state its Expression.
c) Define RTC. What is its unit?
d) Define self-Inductance.
e) Define Magnetic flux density, Reluctance.
f) State the effect of temperature on resistance of Alloys & Insulators.
g) What is Hysteresis loss?
h) Define MMF and Permeability.

Q.2 a) State and explain with the neat fig. self-Induced E.M.F. 05

b) Prove $\propto_t = \frac{\propto_0}{1+\propto_0 t}$ 05

c) An un charged capacitance of $30\mu f$ is connected in series with a resistance of 400 Ω is suddenly connected across 100 V d.c. supply. find 05
i) The time constant of the circuit
j) Initial current
k) Current after 0.05 sec.

Q.3 a) Determine the value of 'R' for maximum power transfer. Also find magnitude of maximum power transferred. 05



b) By using Loop analysis find the current through '20 Ω 'resistor. 05

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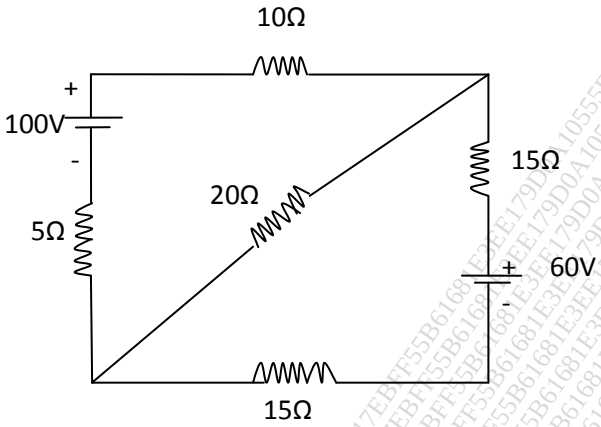
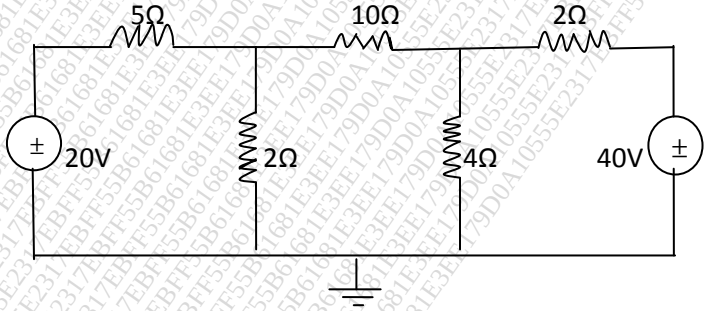


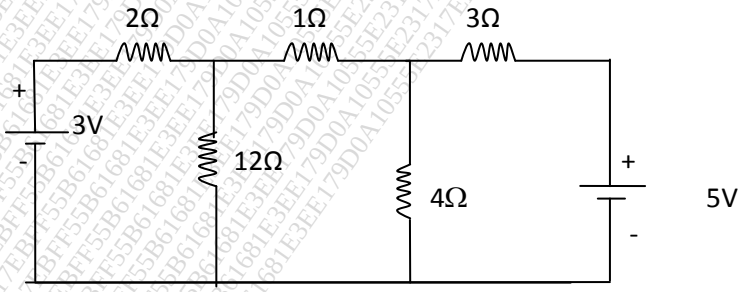
c) State and Explain superposition theorem. 05

Q.4 a) State and Explain Maximum Power transfer theorem. 05

b) Using Node analysis find magnitude & direction of current in '10 Ω' resistance. 05



c) Find the current in '4Ω' resistance by using superposition theorem. 05



Q.5 a) Give the comparison between Electrical circuit and Magnetic circuit. 05

b) Explain Hysteresis and eddy current loss. 05

c) With the help of Neat figure Explain Magnetic Fringing & Magnetic Leakage. 05

2016

Total No. of Printed Pages:3

SUBJECT CODE NO:- K-228
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E. (P-2016) Examination Oct/Nov 2016
Basic Electrical Engineering
(Revised)

[Time: Three Hours] **[Max. Marks:80]**

Please check whether you have got the right question paper.

N.B
1) Q.5 and Q. 10 are compulsory.
2) Attempt total three questions from each section.
3) Make suitable assumptions where necessary, stating the same.

Section A

Q.1 a) Explain constructional features and working of lead –acid battery. 06

b) Explain how a capacitor is charged from d. c. supply through a series resistance. Derive equation of charging current. Draw its graph and define time constant for this circuit. 08

Q.2 a) For the circuit shown below. Find current flowing through each resistor, using node voltage method. 06

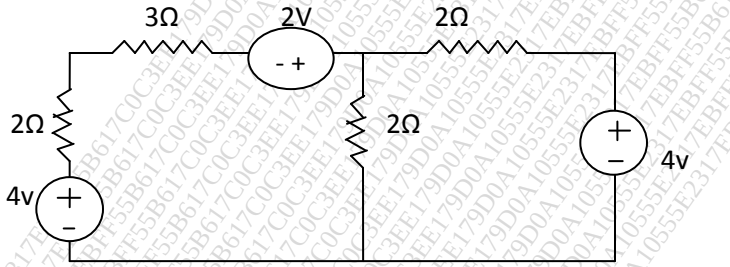


Fig.1

b) For the circuit shown below. Find ϑ using superposition theorem. 04

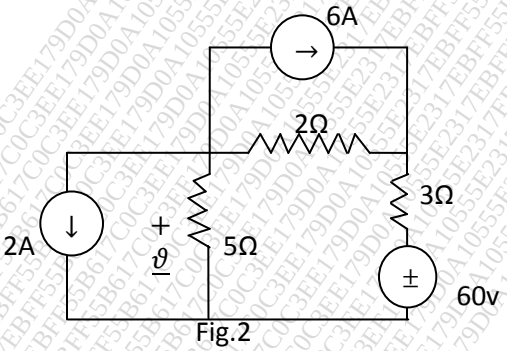


Fig.2

c) State and explain Theremin's theorem with the help of simple example. 04

Q.3 a) For the network shown below [fig.3] find current 'I' using Star – Delta or Delta – Star transformation. 06

b) Compare magnetic circuit with electric circuit giving similarities and dissimilarities. 08

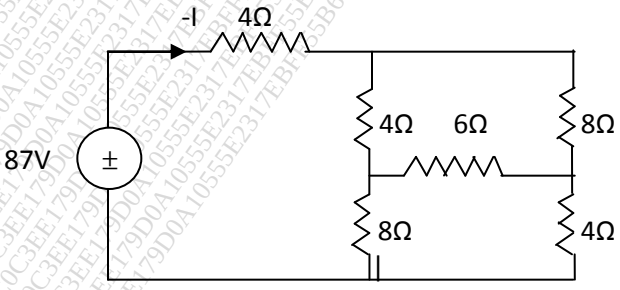


Fig.3

Q.4 a) Derive expression for energy stored in magnetic field. 04

b) Draw a series magnetic circuit and explain the method of calculation of ampere-turns required to produce flux, in terms of dimension of the circuit. 06

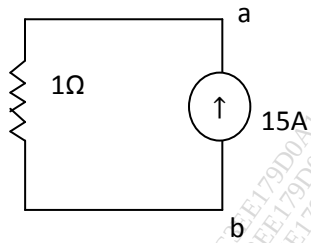
c) Explain briefly phenomenon of Magnetic hysteresis and define the following terms. 04

i. Retentivity.

ii. Coercive force.

Q.5 Answer the following (any six) 12

a) What is magnitude and polarity of voltage V_{ab}?



b) A voltage source of 1.5v has an internal resistance of 0.25Ω. What is the maximum power it is capable of delivering to an external load.

c) 'Left hand rule can be applied to find the direction of induced emf due to movement'. Correct the statement if necessary and explain.

d) Explain the terms 'Self Inductance' and 'Mutual - Inductance'.

e) State the effect of temperature on resistance of i) rubber. ii) Gold.

f) Four equal value resistors are connected in parallel. Five volts are applied across the parallel circuit and current of 2.5A is measured from the source. What is the value of each resistor?

g) Three equal resistances of 5Ω are connected in star. What is the resistance in one of the arms in an equivalent delta?

h) State 'Maximum Power Transfer Theorem' as applied to D.C. networks. Where is it applicable?

Section-B

Q.6 a) Explain the behaviour of pure inductor when connected across single phase a.c. supply. 04

b) When a sinusoidal voltage 120volts (RMS) is applied to a series LR circuit, it is found that there occurs a power dissipation of 1200 watts and current flow is given by $i = 28.3\sin(314t - \theta)$: 05
Find circuit resistance and inductance in Henry.

c) A pure capacitor is connected in series with a coil (practical inductor), the voltage source is 10V at 10KHz frequency. It was observed that a maximum current of 2A flows in the circuit when the value of capacitor is $1\mu F$. Find resistance and inductance of the coil. 05

Q.7 a) A 10 micro farad (10 μF) capacitor is connected in parallel with 200Ω resistor across a 240v, 50Hz supply. Calculate i) supply current ii) P.F. iii) Power dissipated. Draw vector diagram. 07

b) Derive expression for frequency a resonance for the circuit shown below (fig.4) 07

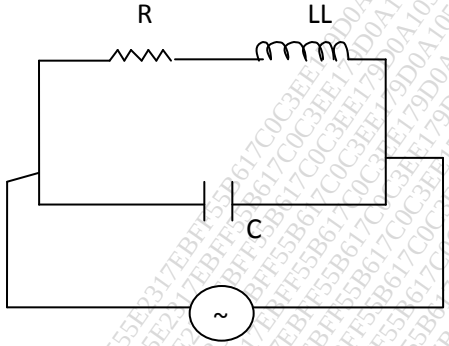


Fig.4 V volts, variable freq.

Q.8 a) Derive EMF equation of a transformer. 05

b) A 2000 KVA, 3300|240v, 50 Hz single phase transformer has 80 turns on the secondary winding. Assuming an ideal transformer calculate 05

i. Primary and secondary current.
ii. Maximum value of Flux.
iii. The number of primary turns.

c) Write short note on 'Losses in Transformer'. 04

Q.9 a) Explain briefly different types of wiring systems. 05
b) Explain construction and working of CFL. 05
c) Write short note on 'Earthing and its importance'. 04

Q.10 Answer the following (Any six) 12

a) State any four conditions of series resonance.
b) In a particular circuit the applied voltage lags current by 90^0 what type of circuit is this? What is the p.f.?
c) The apparent power in a circuit is 50VA and a reactive power is 40VAR. Draw power triangle and calculate true power.
d) Define efficiency and voltage regulation of transformer.
e) How is core of transformer constructed? Why?
f) The voltage and current in a circuit are represented by (100+j200) v and (10+j5) A respectively. Calculate active power and reactive power
g) Define form factor and peak factor. Write their values for a.c sinusoidal waveform.
h) Why is switch always connected in phase wire?

Total No. of Printed Pages:1

SUBJECT CODE NO:- K-260

FACULTY OF ENGINEERING AND TECHNOLOGY

F. E.[Online +Theory Exam] Examination Oct/Nov 2016

Elements of Civil Engineering

(Old)

[Time:Two Hours] **[Max. Marks:40]**

Please check whether you have got the right question paper.

N.B i) Q.No.1 is compulsory.
ii) Attempt any two questions from remaining questions.
iii) Draw neat sketch wherever necessary.

SECTION B

Q.6 Define the following (Any five) 10

i. Geodetic surveying
ii. Sedimentation
iii. Reduced level.
iv. Filtration
v. Irrigation
vi. Closed traverse
vii. Watershed area.

Q.7
a) Explain reciprocal ranging with neat sketches. 05
b) State and explain types of benchmark. 05
c) Explain Principle of survey (to work from whole to part) 05

Q.8
a) Explain different types of benchmark 05
b) State the objectives of surveying. 05
c) Explain working of prismatic compass. 05

Q.9
a) Explain rainwater harvesting with neat sketches. 05
b) State the benefits of irrigation. 05
c) Enlist and describe the different types of water demand. 05

Q.10
a) Differentiate between earthen dam and gravity dam. 05
b) Draw labelled diagram of water supply scheme. 05
c) Describe ground water recharge. 05

Total No. of Printed Pages:1

SUBJECT CODE NO:- K-261
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E. (P-2016) Examination Oct/Nov 2016
Basic Civil Engineering
(Revised)

[Time: Two Hours] **[Max. Marks:40]**

Please check whether you have got the right question paper.

N.B
i) Q.No.1 is compulsory.
ii) Attempt any two questions from remaining questions.
iii) Draw neat sketches wherever necessary.
iv) Figures to the right indicate full marks.

Q.1 Answer the following (any five) 10
i) Define plot area and Built up area.
ii) What are the principles of surveying?
iii) Define ranging.
iv) What are the factors influencing FSI?
v) What is fire demand?
vi) Define carriageway and camber
vii) What is arithmetic increase method?
viii) Define back sight and fore sight?

Q.2 a) Give comparison between load bearing structure and framed structure. 07
b) Which points should be considered in the selection of site for residential building? 08

Q.3 a) Explain the various factors affecting the size, shape and location of door and window in a room. 07
b) Give importance of road transportation and explain the classification of roads according to Nagpur road plan. 08

Q.4 a) Explain indirect ranging with neat sketch. 05
b) The following readings were taken with a dumpy level and levelling staff are 0.985, 1.115, 2.000, 1.600, 1.850, 2.100, 2.300, 2.400, 1.900, 2.200, 2.650, and 3.500 the instrument was shifted after 3rd and 8th readings. The R.L of B.M is 500M. Calculate the R.L of all points by height of instrument method. Give arithmetical check. 10

Q.5 a) Discuss the various treatment units for a water supply scheme along with neat sketch. 07
b) What is necessity of Irrigation? Give advantages and disadvantages of Irrigation. 08