

Total No. of Printed Pages:3

SUBJECT CODE NO: E – 01
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) Examination Nov/Dec 2017
Engineering Mathematics-II
(OLD)

[Time: Three Hours]

[Max.Marks:80]

N.B

Please check whether you have got the right question paper.

- i. Question Nos. 1 and 6 are compulsory.
- ii. Attempt any two questions remaining four questions from each section.
- iii. Figures to the right indicate full marks.
- iv. Assume suitable data, if necessary.

Section A

Q.1 Attempt any five from the following: 10

- a) Define Gamma function and evaluate: $\int_0^{\infty} e^{-t} t^6 dt$.
- b) Evaluate $\int_0^1 x^6 (1-x)^7 dx$.
- c) Evaluate $\int_0^1 \int_0^2 \int_0^3 dx dy dz$.
- d) Change the order of integration of $\int_0^1 \int_0^{\sqrt{1-x^2}} f(x, y) dx dy$.
- e) Evaluate $\int_0^1 \int_0^x e^{\frac{y}{x}} dy dx$.
- f) Find the mean value of $y = e^x$ in the range $0 < x < 5$.
- g) 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
- h) Find the volume of the solid generated by the curve $y = \sin x$ between the $x = 0$ and $x = \pi$.

Q.2 a) Evaluate $\int_0^1 (x \log x)^4 dx$. 05

b) Evaluate $\int \int x^2 y^2 dx dy$ over the positive quadrant of circle $x^2 + y^2 = 1$. 05

c) Find the surface of the solid generated by revolution of the loop of the curve $x = t^2, y = t - \frac{t^3}{3}$ About x -axis. 05

Q.3 a) Prove that $\int_0^{\pi/2} \sin^p x dx \cdot \int_0^{\pi/2} \sin^{p+1} x dx = \frac{\pi}{2(p+1)}$. 05

2017

- b) Change the order of integration by showing the region of integration

$$\int_0^1 \int_{x^2}^{\sqrt{2-x^2}} f(x, y) dx dy.$$

05

- c) Find the area bounded by the x – axis circle $x^2 + y^2 = 16$ and the line $y = x$.

05

- Q.4 a) Prove that $\int_{-1}^1 (1+x)^m (1-x)^n dx = 2^{m+n+1} \frac{m!n!}{(m+n+1)!}$ Where m and n are positive integers.

05

- b) Change to polar co – ordinate and evaluate $\int_0^a \int_{\sqrt{ax-x^2}}^{\sqrt{a^2-x^2}} \frac{xdy}{\sqrt{a^2-x^2-y^2}}.$

05

- c) Find the root mean square value of $3 \sin 2x$ over the interval 0 to 2π .

05

- Q.5 a) Evaluate $\int_0^\infty \frac{x^4(1+x^5)}{(1+x)^{15}} dx.$

05

- b) Evaluate $\int_0^2 \int_0^x \int_0^{2x+2y} e^{x+y+z} dx dy dz.$

05

- c) Find volume bounded by the cylinders $y^2 = x$ and $x^2 = y$ and the planes $z = 0$ and $x + y + z = 2$.

05

Section -B

- Q.6 Attempt any five of the following:

10

- a) Define Fourier series of $f(x)$ in the interval $0 \leq x \leq 2\pi$.

- b) Define Dirichlet's conditions.

- c) If $a_n = \frac{4}{\pi n^2} [(-1)^n - 1]$ then $a_n = \dots$; if n is odd number.

- d) Find the Fourier series coefficient a_0 & a_n for $f(x) = x^3, -1 < x < 1$.

- e) Define rank of matrix.

- f) Find the characteristic roots of the matrix $A = \begin{bmatrix} 1 & 2 & -5 \\ 0 & 5 & -2 \\ 0 & 0 & 1 \end{bmatrix}.$

- g) Check the linear independence and dependence for following vector $X_1 = (1, 1, 1); X_2 = (3, 2, 1); X_3 = (0, 0, 1).$

- h) Define matrix if its quadratic form is $x_1^2 + 2x_2^2 - 7x_3^2 + 4x_1x_2 - 8x_1x_3 - 6x_2x_3.$

- Q.7 a) Find the Fourier series of $f(x) = 2x - x^2$; in the interval (0, 3).

05

b) Find the rank of matrix A

$$A = \begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}$$

c) Obtain eigen values and eigen vectors for least positive eigen value for the matrix.

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

Q.8 a) Find half range cosine series for $f(x) = e^x$ in the interval $(0,1)$. 05

b) Is the following system of equations consistent? If so solve it. 05

$$x + y + z = 6; x - y + 2z = 5; 3x + y + z = 8; 2x - 2y + 3z = 7.$$

c) Find characteristic equations of the matrix A. Verify that it satisfy cayley – Hamilton theorem. 05

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

Q.9 a) Expand $f(x)$ in Fourier series if 05

$$f(x) = -\pi; 0 \leq x \leq \pi \\ = x - \pi; \pi \leq x \leq 2\pi$$

b) Obtain half range sine series for: 05

$$f(x) = \frac{1}{4} - x, 0 < x < \frac{1}{2} \\ = x - \frac{3}{4}, \frac{1}{2} < x < 1.$$

c) Check the consistency and solve 05

$$\begin{aligned} x + y + 3z &= 0 \\ x + 2y + 3z &= 0 \\ x + 3y + 4z &= 0 \\ 3x + 4y + 7z &= 0 \end{aligned}$$

Q.10 a) Find Fourier series of $x \cos x$ over $(-\pi, \pi)$. 05

b) Find half range cosine series of $f(x) = x^2$ in the interval $(0, \pi)$. 05

c) Find the inverse transformation of 05

$$\begin{aligned} y_1 &= x_1 + 2x_2 \\ y_2 &= 2x_1 - x_2 + x_3 \\ y_3 &= 4x_1 + 3x_2 + 2x_3 \end{aligned}$$

Total No. of Printed Pages:3

SUBJECT CODE NO:- E – 02
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) (CGPA) Examination Nov/Dec 2017
Engineering Mathematics-II
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

N.B Please check whether you have got the right question paper.

- i. Question numbers 1 and 6 are compulsory.
- ii. Solve any two questions from remaining of each section.
- iii. Figure to the right indicate full marks.
- iv. Assume suitable data, if necessary.

Section A

Q.1 Solve any five from the following 10

- a) The differential equation $(1 + e^{x/y})dx + e^{x/y} \left(1 - \frac{x}{y}\right)dy = 0$ is exact then find its solution.
- b) State Newton's law of cooling.
- c) If $f(x)$ is an even function defined in the interval $(-\pi, \pi)$ then write Fourier series and Fourier coefficient for $f(x)$.
- d) If $f(x) = 2\pi x - x^3$ in $(0, 3)$ then find the value of Fourier coefficient b_n .
- e) If $f(x) = \sqrt{1 - \cos x}$, in $(0, 2\pi)$, then find a_0 .
- f) The curve $y^2(a + x) = x^2(a - x)$ is symmetrical about.....
- g) Find the tangent at origin to the curve $y^2(a - x) = x^2(a + x)$.
- h) The length of the curve $r = f(\theta)$ from $\theta = a$ to $\theta = b$ is.....

Q.2 a) Solve $(2xy + y - \tan y)dx + (x^2 - x \tan^2 y + \sec^2 y)dy = 0$. 05

b) Obtain the Fourier series 05
 $f(x) = \pi x, 0 \leq x \leq 1$
 $= \pi(2 - x), 1 \leq x \leq 2$.

c) Trace the curve $y^2(2a - x) = x^3$ with full justification. 05

- Q.3
- Solve $(x + 2y^3) \frac{dy}{dx} = y$. 05
 - Find Fourier series of the function $f(x) = \frac{x(\pi^2 - x^2)}{12}$ in the interval $(-\pi, \pi)$. 05
 - Trace the curve $r = a \cos 2\theta$ with full justification. 05
- Q.4
- An RC circuit has an e.m.f. given in volt by $400 \cos 2t$. A resistance of 100 ohms, and a capacitance of 10^{-2} farad. Initially $q(0) = 0$ find the current i at any time t . 05
 - Find the half range cosine series for $f(x) = e^x$ in the interval $(0, \pi)$. 05
 - Trace the curve $x = a(t + \sin t)$; $y = a(1 + \cos t)$ with full justification. 05
- Q.5
- Solve $\frac{dy}{dx} + x \sin 2y = x^3 \cos^3 y$. 05
 - Obtain the Fourier series of $f(x) = \left(\frac{\pi - x}{2}\right)^2$ in the interval $0 \leq x \leq 2\pi$. 05
 - Find the total length of the curve $x = a \cos^3 t$; $y = a \sin^3 t$. 05
- Section B
- Q.6 Solve any five from the following 10
- Define the Gamma function and evaluate $\int_0^\infty e^{-x} x^2 dx$.
 - Evaluate $\int_0^{\pi/2} \sin^2 t \cos^5 t dt$.
 - Evaluate $\int_1^2 \int_0^{\log r} e^{-\theta} d\theta dr$.
 - Evaluate $\int_0^a \int_0^b \int_0^c dx dy dz$.
 - Change the order of integration $\int_0^1 \int_0^x f(x, y) dx dy$.
 - Evaluate $\int \int x^2 y^3 dx dy$ over the rectangle $0 \leq x \leq 1$ and $0 \leq y \leq 3$.
 - The total volume of the solid formed by the revolution of the area R about x -axis is
 - The surface area of solid formed the revolution of the curve $y = f(x)$ about x -axis from $x = a$ to $x = b$ is.....

- Q.7
- Evaluate $\int_0^{\infty} \frac{x^a}{a^x} dx, a > 0$. 05
 - Evaluate $\int_0^1 \int_0^{\sqrt{1+x^2}} \frac{dy dx}{1+x^2+y^2}$. 05
 - Find the area by double integration bounded by the curves $y^2 = 2 - x, y^2 = x$, 05
- Q.8
- Evaluate $\int_0^2 x^3 (2 - x)^{1/2} dx$. 05
 - Change the order of integration $\int_{-a}^a \int_0^{\sqrt{a^2-y^2}} f(x, y) dx dy$. 05
 - Calculate by double integration, the volume generated by the revolution of the cardioid $r = a(1 - \cos \theta)$ about its axis. 05
- Q.9
- Evaluate $\int_0^{\pi} x \sin^5 x \cos^4 x dx$. 05
 - Evaluate $\int_0^{\infty} \int_0^{\infty} e^{-(x^2+y^2)} dx dy$ by changing to polar co-ordinates. 05
 - Find by triple integration, the volume of the sphere $x^2 + y^2 + z^2 = a^2$. 05
- Q.10
- Prove that $\beta(m, n) = \int_0^{\infty} \frac{t^{m-1}}{(1+t)^{m+n}} dt$. 05
 - Evaluate $\int_{-2}^2 \int_0^z \int_{x-z}^{x+z} (x + y + z) dx dy dz$. 05
 - Calculate the volume of solid bounded by the planes $x = 0, y = 0, x + y + z = a$ and $z = 0$. 05

Total No. of Printed Pages:4

SUBJECT CODE NO: E-13
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(All Branches) Examination Nov/Dec 2017
Engineering Mathematics -IV
(OLD)

[Time: Three Hours]

[Max.Marks:80]

N.B

Please check whether you have got the right question paper.

- 1) Q. no 1 and 6 are compulsory.
- 2) solve any two question from remaining of each section
- 3) Figures to right indicate full marks.
- 4) Assume suitable data if necessary.

Section A

Q.1 Solve any five from the following 10

- a) What are the sufficient conditions for $f(z)$ to be analytic?
- b) Find the image of $|z| = 1$ under the mapping $w = \frac{1}{z}$
- c) Expand $f(z) = \sin Z$ about $z = \frac{\pi}{4}$ by using Taylor's series
- d) Evaluate $\int_0^i z e^{z^2} dz$
- e) Solve : $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = u, u(0, y) = 3e^{-3y}$

OR

Find Z – transform of $F(k) = k, k \geq 0$

- f) Solve : $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 0$

OR

Find the Z – transform of $c^k \sin \alpha k, k \geq 0$

- g) State cauchy's residue theorem
- h) Determine the poles and the residue at each pole of the function $f(z) = \frac{z^2}{(z-1)^2(z+2)}$

- Q.2
- Determine the function $f(z) = ze^{-z}$ is analytic or not 05
 - Evaluate $\oint_C \log z \, dz$ where C is the standard unit circle 05
 - Evaluate $\int_0^\infty \frac{dx}{(a^2+x^2)^2}$ by using residue theorem 05

- Q.3
- If $f(\alpha) = \int_C \frac{3z^2+7z+1}{z-\alpha} dz$ where C is the circle $x^2 + y^2 = 4$ find the value of $f(3), f'(1-i)$ and $f''(1-i)$ 05
 - Show that $u(r, \theta) = e^{-\theta} \cos(\log r)$ is harmonic, find its harmonic conjugate function 05
 - Solve the partial differential equation $\frac{\partial u}{\partial t} = \frac{1}{h^2} \frac{\partial^2 u}{\partial x^2}$, with subject to the condition 05

$$u(0, t) = 0, u(l, t) = 0, u(x, 0) = \sin \frac{\pi p}{a} x$$

OR

Find Z - transform of $F(k) = 3^k \cos\left(\frac{k\pi}{2} + \frac{\pi}{4}\right), k \geq 0$

- Q.4
- Find and plot the image of rectangular region bounded by $x = 0; y = 0; x = 2; y = 1$ under the transformation $w = iz$ 05
 - Find the Laurent series expansion of the function $\frac{1}{(z-1)(z-2)}$ in the region $1 < |z-1| < 2$ 05
 - Solve the equation $u_{xx} + u_{yy} = 0$ subject to the conditions $u(0, y) = u(\pi, y) = 0$ for all y and $u(x, 0) = k, 0 < x < \pi$ and $u = 0$ when $y \rightarrow \infty$ 05

OR

solve $y(k+2) - 3y(k+1) + 2y(k) = 4^k, y(0) = 0, y(1) = 1$

- Q.5
- Find the bilinear transformation which maps the point $-1, 0, 1$ in z -plane onto the points $-1, -i, i$ in w -plane 05
 - Evaluate $\int_0^{2\pi} \frac{d\theta}{2+\cos \theta}$ by calculus of residue 05
 - The vibration of an elastic string is governed by the partial differential equation 05

$\frac{\partial^2 u}{\partial t^2} = \frac{\partial^2 u}{\partial x^2}$. The π and the ends are fixed. The initial velocity is zero and initial deflection

$u(x, 0) = 2(\sin x + \sin 3x)$. find the deflection $u(x, t)$ of the vibrating string for $t > 0$

OR

Find the inverse z - transform of $\frac{1}{(z-3)(z-2)}$ in the region $2 < |z| < 3$

Section B

Q.6 Solve any five from the following 10

- 1) State second shifting theorem of Laplace transforms
- 2) Find Laplace transform of $\sqrt{1 - \sin t}$
- 3) Find Laplace transform of $(e^{-4t} + \log t) \delta(t - 2)$
- 4) Find inverse Laplace transform of $\frac{1}{(s+3)^3}$
- 5) Find inverse Laplace transform of $\frac{e^{-2s}}{s^2 + 8s + 25}$
- 6) State inverse convolution theorem of Laplace transform
- 7) Find Fourier transform of $f(x) = e^{-ax}, x > 0$
 $= e^{ax}, x < 0$
- 8) find Fourier cosine transform of $e^{-\beta x}$

Q.7 a) Find Laplace transform of $\int_0^t \int_0^t \int_0^t t \sin t \, dt \, dt \, dt$ 05

b) Find inverse Laplace transform of $\frac{1}{s^3 + 1}$ 05

c) Solve the integral equation $\int_0^\infty f(x) \sin \lambda x \, dx = e^{-\lambda}, \lambda > 0$ 05

- Q.8
- Evaluate $\int_0^{\infty} e^{-t} \frac{\sin \sqrt{3} t}{t} dt$ 05
 - Find inverse Laplace transform of $2 \tanh^{-1} s$ 05
 - Find Fourier sine and cosine transform $f(x) = 3e^{-2x} - 7e^{-3x}$ 05
- Q.9
- Express the function in terms of Heaviside unit step function hence find their Laplace transform of 05

$$f(t) = \begin{cases} t - 2, & 1 < t < 2 \\ 4 - t, & 2 < t < 3 \\ 0, & t > 3 \end{cases}$$
 - Solve $\frac{d^2 y}{dt^2} - 6 \frac{dy}{dt} + 9y = t^2 e^{3t}$, $y(0) = 2, \frac{dy}{dt} = 6$ at $t = 0$ 05
 - Using Fourier transform, solve the equation $\frac{\partial u}{\partial t} = k \frac{\partial^2 u}{\partial x^2}$ for $x \geq 0, t \geq 0$ under the given condition 05

$$u = u_0 \text{ at } t = 0, t > 0 \text{ and } u(x, 0) = 0, x \geq 0$$
- Q.10
- Find Laplace transform of 05

$$f(t) = \begin{cases} 1, & 0 < t < 1 \\ 0, & 1 < t < 2 \\ -1, & t > 2 \end{cases} \quad \text{if } f(t) = f(t + 3)$$
 - Solve $\frac{dx}{dt} = 2x - 3y; \frac{dy}{dt} = y - 2x$, where $x(0) = 8, y(0) = 3$ by Laplace transform method 05
 - Find $f(x)$ if its Fourier sine transform is $\frac{e^{-a\lambda}}{\lambda}$. 05

Total No. of Printed Pages:3

SUBJECT CODE NO: E-24
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) Examination Nov/Dec 2017
Engineering Mechanics
(OLD)

[Time: 2:00 Hours]

[Max.Marks:40]

N.B

Please check whether you have got the right question paper.

- i) Question number 1 is compulsory.
- ii) Solve any two questions from the remaining.
- iii) Figures to the right indicate full marks.
- iv) Assume suitable data if required.

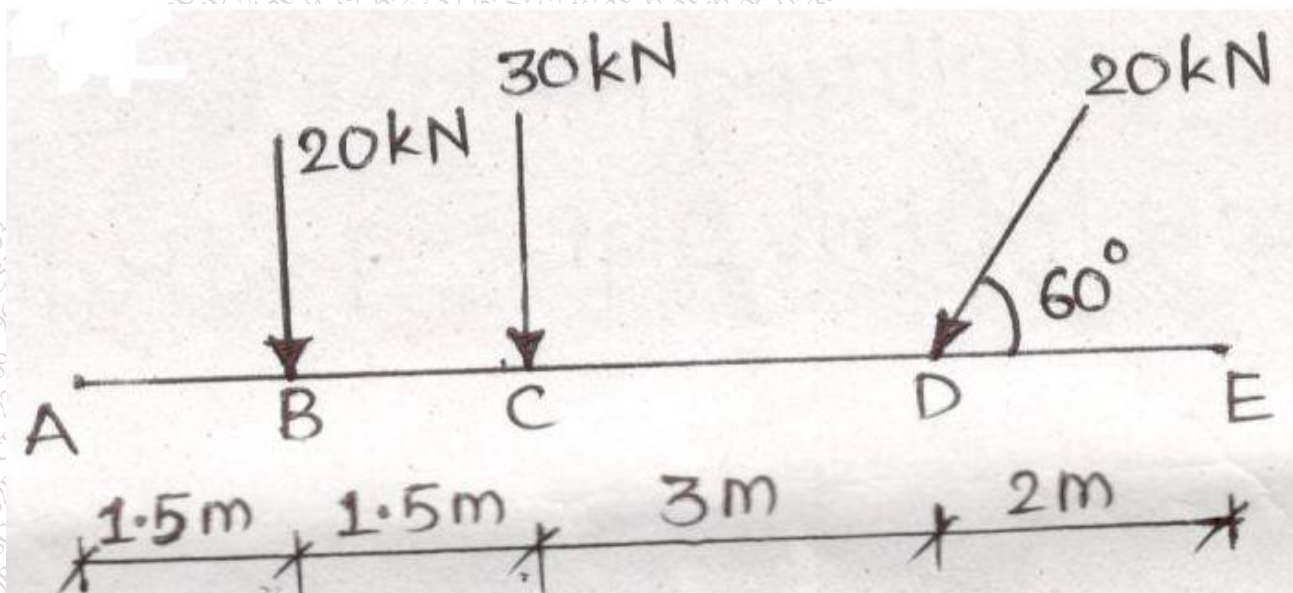
Q.1 Attempt any Five from the following.

10

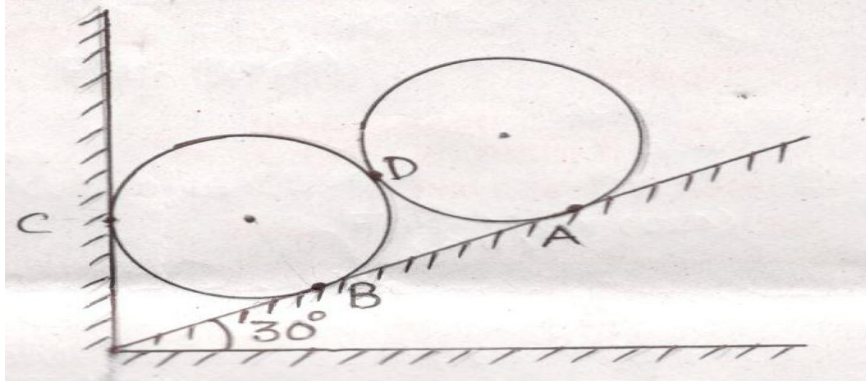
- i) State Lamis's theorem.
- ii) Define the coplanar and Non-coplanar Force System.
- iii) State the principle of transmissibility.
- iv) Define the angle of friction.
- v) State and explain Perpendicular axis theorem.
- vi) State Varignon's theorem.
- vii) Define Polar moment of inertia.
- viii) Define the force and give its unit in S.I sytem.

Q.2 (a) Determine the magnitude, direction and position of resultant with respect to point 'A'

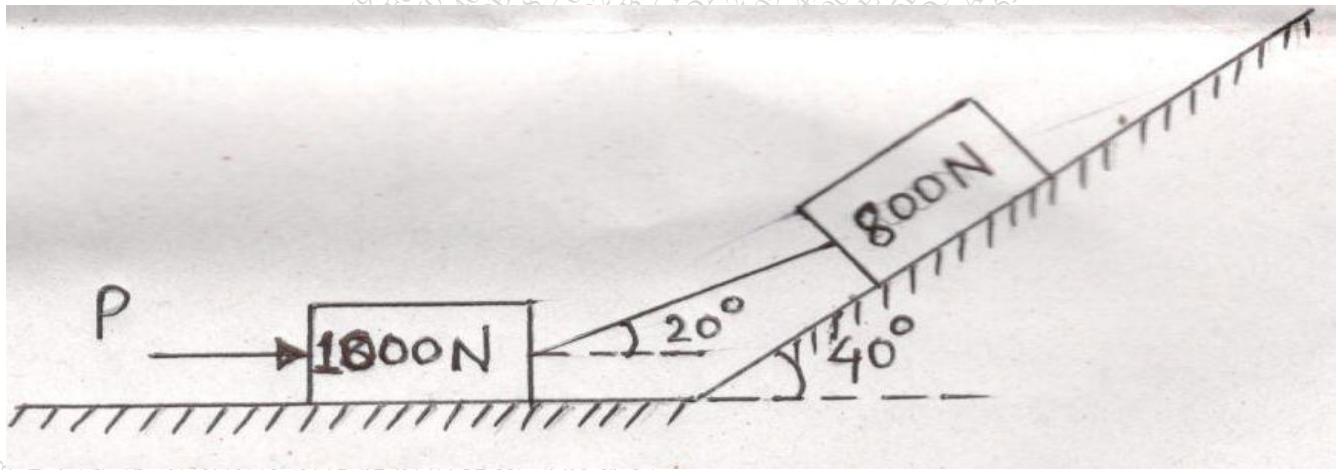
06



- (b) Two identical rollers, each of weight 2000N, are supported by inclined plane and a vertical wall 09 as shown in figure. Find the reactions at the points of support A, B and C. Assume all the surfaces are smooth.

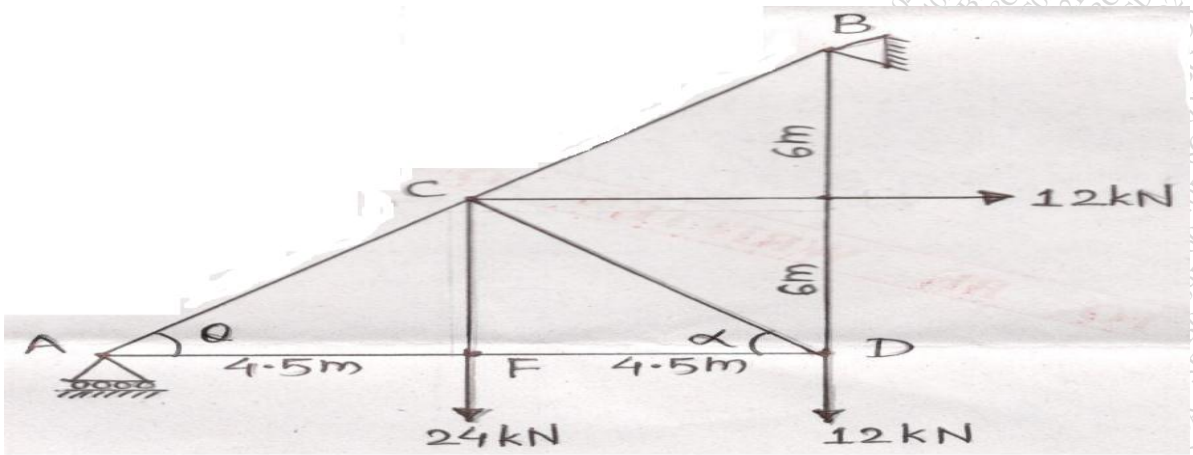


- Q.3 (a) A block of weight 800N is held on an inclined plane by a bar attached to a block of weight 1000N on a horizontal plane as shown in figure. The coefficient of friction for all surfaces is 0.324. Find the magnitude of 'P' which when applied will cause 1000N block to be on the point of moving to right. 07

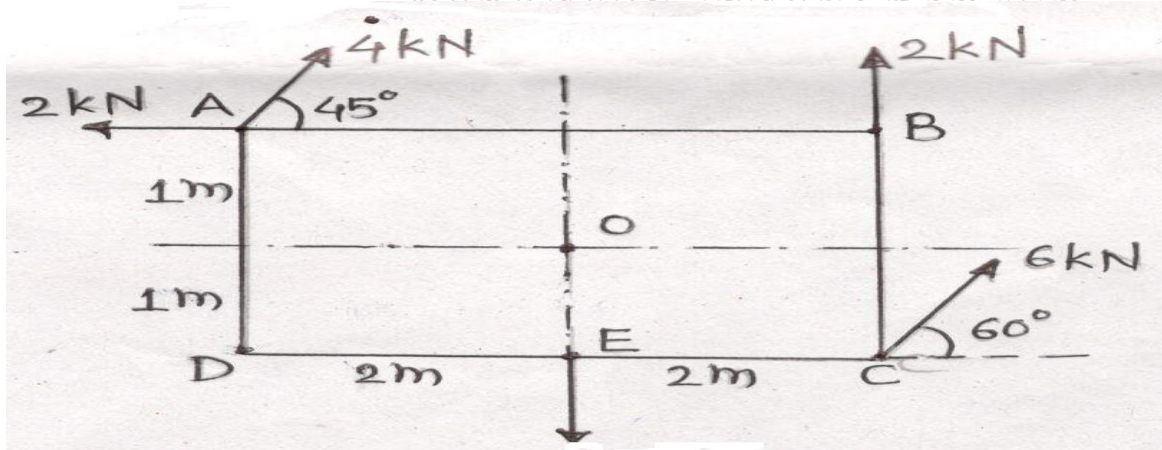


- (b) State and explain parallel axis theorem. 04
(c) State and Explain the principle virtual work. 04

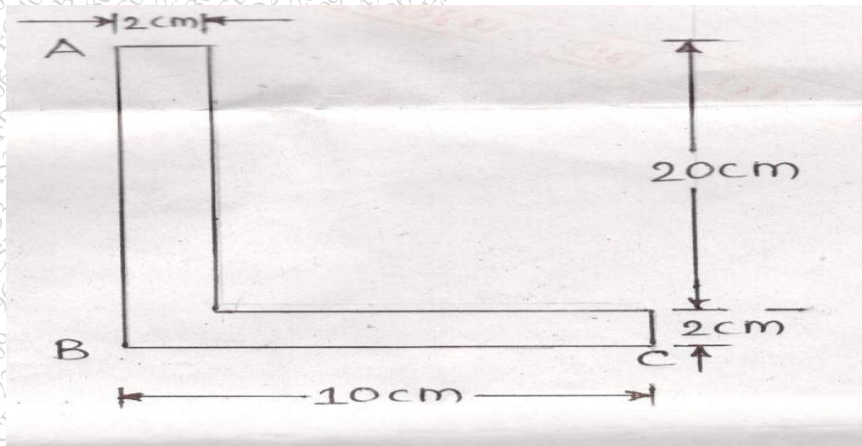
- Q.4 (a) Determine the force in all the members of truss as shown in figure. Indicate the nature of forces 08



- (b) A plate $2m \times 4m$ is subjected to the system of coplanar forces as shown in figure. Determine the equivalent force-couple system at point 'O'. 07



- Q.5 (a) Show that the moment of inertia of a circular section about X-X axis passing through centre of gravity of the section is $\frac{\pi}{64} d^4$. 06
 (b) Find the position of the centroid and the moment of inertia about the X-X and Y-Y axes passing through centroid. 09



SUBJECT CODE NO: E-25
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) (CGPA) Examination Nov/Dec 2017
Engineering Mechanics
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

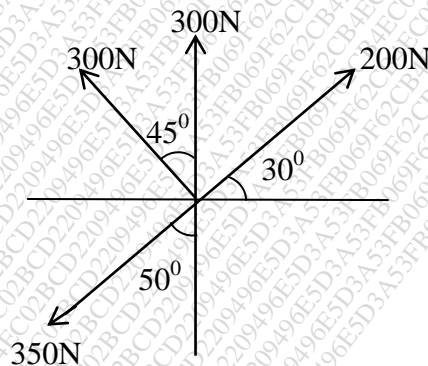
- N.B
1. Q.No.one & six are compulsory.
 2. Attempt any two questions from each section from remaining.
 3. Figures to the right indicate full marks.
 4. Assume suitable data if necessary.

Section -A

Q.1 Attempt any five from the following. 10

- a) Define force.
- b) State law of parallelogram of forces
- c) State law of triangle of forces
- d) What are the assumptions made in the analysis of a simple truss
- e) State parallel axis theorem
- f) What is difference between coefficient of friction & angle of friction
- g) What do you mean by friction
- h) Enlist types of beam

Q.2 a) Find the magnitude of resultant & its location of the following forces acting at a point o as shown in fig. 07

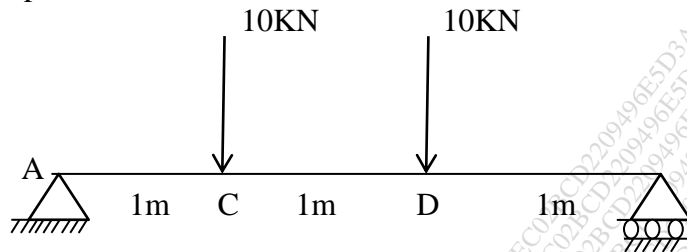


- b) Two men carry a weight of 200 N by means of rope fixed to the weight one rope is inclined at 45° & other at 30° with vertical. Find tension in each rope. 08

Q.3 a) A body of weight 90N is placed on a rough horizontal plane. Determine the coefficient of friction if a horizontal force of 63N just causes the body to slide over the horizontal plane. 07

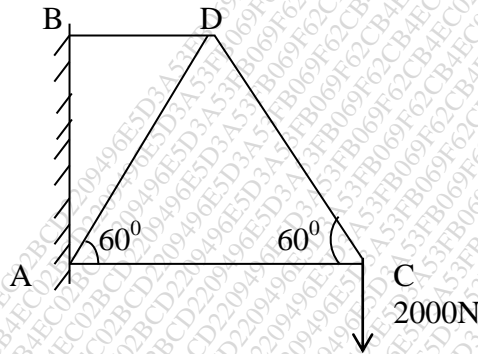
- b) Determine the reaction at the support A & B of the beam loaded as shown in fig. use principle of virtual work method

08



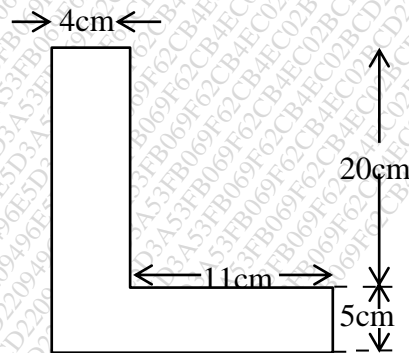
- Q.4 Determine the forces in all the members of cantilever truss shown in fig.

15



- Q.5 Determine the moment of inertia of the area about the centroidal axis.

15



Section -B

- Q.6 Attempt any five questions from the following.

10

- Define the term 'Trajectory'
- Define time of flight
- What is Rectilinear motion
- Distinguish between uniform motion and uniformly accelerated motion.
- A flywheel starts from rests and revolves with an acceleration of 0.5 rad/sec^2 . What will be its angular velocity and angular displacement after 10 seconds?
- Define the term instantaneous centre
- Define the term 'collision of elastic bodies'
- Define 'power'

- Q.7
- A body starts with a velocity of 3m/s and moves in a straight line with constant acceleration. If its velocity at the end of 5 seconds is 5.5 m/s, find
 - The uniform acceleration
 - Distance travelled in 10 second.
 - A stone is dropped from a height. After falling 5 seconds from rest, the stone breaks the glass pane and in breaking, the stone loses 20% of its velocity. Find the distance travelled by the stone in the next seconds. Take $g = 9.81 \text{ m/s}^2$.
- Q.8
- A particle is projected from a point on an inclined plane with a velocity of 30m/s. the angle of projection & angle of the plane are 45° & 15° to the horizontal respectively. If the motion of the particle is up the plane. Determine
 - time of flight
 - range of projectile
 - angle of projection for maximum range
 - A car moves along a straight line whose equation of motion is given by $s = 12t + 3t^2 - 2t^3$ Where (s) is in meters & (t) is in seconds Calculate
 - velocity & acceleration at start
 - Acceleration when velocity is zero.
- Q.9
- Two bodies of weight 60N & 40N are connected to the two ends of a light inextensible string. The string is passing over a smooth pulley. Determine
 - the acceleration of the system &
 - Tension in the string. Take $g = 9.80 \text{ m/s}^2$.
 - A body of mass 50kg, moving with a velocity of 6 m/s, collides directly with a stationary body of mass 30 kg. If the two bodies become coupled so that they move on together after the impact what is their common velocity.
- Q.10
- A block of wood of weight 1200N is placed on a smooth inclined plane which makes an angle of 30° with the horizontal. Find the work done is pulling the block up for a length of 8m.
 - A body is rotating with an angular velocity of 8 radian/ sec. after 5 sec the angular velocity of the body becomes 28 rad/s. determine the angular acceleration of the body.

Total No. of Printed Pages:1

SUBJECT CODE NO:- E_55
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) Examination Nov/Dec 2017
Elements of Mechanical Engineering
(OLD)

[Time: 2:00 Hours]

[Max.Marks:40]

N.B Please check whether you have got the right question paper.

- N.B
- i) Question 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) Define sensible heat and latent heat.
 - b) Differentiate between state function and path function.
 - c) State similarities between heat and work.
 - d) State and explain Boyle's law.
 - e) Write any four applications of reaction turbine.
 - f) Represent constant volume process on PV and TS diagram
 - g) Write different statements of first law of thermodynamics.
 - h) Define renewable and non-renewable energy sources.
- Q.2** **08**
- a) Explain in brief the concept of constant pressure process on PV and TS diagram.
- Q.3** **07**
- a) Explain with neat diagram the construction and working of four strokes Petrol engine.
 - b) Explain the working principle of reciprocating air compressor. State any two applications of compressed air.
- Q.4** **08**
- a) Differentiate between renewable and non-renewable energy sources.
 - b) Write advantages and limitations of thermal power plant.
- Q.5 Write short note on [Any 03]** **15**
- a) Types of thermodynamic equilibrium with one example of each.
 - b) Adiabatic Process
 - c) Domestic Refrigerator
 - d) MPFI system.

SUBJECT CODE NO:- E-56
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) (CGPA) Examination Nov/Dec 2017
Basic Mechanical Engineering
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

N.B Please check whether you have got the right question paper.

- 1) Q. no. 1 and Q. no. 6 are compulsory
- 2) Attempt any two questions from the remaining question in each section 'A' and 'B'
- 3) Assume suitable data if necessary and mentioned it clearly
- 4) Figure to right indicate full marks
- 5) Use of non- programmable calculator is allowed

Section A

- | | | |
|-----|---|----|
| Q.1 | Attempt <u>any five</u> questions. | 10 |
| | a) Define point and path function | |
| | b) Differentiate between open system and close system | |
| | c) Define entropy | |
| | d) Define sensible heat and latent heat | |
| | e) Show constant temperature process on PV and TS diagram | |
| | f) State different statements of first law of thermodynamics | |
| | g) State the function of spark plug and fuel injector | |
| | h) State similarities between heat and work | |
| Q.2 | a) State the various modes of heat transfer and explain them briefly | 08 |
| | b) Explain Pdv work in detail | 07 |
| Q.3 | a) Explain the concept of constant pressure process on PV and TS diagram | 08 |
| | b) One kg of gas is confined to a constant volume tank. Initial pressure and volume are 4 bar and 0.21m^3 respectively. when a heat energy of 82KJ is supplied to the system the final temperature of the gas becomes 127°C find | 07 |
| | 1) Work done | |
| | 2) Change in internal energy | |
| | 3) Specific heat at constant volume. [Take $R = 300\text{Nm/kgK}$] | |
| Q.4 | a) Differentiate between two stroke and four stroke engine | 07 |
| | b) Explain construction and working of reciprocating air compressor. Also write it's applications. | 08 |
| Q.5 | a) Write short note on forms of energy | 07 |
| | b) Explain Domestic refrigerator | 08 |

Section – B

- Q.6 Solve any five Questions. 10
- a) State function of tailstock
 - b) Differentiate between spur gear and Helical gear
 - c) Define brake write it's classification
 - d) Enlist the different applications of non metals
 - e) State the purpose of heat treatment process
 - f) Define runner and riser
 - g) State the working principle of milling machine
 - h) Define shaft
-
- Q.7 a) Explain with neat sketch the working principle of Double block brake .Also write it's applications 07
- b) A pair of spur gears consists of 25 teeth pinion meshing with gear of 100 teeth the module is 5mm. determine 08
- i) The circular pitch
 - ii) The diametral pitch
 - iii) The center distance
 - iv) The pitch circle diameters of pinion & the gear
 - v) The velocity ratio
 - vi) The gear ratio
-
- Q.8 a) Explain the following terms related to sand casting with neat sketch 08
- 1) Pattern
 - 2) Mould cavity
 - 3) Parting line
 - 4) Sprue
- b) Explain with neat sketch Arc welding process 07
-
- Q.9 a) Explain with neat sketch the various operations carried out on drilling machine 08
- b) Explain the surface grinding machine with neat sketch 07
-
- Q.10 a) Write the short note on end milling and Gang milling 08
- b) Define forging. Explain working principle of press forging with neat sketch 07

Total No. of Printed Pages:2

SUBJECT CODE NO: E-88
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) Examination Nov/Dec 2017
Elements of Electronics & Comp. Engg.
(OLD)

[Time: 2:00 Hours]

[Max.Marks:80]

N.B

Please check whether you have got the right question paper.

- i. Q.No.1 & 6 is compulsory
- ii. Attempt any two questions from remaining questions in each section.
- iii. Assume suitable data if necessary.

Section-A

- | | | |
|-----|---|----------|
| Q.1 | Solve any five.
1) Draw symbol of NAND, NOR, Ex-OR, Ex-NOR.
2) Define Holding current & Launching current.
3) Draw construction of MIETE optocoupler.
4) Explain necessity of rectification.
5) Enlist features of IC 7400.
6) How depletion layer is formed?
7) Define capacitor & its types. | 10 |
| Q.2 | a) Compare BJT & JFET.
b) What are the different types of resistor? Explain in detail. | 08
07 |
| Q.3 | a) What is need of voltage regulator? Explain 78XX & 79XX IC in detail.
b) Explain any one filter with circuit & waveform. | 08
07 |
| Q.4 | a) Explain AND, OR & NOT gate with their symbol & truth table.
b) Explain different number system & their conversion. | 08
07 |
| Q.5 | Solve any three
i) LED working
ii) 2's compliment method of binary subtraction.
iii) Universal logic gates.
iv) Applications of rectifier
v) p.n junction diode. | 15 |

Section-B

Q.6	Attempt any five questions from the following	10
	<ol style="list-style-type: none"> 1) Explain basic structure of C program. 2) Why and when do we use #define directive? 3) What does int main() means? 4) Write a program for addition of two numbers in C language. 5) Explain the use of scanf() function in C. 6) What is flowchart? Explain with an example. 7) What is the meaning of expression $!(a < 4)$ in C. 	
Q.7	<ol style="list-style-type: none"> a) Write a program in C language to find area of circle. b) Explain the structure of goto statement in C language with an example. 	08 07
Q.8	<ol style="list-style-type: none"> a) Write a program in C to check whether an integer entered by the user is odd or even using if....else statement. b) Explain general form of if statement in C language with an example. 	08 07
Q.9	<ol style="list-style-type: none"> a) Explain format of a switch statement with an example. b) Write a program in C to determine whether a number is prime or not using break statement. 	08 07
Q.10	<ol style="list-style-type: none"> a) Write program in C to find largest of two numbers using functions. b) What is recursion? Explain with suitable example. 	08 07

Total No. of Printed Pages:1

SUBJECT CODE NO: E-89
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) (CGPA) Examination Nov/Dec 2017
Basic Electronics Engineering
(REVISED)

[Time: 2:00 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 whatever necessary.
-
- Q.1 Solve any five. 10
- a) Enlist Different types of resistors
 - b) Draw the symbols of NPN Transistor & TRIAC.
 - c) Define Rectifier
 - d) State any two Boolean laws
 - e) Write Colour code for the following
 - i) $240\Omega, \pm 20\%$ ii) $1\Omega, \pm 5\%$
 - f) Define Latching current
 - g) Draw circuit diagram of half wave rectifier
 - h) Write 1's complement of the following
 - i. $(100001)_2$ ii. $(110011)_2$
-
- Q.2 08
- a) What are the different types of capacitor? Explain any one in detail.
- 07
- b) Explain construction, working & principle of TRIAC device.
-
- Q.3 07
- a) What is need of rectifier? Explain bridge rectifier with circuit diagram.
- 08
- b) Explain Adjustable voltage regulator using LM317.
-
- Q.4 07
- a) Implement NOT, OR & AND Gate by using NAND gate.
- 08
- b) Perform following conversion.
 - i. $(347)_8 = ()_2 = ()_{16}$
 - ii. $(100001)_2 = ()_{10} = ()_{16}$
-
- Q.5 Write short note on (any three) 15
- a) DE-MORGANS Theorem
 - b) SCR
 - c) Zener diode as voltage regulator
 - d) 1'S complement & 2'S complement
 - e) Voltage regulator IC 78XX & IC 79XX

SUBJECT CODE NO: E-181
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) Examination Nov/Dec 2017
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 question No. 2, 3, 4 and 5.
 - iii. Solve any two question from question No 7, 8, 9 and 10.

Section A

Q.1 Solve any five questions of the following.

10

- a) Find general value of $\log(-i)$
- b) Express $\frac{(2+i)(5-i)}{4+2i}$ in the form of $A + iB$
- c) Find n^{th} derivative of $\sin^3 x$
- d) Obtain the expansion of $\sinh x$
- e) Evaluate $\lim_{\alpha \rightarrow \frac{\pi}{2}} \frac{\log(\alpha - \frac{\pi}{2})}{\tan \alpha}$
- f) Solve $(x^2 - 4xy - 2y^2)dx + (y^2 - 4xy - 2x^2)dy = 0$
- g) Find integrating factor $\frac{dy}{dx} + y \tan x = y^3 \sec x$
- h) Find the locus of Z satisfying $|Z - \sqrt{3}i| = 5$

Q.2 a) If $\cos h(u + iv) = x + iy$ then prove that $\frac{x^2}{\cos h^2 u} + \frac{y^2}{\sin h^2 u} = 1$ and $\frac{x^2}{\cos^2 v} - \frac{y^2}{\sin^2 v} = 1$ 05

b) Find n^{th} derivative of $\tan^{-1}\left(\frac{x}{a}\right)$ 05

c) Solve $y \sin 2x \, dx - (1 + y^2 + \cos^2 x) \, dy = 0$ 05

Q.3 a) Find the region of complex plane satisfying the condition $\left|\frac{z-i}{z+i}\right| \geq 2$ 05

b) Evaluate:- $\lim_{x \rightarrow 0} \frac{e^x + \log\left(\frac{1-x}{e}\right)}{\tan x - x}$ 05

c) Solve $\frac{dy}{dx} + \frac{5y}{x} = x^2$ 05

Q.4 a) Find the expansion of $\sin 5\theta$

05

b) Prove that

05

$$\log \tan\left(\frac{\pi}{4} + x\right) = 2x + \frac{4}{3}x^3 + \dots$$

c) An electromotive force $E = 200 e^{-5t}$ is connected in series with 20Ω resistance and 0.01 farad capacitance find the charge and current at any time t if $q = 0$ at $t = 0$

05

Q.5 a) Find x if $7 \cos hx + 8 \sin hx = 1$

05

b) Test the convergence of the series

05

$$\sum_{n=1}^{\infty} \frac{n^3 + k}{2^n + k}$$

c) Find orthogonal trajectory of $y = (x - k)^2$

05

Section B

Q.6 Solve any five questions.

10

a) Find asymptotes $\frac{a^2}{x^2} - \frac{b^2}{y^2} = 1$

b) Find the symmetry of $r = a(1 - \cos \theta)$

c) The length of the curve $\theta = f(r)$ from $r = r_1$ and $r = r_2$ is-----

d) Find the pole $r = a \sin^3\left(\frac{\theta}{3}\right)$

e) Find $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} =$ if $u = \frac{x^3 + y^3}{y\sqrt{x}}$

f) Find $\frac{\partial(x, y, Z)}{\partial(P, \phi, Z)}$ if $x = p \cos \phi, y = p \sin \phi, Z = Z$

g) Find stationary point of $x^3 + y^3 - 3axy$

h) If $u = x^3 + y^3$ where $x = a \cos t, y = b \sin t$ find $\frac{du}{dt}$

- Q.7 a) Trace the curve $y^2(a - x) = x^2(a + x)$ with full justification 05
- b) If $u = \log(x^3 + y^3 + z^3 - 3xyz)$ then show that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = \frac{-9}{(x+y+z)^2}$ 05
- c) If $u = \frac{2yz}{x}, v = \frac{3zx}{y}, w = \frac{4xy}{z}$ find $\frac{\partial(x,y,z)}{\partial(u,v,w)}$ 05
- Q.8 a) Trace the curve $r = a \cos 2\theta$ with full justification 05
- b) If $\sin u = \frac{x^2 y^2}{x+y}$ show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 3 \tan u$ 05
- c) Find the length of the circumference of the circle $x^2 + y^2 = a^2$ 05
- Q.9 a) Trace the curve $x = a(t + \sin t), y = a(1 + \cos t)$ with full justification 05
- b) If $u = f(x - y, y - z, z + x)$ then prove that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$ 05
- c) Using the Lagrange's method find the minimum and maximum distance from the point (1,2,2) to the sphere $x^2 + y^2 + z^2 = 36$ 05
- Q.10 a) Find the extreme value of $u = x^3 + y^3 - 63(x + y) + 12xy$ 05
- b) Find the length of curve $\theta = \frac{1}{2}\left(r + \frac{1}{r}\right)$ for $r = 1$ & $r = 3$ 05
- c) Find the length of an area of the curve 05
- $x = \log(\sec t + \tan t) - \sin t$
 $y = \cos t$ between $t = 0$ and $t = \pi$

Total No. of Printed Pages:3

SUBJECT CODE NO: E-182
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) (CGPA) Examination Nov/Dec 2017
Engineering Mathematics - I
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

- i. Use of non-programmable calculator is allowed
- ii. Q.No.1 & Q.No.6 are compulsory
- iii. Solve any two question from Q.No.2,3,4,and 5
- iv. Solve any two question from Q.No.7,8,9and 10

Section A

Q.1 Attempt the following(Any five) 10

- a) Define normal form of matrix
- b) State Cayley-Hamilton's theorem.
- c) Show the matrix $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ is orthogonal.
- d) Define Eigen values and Eigen vectors
- e) Define modules and amplitude of complex number.
- f) Find locus Z if $|Z - i| = 4$
- g) State De-Moivre's theorem.
- h) Find general value of $\log(-5)$

Q.2 05

- a) Find ranks of matrix A by reducing it to its normal form $A = \begin{bmatrix} 0 & 1 & 2 & -2 \\ 4 & 0 & 2 & 6 \\ 2 & 1 & 3 & 1 \end{bmatrix}$

b) Find Eigen values and Eigen vector corresponding largest Eigen value of following matrix 05

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

- c) The centre of regular hexagon is at origin and vector is $1 + i$ on Argand's diagram, determine the other vertices. 05

- Q.3 a) Test for consistency and solve if possible the following system of equations 05

$$x + 2y - z = 3, 3x - y + 2z = 1, 2x - 2y + 3z = 2$$
- b) Verify Cayley-Hamilton theorem and find inverse $A = \begin{bmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$ 05
- c) Show that all roots of equation 05
 $(x + 1)^6 + (x - 1)^6 = 0$ are given by $\pm i \cot \frac{2r+1}{12} \pi$ where $r = 0, 1, 2, 3$
- Q.4 a) Examine for linear dependence or linear independence and find relation if dependence the 05
 following set of vectors. $[3, 2, 7], [2, 4, 1], [1, -2, 6]$
- b) Separate real and imaginary parts of $\cos^{-1} \left[\frac{3i}{4} \right]$ 05
- c) Use De-Moivre's theorem to express $\tan 5\theta$ in terms of power of $\tan \theta$ and deduce 05
 $5 \tan^4 \frac{\pi}{10} - 10 \tan^2 \frac{\pi}{10} + 1 = 0$
- Q.5 a) Given the transformation $Y = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 5 \\ 1 & 3 & 3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$ find co-ordinates $[x_1 \ x_2 \ x_3]$ to $(2, 0, 5)$ in y . 05
- b) If $\tan(a + i\beta) = i$, α, β being real, prove that α is indeterminate and β is infinite. 05
- c) Considering principle value, separate $\sqrt{i}^{\sqrt{i}}$ into real and imaginary parts. 05

Section B

- Q.6 Attempt the following (Any five) 10
- a) Find n^{th} order derivative of $y = (x + 1)^m$
- b) Derive series for $\cosh x$
- c) State Cauchy's root test for convergence of a power series
- d) State Maclaurin's theorem and derive series for $\tan x$
- e) Find Jacobian if $u = e^x \sin y, v = x + \log \sin y$
- f) Find stationary value of function $z^z = xy + 1$
- g) If $u = \sin \sqrt{\frac{x-y}{x+y}}$ prove that $x \frac{du}{dx} + y \frac{du}{dy} = 0$
- h) Evaluate $\lim_{x \rightarrow 0} (\cot x)^{\sin x}$

- Q.7
- Find the n^{th} derivative of $\frac{1}{x^2+x+1}$ 05
 - If $u = \log_e \left(\frac{x^4+y^4}{x+y} \right)$ show that $x \frac{du}{dx} + y \frac{du}{dy} = 3$ 05
 - Find $\frac{dy}{dx} = \text{if } y^x + x^y = (x+y)^{(x+y)}$ 05
- Q.8
- Find $\lim_{x \rightarrow 0} (a^x + x)^{\frac{2}{x}}$ 05
 - If $u = \frac{yz}{x}, v = \frac{xz}{y}, w = \frac{xy}{z}$ find $\frac{d(u,v,w)}{d(x,y,z)}$ 05
 - If $u = \frac{e^{x+y+z}}{e^x + e^y + e^z}$ show that $u_x + u_y + u_z = 2u$ 05
- Q.9
- Prove that the $\log \left(\frac{\sin x}{x} \right) = -\frac{1}{6}x^2 - \frac{1}{180}x^4 \dots \dots \dots$ 05
 - Obtain the expansion of $\tan^{-1}x$ in powers of $(x-1)$ 05
 - If $x + y = 2e^\theta \cos \phi$ and $x - y = 2ie^\theta \sin \phi$ show that $\frac{\partial^2 u}{\partial \theta^2} + \frac{\partial^2 u}{\partial \phi^2} = 4xy \frac{\partial^2 u}{\partial x \partial y}$. 05
- Q.10
- Prove that $\sin^{-1}(3x - 4x^3) = 3\left(x + \frac{1}{6}x^3 + \frac{3}{40}x^5 + \dots\right)$ 05
 - Test for convergence or divergence of $\sum \frac{3^n n!}{n^n}$ 05
 - A rectangular box is open at top is to have volume of 32 cu. feet. Find the dimensions of the box requiring least material for its construction. 05

SUBJECT CODE NO: E-195
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(ALL-BRANCHES) Examination Nov/Dec 2017
Engineering Mathematics - III
(OLD)

[Time: Three Hours]

[Max.Marks:80]

- N.B
- Please check whether you have got the right question paper.
- Question number one and six are compulsory.
 - Attempt any two questions from the remaining each section.
 - Figures to the right indicate full marks.
 - Assume suitable data if necessary.

SECTION-A

- Q.1 Solve any five from the following: 10
- Solve $(D^3 - 3D^2 - D + 3)y = 0$
 - Solve $(D^2 - 2D - 1)y = 0$
 - Find the particular integral of $(D^2 + 2D + 1)y = x$
 - Solve $(x^2D^2 + 5xD + 3)y = 0$
 - Set-up the equation of motion of a body of weight 10kg attached to a spring given that 20 kg weight will stretch the spring to 10 cm.
 - Set-up the differential equation of an electrical circuit consists of an inductance L, a resistance of R and capacitance of C with alternating EMF $E \sin \omega t$.
 - If 2% bulbs are known to be defective bulbs, find the profitability that in a lot of 300 bulbs, there will be 2 or 3 defective bulbs using Poisson's distribution.
 - The marks of 1000 students in a university are found to be normally distributed with mean 70 and standard deviation 5. Find the number of students whose marks will be more than 75.

- Q.2
- a) Solve $(D^2 - 4D + 4)y = e^{2x} \sin 2x$ 05
- b) Determine whether the resonance occurs in a system consisting of a weight $32lb$ 05
Attached to a spring with constant $k=4lb/f t$ and external force $16 \sin 2t$ and no damping force exists. Initially $x = \frac{1}{2}, \frac{dx}{dt} = -4$ at $t = 0$.
- c) Calculate the mean deviation from mean of the following data:

x	4-5	6-7	8-9	10-11	12-13	14-15
f	4	10	20	15	8	3

- Q.3
- a) Solve $(D^3 + 8)y = x^4 + 2x + 1$ 05
- b) An EMF of 200 volts is in series with a 10 ohm resistor and one henry inductor and 0.2 05
farad capacitor are connected in series at $t=0$, the charge and the current are zero. Find the current at any time t .
- c) In a normal distribution, 7% of the items are under 35 and 89% are under 63. What are the 05
mean and standard deviation of the distribution?

- Q.4
- a) Solve $(D^2 - 3D + 2)y = \cos(e^{-x})$ by using general method. 05
- b) Along column of length l fixed at one end, at hinged at the other is under the action of axial 05
load P , taking the fixed end as origin, it satisfies the equation

$$\frac{d^2y}{dx^2} + n^2y = \frac{Fn^2}{P}(l - x), \text{ where } n^2 = \frac{P}{EI}$$

And F is the force applied laterally at the hinge to prevent the lateral movement. Show that the deflection curve is

$$y = \frac{F}{P} \left[\frac{\sin nx}{n} - l \cos nx + l - x \right].$$

- c) The first four moments of a distribution about the value 5 of the variable are 2, 20, 40 and 50. Find moments about the mean. 05

- Q.5 a) Solve $(D^2 - 4D + 4)y = e^{2x} \sec^2 x$ by using method of variation of parameter. 05
- b) Solve $x^3 \frac{d^2 y}{dx^2} + 3x^2 \frac{dy}{dx} + xy = \sin(\log x)$ 05
- c) Find the best value of a and b so that $y = a + bx$ fits the given data: 05

x	0	1	2	3	4
y	1	2.9	4.8	6.7	8.6

SECTION-B

- Q.6 Solve any five from the following: 10
- a) Find $\Delta \phi$ if $\phi = r^2 e^{-r}$
- b) Find the unit vector normal to the surface $x^2 y + 2xz = 4$ at the point (2, -2, 3)
- c) Prove that $\frac{\vec{r}}{r^3}$ is sinusoidal.
- d) Evaluate $\int_C y^2 dx - 2x^2 dy$ along the parabola $y=x$ from (0,0) to (2,4)
- e) State Green's theorem.
- f) Find the first approximate root of the equation $x^3 - 3x - 5 = 0$ using Newton-Raphson method.
- g) Find the first approximate solution of the equation $10x + 2y + z = 69, x + 8y + 2z = -3, 2x - y + 20z = 76$ by Gauss Seidal method.
- h) Find the missing term in the following:

x	2	5	7	10
f(x)	18	180	--	1210

- Q.7 a) Find the directional derivative of $\phi = 6x^2 y + 24y^2 z - 8z^2 x$ at the point (1,1,1) in the direction parallel to the line $\frac{x-1}{2} = \frac{y-3}{-2} = \frac{z}{1}$ 05
- b) If $\vec{F} = (2xye^z)i + x^2 e^z j + x^2 y e^z k$, then prove that \vec{F} is conservative, find scalar potential ϕ such that $\vec{F} = \nabla \phi$, also find the work done in moving the particle under this field from (0, 0, 0) to (1, 1, 1). 05
- c) Find the real root of the equation $4(x - \sin x) = 1$ by Newton-Raphson method correct to three decimal places. 05

- Q.8
- a) Prove that $\nabla \cdot \left(\frac{\log r}{r} \vec{r} \right) = \frac{1}{r} (1 + 2 \log r)$ 05
- b) Evaluate by Green's theorem in the plane $\int_C (2x - y^3) dx + xy dy$ where C is the boundary of the annulus region enclosed by the circles $x^2 + y^2 = 1$ and $x^2 + y^2 = 9$ 05
- c) Use Runge-Kutta fourth order method to find $y(1,2)$ if $y(1) = 2$ and $\frac{dy}{dx} = xy$, take $h = 0.1$ 05

- Q.9
- a) Prove that the vector field $\vec{F} = (y^2 \cos x + z^3)i - (2y \sin x - 4)j + (3xz^2 + 2)k$ is irrotational. Find the scalar potential ϕ such that $\vec{F} = \nabla \phi$. 05
- b) Evaluate $\iint_S \vec{F} \cdot \vec{ds}$ where $\vec{F} = 4xi - 2y^2j + z^2k$ and S is the surface bounded by $x^2 + y^2 = 4, z = 0, z = 3$ 05
- c) Solve the equations $5x + 2y + z = 12, x + 4y + 2z = 15, x + 2y + 5z = 20$ by Gauss Seidal method. 05

- Q.10
- a) Verify Stoke's theorem for $\vec{F} = x^2i + xyj$ and C is the boundary of the rectangle $x = 0, y = 0, x = a, y = b$ 05
- b) Find $y'(0)$ and $y''(0)$ from the given table 05

x	0	1	2	3	4	5
y	4	8	15	7	6	2

- c) Solve for y at $x=1.05$ by Euler's modified method, the differential equation $\frac{dy}{dx} = 2 - \frac{y}{x}$, where $y = 2$, when $x = 1$ (take $h = 0.05$). 05

SUBJECT CODE NO: E – 409
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) (CGPA) Examination Nov/Dec 2017
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 question 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. | 10 |
| | <ol style="list-style-type: none"> a) Write the important properties of positive rays. b) Define the term specific rotation. c) Write engineering application of X – rays. d) What is the function of velocity selector? e) Write application of magnetic materials. f) Draw blocks diagram of C.R.O. g) Define Half wave plate h) What is mean be magnetic susceptibility. | |
| Q.2 | <ol style="list-style-type: none"> a) Explain principle, construction, working of Aston's mass spectrograph. b) Describe Bragg's X – ray spectrometer. c) Electron accelerated by a potential of 250 V enter the electric field at an angle of incidence 50° and get refracted through an angle of 30°. Find the potential difference between two fields. | <p>07</p> <p>05</p> <p>03</p> |
| Q.3 | <ol style="list-style-type: none"> a) Obtain an expression for the radius of nth dark and bright ring. b) Explain resolving power of diffraction grating. c) Explain <ol style="list-style-type: none"> i. Photoelasticity ii. Quarter wave plate. | <p>06</p> <p>05</p> <p>04</p> |
| Q.4 | <ol style="list-style-type: none"> a) Write important points of BCS theory. b) Describe Meissener effect. c) Write the properties of <ol style="list-style-type: none"> i. Diamagnetic material ii. Ferromagnetic material | <p>05</p> <p>05</p> <p>05</p> |
| Q.5 | Write a short notes on. | |
| | <ol style="list-style-type: none"> a) Cathode Ray Tube. b) Josephson junction c) Diffraction of X – rays. | <p>05</p> <p>05</p> <p>05</p> |

Section B

Q.6	Attempt any five questions	10
	a) Define Hall Effect.	
	b) Write the physical significance of wave function.	
	c) What is mean by Zeeman Effect?	
	d) Write the properties of Laser.	
	e) Write the application of ultrasonic waves.	
	f) Write the properties of nanoparticles.	
	g) Define:	
	i. Spontaneous emission	
	ii. Population inversion.	
	h) Write the factors affect the architectural acoustics.	
Q.7	a) Define energy gap? Obtain an expression for Fermi level in extrinsic semiconductor.	06
	b) State and explain Zeeman Effect.	05
	c) Derive Schrodinger time dependent wave equation.	04
Q.8	a) Explain the construction and working of He –Ne laser.	06
	b) What is the range of ultra – sonic waves? Explain the production of ultra – sonic waves by magneto striction method.	06
	c) A cinema hall has a volume of $7500m^3$. It is required the have a reverberation time of 1.5sec. What should be the total absorption in the hall?	03
Q.9	a) Explain vapour deposition method.	05
	b) Write the optical properties of nanomaterials.	05
	c) Explain the use of nanotechnology in medical and cosmetics.	05
Q.10	Write a short note on	15
	a) Hall effect	
	b) Explain the important application of CNT's	
	c) Write application of fiber optics.	

Total No. of Printed Pages:2

SUBJECT CODE NO: E-157
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) Examination Nov/Dec 2017
Engineering Physics
(OLD)

[Time: 2:00 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 the remaining questions.
- iii) Figures to the right indicate full marks.

- Q.1 Attempt any five questions from the following. 10
- i) Draw a neat diagram of CRO.
 - ii) What are positive rays? State their important properties.
 - iii) What is Compton effect?
 - iv) Why are Newton's rings circular in nature?
 - v) What is constructive and destructive interference?
 - vi) Define optical activity and specific rotation.
 - vii) Explain Isotope effect in case of superconductors.
 - viii) Write any four applications of x-rays.
- Q.2 a) Describe the construction and working of Aston's mass spectrograph and hence derive the condition of focussing. 07
- b) Describe Bragg's x-ray spectrometer to determine the wavelength of x-rays. 05
- c) Electron accelerated by a potential of 250v enter the electric field at an angle of incidence 50° and get refracted through an angle 30° . Find the potential difference between the two regions. 03

- Q.3 a) Describe the construction and working of Michelson's interferometer. 06
- b) Define the term resolving power and hence obtain an expression for resolving power of diffraction grating. 06
- c) A tube of sugar solution 20cm long is placed between crossed Nicol prisms and illuminated with a light of wavelength 6×10^{-5} cm. If the optical rotation produced is 13° And specific rotation is 66° , determine strength of solution. 03
- Q.4 a) Explain liquid drop model of nucleus. 05
- b) What do you mean by superconductivity? State and explain Meissner effect. 05
- c) Describe the construction and working of G.M counter. 05
- Q.5 a) Write a note on Bainbridge mass spectrograph. 05
- b) Describe Laurent's-Half shade polarimeter to determine specific rotation. 05
- c) Write a note on Betatron. 05

Total No. of Printed Pages:1

SUBJECT CODE NO:- E-158
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) (CGPA) Examination Nov/Dec 2017
Computer Fundamentals - II
(REVISED)

[Time: Two Hours]

[Max.Marks:40]

N.B Please check whether you have got the right question paper.
Question no.1 is compulsory and solve any two Questions from the remaining.

- Q.1 Solve any five questions: 10
- a) Define Strings in C.
 - b) Explain use of strcat().
 - c) Define Structures in C.
 - d) Explain Opening of a File.
 - e) Explain Formatted fprintf() and fscanf().
 - f) Define Open Source Software.
- Q.2 a) Write a program to swap two numbers using function call by reference. 07
- b) Explain the following String Functions: 08
- i. strlen()
 - ii. strcmp()
 - iii. strcpy()
 - iv. gets()
- Q.3 a) Explain Nested Structures with suitable example. 08
- b) Explain Different File Opening Modes in detail. 07
- Q.4 a) What is free software? Explain with four types of freedom for free software. 08
- b) Explain Open Source Standard Requirement for Software. 07
- Q.5 a) Write a Program for Reading and Printing Full name of Student. 05
- b) Explain Union with suitable example. 05
- c) Explain with syntax different functions to read and write data to / from a File. 05

SUBJECT CODE NO: E-289
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) (CGPA) Examination Nov/Dec 2017
Basic Civil Engineering
(REVISED)

[Time: 2 Hours]

[Max.Marks:40]

Please check whether you have got the right question paper.

N.B

1. Question no 1 is compulsory.
2. Attempt any two questions from Q.2 to Q.5.
3. Draw neat sketches whenever necessary.
4. Assume suitable data if necessary.

SECTION A

- Q.1 Answer the following. (any five) 10
- a) Write down the benefits of water shed management.
 - b) Enlist water shed structure.
 - c) Define reduced level.
 - d) Define Closed Traverse.
 - e) Define Screening.
 - f) Define Irrigation.
 - g) Draw neat sketch of earthen dam.
- Q.2 Answer the following. 06
- a) Enlist the classification of road and explain each in detail.
 - b) The following consecutive reading were taken with dumpy level and 4m staff on a continuously sloping ground 1.65, 1.92, 2.5, 1.6, 1.85, 2.15, 2.50, 2.10, 2.68, 2.90. The instrument was shifted after taking 4th and 6th reading. Calculate R.L.S of all the points. If R.L. of B.M. =140.00M. 09
- Q.3 Answer the following. 08
- a) Distinguish between Rigid Pavement and Flexible Pavement.
 - b) Enlist various modes of transportation and explain them in detail. And also give their merits and demerits. 07
- Q.4 Answer the following. 05
- a) Draw the flow diagram of water treatment plant and function of different unit. 05
 - b) Explain in detail Incremental Increase method. 05
 - c) Using Arithmetic Increase method, find the population for the year 1990, 2000, 2010, 2020. 05
- | | | | | |
|------------|------|-------|-------|--------|
| Year | 1940 | 1950 | 1960 | 1970 |
| Population | 9000 | 13000 | 18000 | 25,500 |
- Q.5 Answer the following. 05
- a) Write down the requirement of good drainage system in building. 05
 - b) Necessity of Irrigation and benefits of irrigation. 05
 - c) Differentiate between earthen dam and gravity dam. 05

SUBJECT CODE NO: E-415
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) (CGPA) Examination Nov/Dec 2017
Engineering Chemistry & Environmental Sci.
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

N.B

Please check whether you have got the right question paper.

- 1) Question No.1 and Question No.6 are compulsory.
- 2) Solve any two questions from the remaining questions of each section A and section B.
- 3) Figures to the right indicate full marks.

SECTION A

- | | | |
|-----|---|--------------------|
| Q.1 | Answer the following question (any five) | 10 |
| | <ol style="list-style-type: none">1) Write two differences between natural and synthetic rubber.2) Polythene is soft & flexible, whereas Bakelite is hard, give reason.3) Write composition of cement.4) Define the term adherents.5) What is a abrasives?6) Write advantages of Reverse Osmosis.7) Write advantages of Zeolite process.8) Why is water softened before using in boiler? | |
| Q.2 | <ol style="list-style-type: none">a) Write preparation, properties & applications of synthetic rubber.b) Write the difference between thermo softening & thermosetting plastics.c) Write classification of polymer. |
07
04
04 |
| Q.3 | <ol style="list-style-type: none">a) What is cement? What are the raw material required for manufacturing cement? Describe any one process of cement manufacture?b) Define Abrasives? Give its application.c) Write the different physical factors influencing the adhesive strength. |
07
04
04 |
| Q.4 | <ol style="list-style-type: none">a) Describe with diagram principle, advantages, limitations of Zeolite process of softening of hard water.b) Write two applications of PH-meter & conductometer.c) Write disadvantages of Hard water. |
07
04
04 |
| Q.5 | <ol style="list-style-type: none">a) Describe the method of preparation, properties & applications of PMMA.b) Write the difference between scale & sludge.c) Write short note on purification of water by Electrodialysis method. |
07
04
04 |

SECTION B

Q.6	Answer the following (any five)	10
	1) Define cloud & pour points.	
	2) Write characteristics of gases fuel.	
	3) Write applications of CNG.	
	4) What is composition of atmosphere?	
	5) Write four causes of air pollution.	
	6) Define octane number.	
	7) Write the name of gases responsible for global warming.	
	8) What are the types of coal?	
Q.7	a) Explain in detail different mechanism of lubrication.	07
	b) Write the name of factors affecting on rate of corrosion.	04
	c) Write the difference between galvanizing & tinning.	04
Q.8	a) Define Net Calorific value & gross calorific value? How will you determine it by bomb calorimeters?	07
	b) Explain proximate analysis of coalsample.	04
	c) Write a note on Lithium ion batteries.	04
Q.9	a) What are different sources of water pollution & their effect on Environment?	07
	b) Write short note on, green house effect.	04
	c) What is Ozone depletion? Explain its causes & ill effects.	04
Q.10	a) Write the characteristic of solid fuel & gases fuel.	07
	b) Explain sacrificial anodic protection method controlling corrosion.	04
	c) Write a short note on noise pollution.	04

SUBJECT CODE NO: E-332
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) (CGPA) Examination Nov/Dec 2017
Computer Fundamentals - I
(REVISED)

[Time: Two Hours]

[Max.Marks:40]

- N.B Please check whether you have got the right question paper.
- i. Question No. 1 is compulsory and solve any two questions from the remaining questions.

Q.1 Solve any five.

10

- a) Explain with example any two secondary storage devices
- b) Explain any 4 keywords in C language
- c) Explain use of Printf() & Scanf() functions.
- d) Explain use of Break & Continue statement.
- e) What is Goto statement?
- f) What is Array?

Q.2 a) Explain Arithmetic, Relational, Logical and Conditional Operators in detail?

08

- b) Explain Operator precedence? Determine the hierarchy of operations and stepwise evaluate the expression: $i = 2 * \frac{3}{4} + \frac{4}{4} + 8 - 2 + \frac{5}{8}$ (assume i as int)

07

Q.3 a) Write a program to read a number and find the sum of digits of that number

08

- b) What is a user defined function in C? Explain general form of function with an example

07

Q.4 a) Write a program to read a number and find whether the number is odd or even

07

- b) Write syntax of following & explain in brief.

08

- i. while loop
- ii. for loop
- iii. do while loop
- iv. switch statement

Q.5 a) Write a C program to sort 10 numbers using bubble sort method

08

- b) What is Recursive Function? Explain with example?

07

Total No. of Printed Pages:2

SUBJECT CODE NO: E-331
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) Examination Nov/Dec 2017
Engineering Chemistry & Environmental Sci.
(OLD)

[Time: Two Hours]

[Max.Marks:40]

- N.B
- Please check whether you have got the right question paper.
- Question No. 1 is compulsory
 - Solve any two questions from the remaining questions
 - Figure to the right indicate full marks
 - Use of non-programmable calculator is allowed

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

10

- How regeneration of zeolite done.
- Why hardness due to $\text{Ca}(\text{HCO}_3)_2$ salts are known as temporary hardness?
- What are the types of coal?
- Give composition of petroleum
- Write example of thermo soft plastic & synthetic rubber.
- Write the name of raw materials used to prepare styrene rubber.
- Write disadvantages of Hard water
- Distinguish between solid fuels & liquid fuels.

Q.2 a) Define temporary and permanent hardness of water? How it is determine by EDTA method?

06

b) Write advantages & limitations of Ion exchange process of water softening

05

c) Give the applications of PH meter & conductometer

04

Q.3 a) What is proximate analysis of coal sample? Write its significance

06

b) Determine the gross calorific value of the coal sample from following data.

05

- Weight of coal sample=0.85g
- Water equivalence of calorimeter=440g
- Weight of water in calorimeter=2560g
- Rise of temperature =2.42°C
- Cooling correction =0.052°C
- Fuse wire correction = 10cal

If the coal containing 6% hydrogen calculate gross calorific value

- c) Define
- 1) Octane numbers
 - 2) Cetane numbers
 - 3) Calorific value
 - 4) Net calorific value

04

Q.4 a) Give preparation, properties & applications of PVC

06

b) Define elastomers. Discuss the structure of elastomers

05

c) Define polymers? How they are classified

04

Q.5 a) Define scale & sludge? What are disadvantages of them in boiler

05

b) Define alkalinity? Give its disadvantages.

03

c) Explain addition polymerization with example

04

d) How coal are classified? Mention their uses.

03

Total No. of Printed Pages:1

SUBJECT CODE NO: E-288
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) Examination Nov/Dec 2017
Elements of Civil Engineering
(OLD)

[Time: Two Hours]

[Max.Marks:40]

N.B Please check whether you have got the right question paper.

- i. Q. No.1 is compulsory
- ii. Attempt any two questions from remaining questions.
- iii. Draw neat sketch whenever necessary

- Q.6 Attempt any five 10
- i) Define change point.
 - ii) Define height of instrument.
 - iii) Enlist various instruments for chain surveying.
 - iv) Define whole circle bearing.
 - v) State two benefits of watershed management.
 - vi) Enlist various types of water demand.
 - vii) Define sedimentation.
- Q.7 a) Explain two types of bearing system with diagram. 05
- b) The following readings were taken with 4m leveling staff and leveling instrument on a sloping ground. 10
0.450, 1.950, 3.750, 0.200, 1.700, 3.000, 3.800, 0.250, 1.850, 2.800, 3.900. The first reading taken on the benchmark was 500.00 m. Calculate R.L. of various points by H.I. method.
- Q.8 a) Explain various water treatment units for water treatment plant 08
- b) Differentiate between gravity dam and earthen dam 07
- Q.9 a) Explain various adjustments of dumpy level. 08
- b) State the various objectives of surveying. 07
- Q.10 a) Explain geometrical and incremental increase method in detail. 08
- b) Explain roof top rain water harvesting. 07

SUBJECT CODE NO: E-248
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) (CGPA) Examination Nov/Dec 2017
Basic Electrical Engineering
(REVISED)

[Time: 3 Hours]

[Max.Marks:80]

N.B

Please check whether you have got the right question paper.

- 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 Nickel Cadmium Battery. 06
 - b) Draw the curves for the capacitor voltage, change on capacitor and current in the process of changing. Write their equations. 04
 - c) State and explain thevenin theorem with the help of simple example. 04
- Q.2
- a) Solve the circuit in figure 1 by superposition theorem to find current through 3Ω . 06

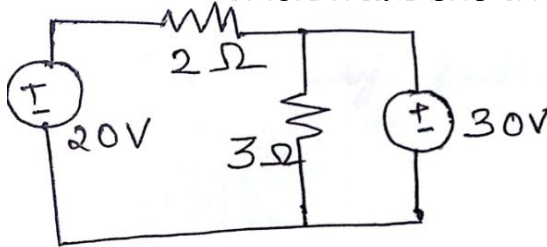


Figure 1

- b) Solve the circuit in figure 2 by loop analysis method. Find I_1 and I_2 . 04

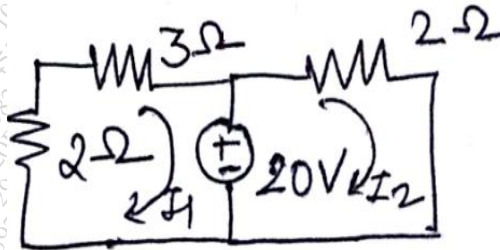
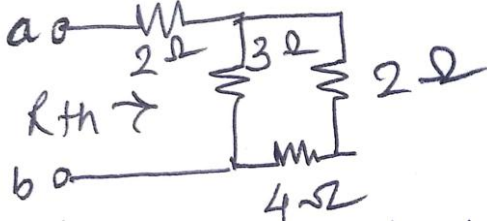


Figure 2

- c) Give the classification of electrical networks. 04
- Q.3
- a) Derive the star to Delta transformation equations. 06
 - b) State the effect of rise in temperature on the resistance of a metal conductor, semiconductor, carbon and rubber. 04
 - c) State and explain maximum power transfer theorem. 04

- Q.4
- Compare magnetic circuit with an electric circuit. 06
 - Explain Hysteresis loss and eddy current loss. 04
 - Derive expression for energy stored in magnetic field. 04

- Q.5 Answer the following (Any six) 12
- Calculate the R_{th} for the circuit across a and b.



- What is an ideal voltage source and practical voltage source.
- List types of batteries or cells.
- Define flux and flux density.
- Define coupling coefficient.
- Define the Fleming's left and right hand rule.
- What is coercive force and retentivity.
- What is the application of maximum power transfer theorem as applied to DC networks.

Section- B

- Q.6
- Define for an alternating current 04
 - Root mean square value
 - Average value
 - Derive an expression for the instantaneous current flowing through a purely inductive circuit when a voltage $V = V_m \sin \omega t$ is applied. 06
 - Define Active power, Reactive power. 04

- Q.7
- A choke takes current of 4A from 230V, 50Hz ac supply and consumes 160 watts power. A capacitor is connected in series to improve the power factor to 0.866 lagging. Calculate the value of capacitor and current drawn from the circuit. 08
 - Explain the phenomenon of series resonance in an ac circuit. 06

- Q.8
- An RLC series circuit with resistance of 10Ω , inductive of 0.2 H and capacitance of $40\mu f$ is supplied with a 100V supply of variable frequency. Find. 06
 - Resonant frequency
 - Power
 - Current at resonance.
 - Write the characteristics of series resonant circuit. 04
 - Draw the admittance and impedance triangle of RL series circuit. 04

- Q.9
- A single phase transformer has 350 primary and 1050 secondary turns. The primary is connected to a 400V, 50Hz supply. If the net cross sectional area of core is 50cm^2 find. 06
 - The maximum value of flux density in the core
 - The voltage induced in the secondary winding.

- b) What are the losses in a transformer?
- c) White the characteristics of ideal transformer.

04

04

Q.10 Answer the following.(Any six)

12

- a) Define resonance
- b) What is importance of electrical safety?
- c) What are different wiring systems?
- d) Write function of wattmeter.
- e) Write function of electronic choke.
- f) What is use of tungsten filament in lamp?
- g) Write applications of wind energy plant.
- h) Give some electrical safety precautions.

Subject Code : 247

FACULTY OF ENGINEERING & TECHNOLOGY

F.E. (All) (Old) Examination

NOVEMBER/DECEMBER, 2017

Elements of Electrical Engineering

Time: Two Hours

Max. Marks: 40

"Please check whether you have got the right the question paper"

- Note:
- Q. No. 1 is compulsory.*
 - Solve any two question from question no 2 to 5*
 - Assume suitable data if required*

Q.1 Solve any Five from the following 2x5=10

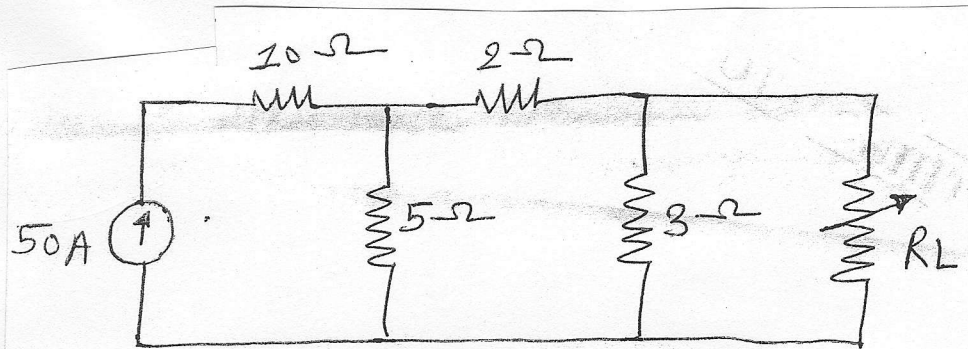
- What is difference between self induced emf and mutually induced emf.
- What are the factors affecting the value of self inductance 'L'?
- State the effect of temperature on plastic and copper.
- Define reluctance.
- Define permeability.
- Define superposition theorem
- Define resistivity and state its expression.
- State 'Maximum Power Transfer' theorem

Q.2 (a) Derive the Discharging equation of the capacitor 05

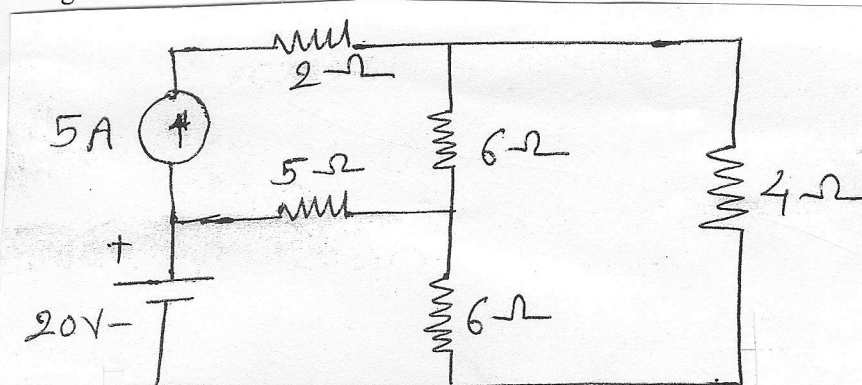
(b) State and explain with neat diagram mutually induced e.m.f. 05

(c) Prove; $\alpha_2 = \frac{\alpha_1}{1 + \alpha_1(t_2 - t_1)}$ 05

Q.3 (a) Determine the 'maximum power delivered to the load in the circuit shown in figure. 05



(b) Use 'superposition theorem' find current in 4Ω resistance of show in figure. 05



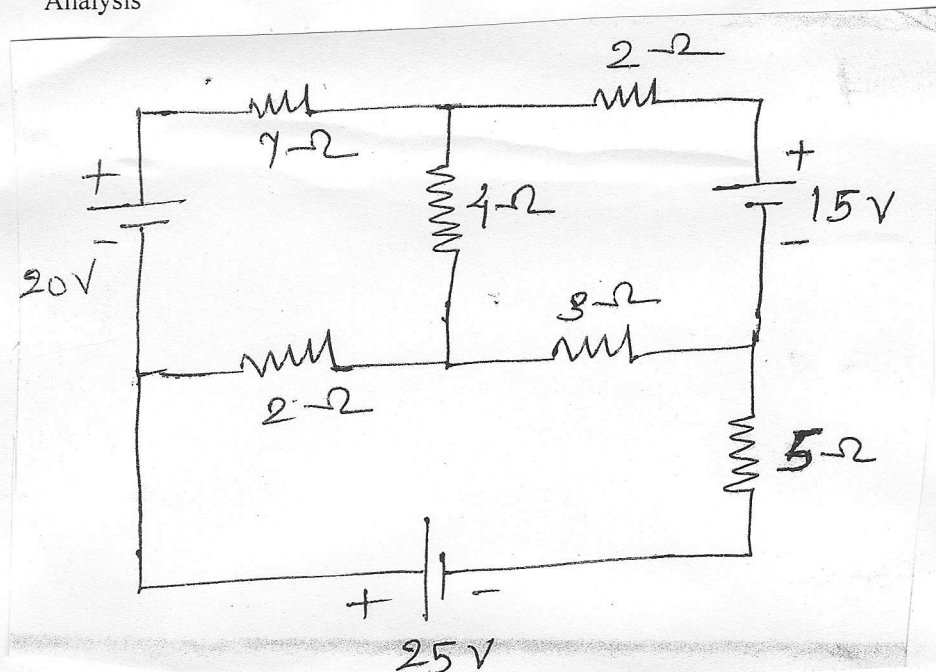
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E - 2017

Subject Code : 247

-2-

- | | | | |
|-----|-----|---|----|
| Q.3 | (c) | State and Explain 'Thevenin theorem' | 05 |
| Q.4 | (a) | Comparison between Electric and Magnetic Circuit | 05 |
| | (b) | Find the current flowing through '4'Ω resistance by using Mesh or Loop Analysis | 05 |



- | | | | |
|-----|-----|--|----|
| | (c) | A coil of 200 turns and resistance of '20'Ω is wound uniformly on an iron ring of mean circumference 50 cm and cross sectional area 4 cm ² . It is connected to 24V d.c. supply ($\mu_r = 800$) | 05 |
| | | Find : | |
| | | i) MMF | |
| | | ii) Magnetising force | |
| | | iii) Total flux | |
| | | iv) Reluctance | |
| Q.5 | (a) | State and Explain Eddy current loss | |
| | (b) | State and explain hysteresis loss | |
| | (c) | State and explain magnetic fringing and magnetic leakage. | |

SUBJECT CODE NO: E-209
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) (CGPA) Examination Nov/Dec 2017
Engineering Graphics
(REVISED)

[Time: 4:00 Hours]

[Max.Marks:80]

N.B 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 right indicate full marks.

Section A

- Q.1 Line PQ 70mm long has its end P is in H.P and 20mm in front of V.P the end B is in the Third quadrant. The Line is inclined at 30^0 to the H.P and at 60^0 to the V.P. Draw its projections and Find Appereut angles and HT,VT. 13
- Q.2 The distance between end projectors of line AB is 70mm and projectors through the traces are 110mm apart. The end point A of a Line is 10mm above H.P. if Top view and Front view of line makes 30^0 to 60^0 with x-y line resp. draw projections of line and determine True inclination with H.P and V.P and Traces. 13
- Q.3 Draw the projections of rhombus having diagonals 150mm and 60mm long, the smaller diagonal of which is parallel to both the principle planes, while the other is inclined at 30^0 to the H.P 13
- Q.4 A hexagonal prism, base 30mm side and axis 70mm long has an edge of the base parallel to the H.P 14 and inclined 45^0 to the V.P its axis makes an angle of 60^0 to the H.P draw its projections. 14
- Q.5 Cone of base 75mm diameter and axis 100mm long, has its base on the H.P. A section plane, parallel to one of the generators and perpendicular to the V.P cuts the cone intersecting the axis at a point 70mm from the base. Draw the sectional top view and true shape of section. 13

Section B

- Q.6 Pictorial view of an object is as shown in fig 6.1 Draw its 13
- i) Front view in the direction of X
 - ii) Top view
 - iii) Side view from right

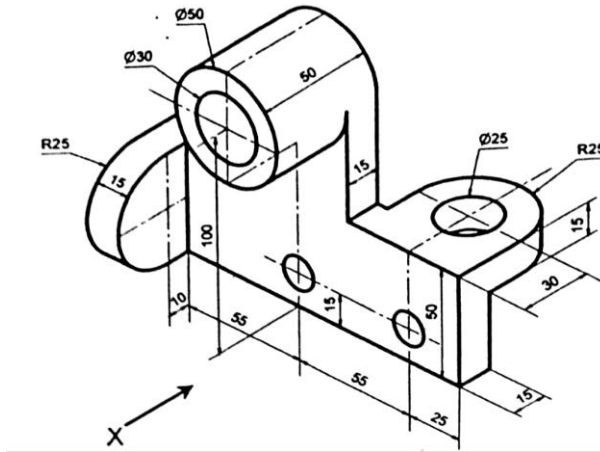


Fig. 6.1

Q.7 Fig 7.1 shows the F.V and S.V of an object draw its isometric view.

13

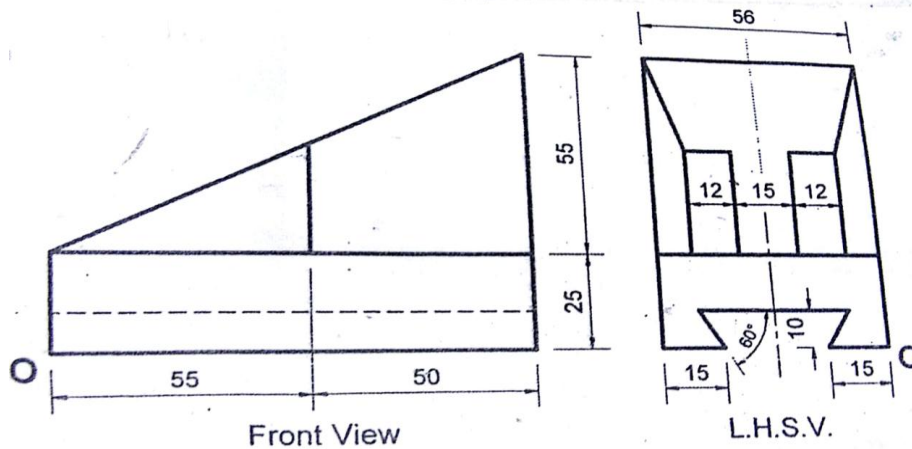


Fig. 7.1

Q.8 Pictorial view of an object is as shown in fig 8.1 Draw its

14

- Sectional F.V along A-A in the direction of X
- Top view.
- Side view from Left

SUBJECT CODE NO: E-208
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) Examination Nov/Dec 2017
Engineering Graphics
(OLD)

[Time: 4:00 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) Figure to right indicate full marks.

Section A

- Q.1 A line PQ 80mm long is having its end L 10mm above H.P. and 15 mm in front of V.P. It is inclined at 45° to H.P. and 35° to V.P. Draw its projections and also locate traces. 13
- Q.2 A line AB 75mm long measures 60mm in top view. The line is inclined at 40° V.P. Its end A is 15 mm above H.P. and 10mm in front of V.P. Draw its Projections and determines inclination with Hx.P. 13
- Q.3 A $30^{\circ} - 60^{\circ}$ set square with longest side 90mm is resting in H.P. on its longest side, 45° inclined to V.P. Draw the projections of the plane when it is 30° inclined to H.P. 13
- Q.4 A square prism with base 40 mm side and axis 70 mm long is resting in H.P. on one of the side of its base, 45° inclined to V.P. Draw the projections of the solid when its axis is 30° inclined to H.P. 13
- Q.5 A right circular cylinder of base diameter 70mm and axis 80mm long is resting in V.P. it is cut by a section plane perpendicular to H.P. and 45° inclined to V.P. passing through the midpoint of the axis. Draw the projections of the solid, sectional front view and true shape of the section. 14

Section B

- Q.6 Draw the development of lateral surface of the cylinder shown in fig1. 13

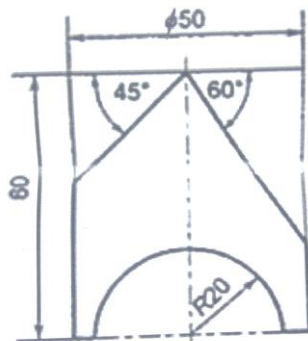


Fig.1

Q.7 Figure 2 shows the pictorial view of the object. Draw the F.V.T.V. and LHSV. 14

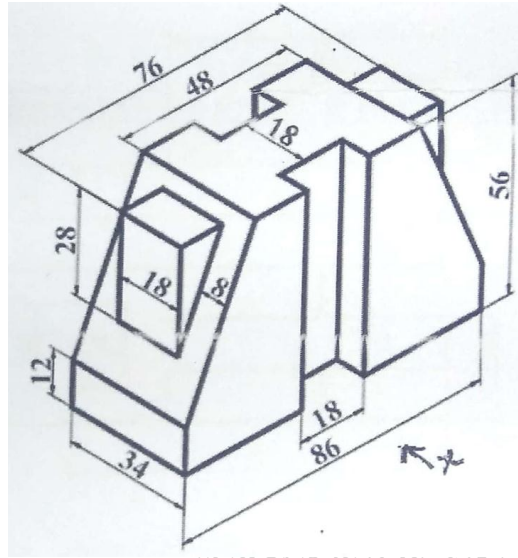
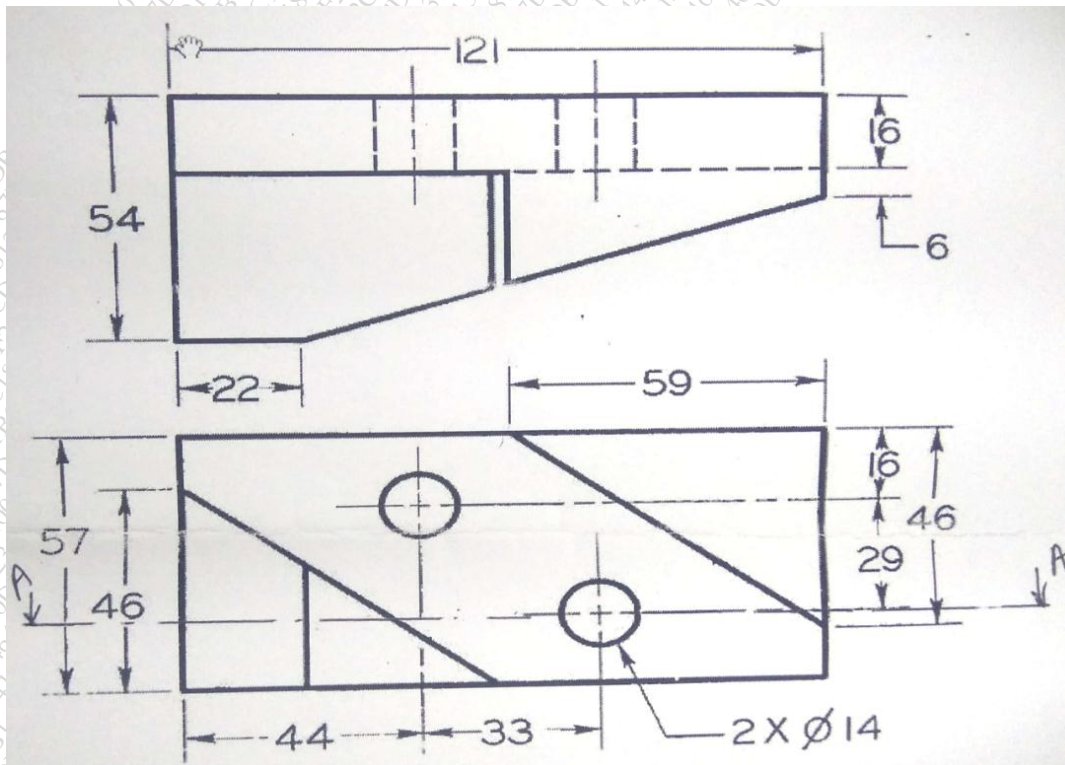


Fig.2

Q.8 Front view and top view of an object are given in figure 3. Draw sectional front view along A-A, redraw top view and add Left hand side view. 13



Q.9 Fig.4 Shows the F.V. and T.V. of an object, draw the isometric view.

13

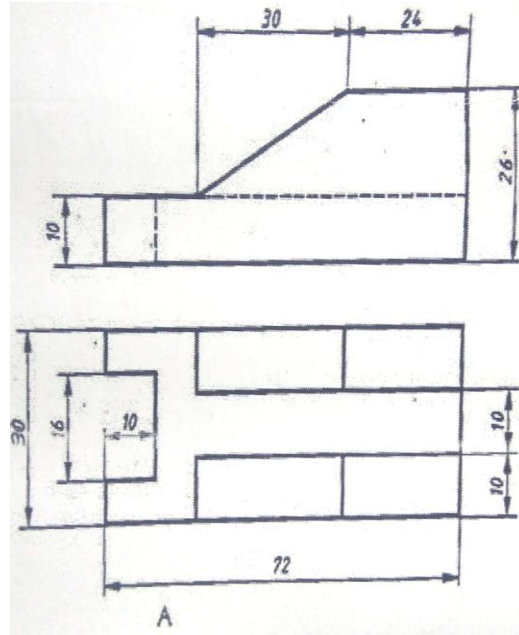


Fig.4

Q.10 Draw the free hand sketches of the following (Any three)

13

- Eye Foundation Bolt.
- Square headed bolt.
- British Association thread
- Acme threads
- Hexagonal Nut and bolt.

SUBJECT CODE NO: E-196
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(ALL) (CGPA) Examination Nov/Dec 2017
Engineering Mathematics - III
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

- N.B
- Please check whether you have got the right question paper.
- Q. No.1 from Section A and Q.No.6 from Section B are compulsory.
 - Solve any two questions from remaining of each section.
 - Figures to the right indicate full marks.
 - Assume suitable data, if necessary.

Section A

- Q.1 Solve any five from the following. 10
- Solve $(D^3 - 3D + 2)y = 0$.
 - Solve $(D^4 - 1)y = 0$
 - Find the particular integral of $(D^2 - D - 6)y = e^{3x} + e^{-2x}$.
 - Find the particular integral of $(D^3 + 2D^2 + 4D + 8)y = x$.
 - The charge Q of a condenser of capacity C is discharged in a circuit of resistance R and self-inductance L. Find the differential equation of the circuit.
 - A column of length 'l' is fixed at one end in completely free at other. The load 'p' is axially applied at the free end, the origin is taken at the fixed end and 'a' is the lateral displacement of the free end, its deflection is given by_____.
 - Find the Fourier transform of
$$f(x) = \begin{cases} 1; & 0 < x < a \\ 0; & \text{otherwise} \end{cases}$$
 - Find the Fourier cosine transform of
$$f(x) = \begin{cases} x; & 0 < x < 1 \\ 0; & x > 1 \end{cases}$$

Q.2 a) Solve $(D^3 + 1)y = \cos(2x - 1)$. 05

b) An emf $e = 200 e^{-5t}$ is applied to a series circuit of 20 ohm resistor and 0.01F capacitor. Find the charge and current at any time assuming that there is no initial charge on capacitor. 05

c) Find the Fourier cosine and sine transform of 05

$$f(x) = \begin{cases} x; & 0 < x < 1 \\ 2 - x; & 1 < x < 2 \\ 0; & x > 2. \end{cases}$$

Q.3 a) Solve $D^2 - 4D + 4)y = 8x^2 e^{2x} \sin 2x$ 05

b) The deflection of a strut of length l with one end ($x = 0$) built in and the other supported and subjected to end thrust P , satisfies the 05

equation $\frac{d^2 y}{dx^2} + a^2 y = \frac{a^2 R}{p} (l - x)$. Prove that the deflection curve is $y = \frac{R}{p} \left(\frac{\sin ax}{a} - l \cos ax + l - x \right)$, where $al = \tan al$.

c) Express the function $f(x) = \begin{cases} 1; & |x| \leq 1 \\ 0; & |x| > 1 \end{cases}$ as a Fourier integral. Hence evaluate 05

$$\int_0^\infty \frac{\sin \lambda \cos \lambda x}{\lambda} d\lambda.$$

Q.4 a) Solve $x^2 \frac{d^3 y}{dx^3} + 3x \frac{d^2 y}{dx^2} + \frac{dy}{dx} = x^2 \log x$. 05

b) A mass 40 kg is attached to a spring for which $k = 640 N/m$ brought to rest. Find the position of the mass at time t if a force equal to $10 \sin 2t$ is applied to it 05

c) Find $f(x)$ if its Fourier sine transform is $\frac{\omega}{\omega^2 + 1}$. 05

Q.5 a) Solve by method of variation of parameter $\frac{d^2 y}{dx^2} - y = \frac{2}{1 + e^x}$ 05

b) Solve without variation of parameter $(D^2 + 3D + 2)y = \cos(e^x)$. 05

c) Solve for $f(x)$ from the integral equation $\int_0^\infty f(x) \cos sx dx = e^{-s}$. 05

Section B

Q.6 Solve any five from the following 10

a) Find the mean from the following data

Mark below	10	20	30	40	50	60	70	80	90	100
No. of Student	5	9	17	29	45	60	70	78	83	85

b) In what direction for the point $(3, 1, -2)$ directional derivative of $\phi = x^2 y^2 z^4$ maximum

- c) State Stoke's theorem
- d) Find $\text{grad } \phi$, if $\phi = 2x^3 y^2 z^4$ at point (1,2,3).
- e) Find the area under the normal curve between $z = -1.23$ to $z = 2.13$.
- f) Show that $\vec{F} = (y^2 + 2xz^2)i + (2xy - z)j + (2x^2z - y + 2z)k$ is irrotational.
- g) The probability of evening college students will graduate is 0.3. Determine the probability that out of five students at least one will graduate.
- h) Coefficient of Quartile Deviation = _____.

Q.7 a) Find the Karl – Pearson Co efficient of skewness for the following data 05

Marks	0-5	5-10	10-15	15-20	20-25	25-30
No. of Students	4	6	8	12	7	2

- b) Prove that $\nabla \cdot \left(r \nabla \frac{1}{r^n} \right) = \frac{n(n-2)}{r^{n+1}}$ 05
- c) Evaluate $\int_c \vec{F} \cdot d\vec{r}$, Where $\vec{F} = zi + xj + yk$ and c is the arc of the curve $\vec{r} = \cos t i + \sin t j + tk$ from $t = 0$ to $t = 2\pi$. 05

Q.8 a) The mean I.Q. of large number of children of age 14 is 100 with standard deviation 16. Assuming the distribution of I.Q. to be normal, find the percentage of children having I.Q. between 70 to 120. 05

- b) Evaluate $\oint_c [x^2 - \cosh y] dx + (y + \sin x) dy$, where c is the rectangle with vertices (0,0), $(\pi, 0)$, $(\pi, 1)$ and $(0,1)$ using Green's theorem. 05
- c) Find coefficients of correlation of the following data 05

X	3.5	5.0	7.0	10	12	15	18
Y	241	318	174	110	147	122	86

- Q.9 a) Verify Stoke's theorem for $\vec{F} = yi + zj + xk$ over the surface $x^2 + y^2 = 1 - z$, $z > 0$ 05
- b) Find the directional derivative of $\phi = x^2y + yz^2$ at $(2, -1, 1)$ in the direction normal to the surface $x^2y + y^2x + yz^2 = 3$ at $(1,1,1)$. 05
- c) According to past record of one day international between India and Pakistan, Indian has won 15 matches and lost 10. If they decide to play a series of 6 matches now, what is the probability of India winning the series. 05

Q.10

- a) Determine the equation of regression line X on Y of the following data

05

X	14	18	23	30	50
Y	900	1200	1600	2100	3800

- b) Prove that $\iint_s \frac{ds}{\sqrt{a^2x^2 + b^2y^2 + c^2z^2}} = \frac{4\pi}{\sqrt{abc}}$,

05

where is the ellipsoid $a^2x^2 + b^2y^2 + c^2z^2 = 1$

- c) Prove that $\vec{F} = (3x + 4y^2z)i + (x^3\sin z - 3y)j - (e^x + 4\cos x^2y)k$ is solenoidal but not irrotational.

05