

SUBJECT CODE NO:- P-1
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) Examination May/June 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 and Q.No.6 are compulsory.
- ii) Solve any two questions from question Nos. 2,3,4 and 5
- iii) Solve any two questions from question No. 7,8,9 and 10

Section A

Q.1 Solve any five of the following. 10

- a) Express $\frac{(1+i)(2+i)}{4+i}$ in the form $A+ iB$
- b) Find the locus represented by $|z + 2-i| = 4$
- c) If $y = \sin 3x - \cos x$ then find y_n
- d) Obtain the expansion of $\log(1+x)$
- e) Evaluate $\lim_{x \rightarrow 0} x \log x$
- f) Solve
$$\left[y \left(1 + \frac{1}{x} \right) + \cos y \right] dx + [x + \log x - x \sin y] dy = 0$$
- g) find Integrating factor of $\cos^2 x \frac{dy}{dx} + y = \tan x$
- h) State ratio test

Q.2 a) If $\sin(\alpha + i\beta) = x + iy$ then prove that 05

i) $\frac{x^2}{\cosh^2 \beta} + \frac{y^2}{\sinh^2 \beta} = 1$ ii) $\frac{x^2}{\sin^2 \alpha} - \frac{y^2}{\cos^2 \alpha} = 1$

b) Find the n^{th} derivative of $y = \cos x \cos 2x \cos 3x$ 05

c) Solve $(x^2 - 4xy - 2y^2)dx + (y^2 - 4xy - 2x^2)dy = 0$ 05

Q.3 a) find the expansion of $\cos \theta$ 05

b) Calculate the value of $\sqrt{10}$, correct up to four decimal place by using Taylor's theorem. 05

c) Solve $\frac{dy}{dx} + y \tan x = y^3 \sec x$ 05

Q.4 a) solve $x^6 - 1 = 0$ using complex number 05

b) Evaluate $\lim_{x \rightarrow 0} (1 + \tan x)^{\cot x}$ 05

c) A coil having resistance of 80 ohms and an inductance of 40 Henry is connected to 400 volts supply. Determine the value of current after $t=2$ seconds. 05

Q.5 a) Simplify $\frac{(\cos 4\theta + i \sin 4\theta)^5 (\cos^3 \theta - i \sin^3 \theta)^2}{(\cos 5\theta - i \sin 5\theta)^{\frac{3}{5}} (\cos 4\theta + i \sin 4\theta)^3}$ 05

by using De-Moivres theorem

b) Test the convergence of series 05

$$\sum \frac{n^2(n+1)^2}{n!}$$

c) Find the orthogonal trajectory of $r=a(1+\cos \theta)$ 05

Section B

Q.6 Solve any five 10

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

b) Find the symmetry of the curve $y=c \cdot \cosh\left(\frac{x}{c}\right)$

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

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

e) find $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$; if $u = \frac{x+y+z}{\sqrt{x}+\sqrt{y}+\sqrt{z}}$

f) If $u=x^2 - y^2, V = 2xy$ then find $\frac{\partial(u,v)}{\partial(x,y)}$

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

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

Q.7 a) Trace the curve $2ay^3 - y^4 - a^2x^2 = 0$ with full justification 05

b) If $u = \log(\tan x + \tan y + \tan z)$ then show that

$$\sin 2x \frac{\partial u}{\partial x} + \sin 2y \frac{\partial u}{\partial y} + \sin 2z \frac{\partial u}{\partial z} = 2$$

05

- Q.8 c) Verify $JJ^* = 1$ for the function $x = e^u \cos v, y = e^u \sin v$ 05
a) Trace the curve $r^2 = a^2 \cos 2\theta$ with full justification 05
- b) If $u = \sin^{-1} \left(\frac{\frac{1}{x^4} - y^{\frac{1}{4}}}{\frac{1}{x^5} + y^{\frac{1}{5}}} \right)$ then 05
find $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$ 05
- Q.9 c) Find the length of the curve $r = a \theta$ in the range $0 < \theta < \alpha$ 05
a) Trace the curve $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$ with full justification 05
b) If $z = f(x, y)$ and $x = e^u + e^{-v}$ 05
and $y = e^{-u} - e^v$, show that

$$\frac{\partial z}{\partial u} - \frac{\partial z}{\partial v} = x \frac{\partial z}{\partial x} - y \frac{\partial z}{\partial y}$$

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 length of an arc 05
 $x = \log[\sec t + \tan t] - \sin t$
 $y = \cos t$ between $t = 0$ and $t = \alpha$
b) Find the maximum and minimum value of $xy + \frac{a^3}{x} + \frac{a^3}{y}$ 05
c) Find the length of an arc of the curve $9y^2 = (x+7)(x+4)^2$ 05

SUBJECT CODE NO:- P-2
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) (CGPA) Examination May/June 2017
Engineering Mathematics - I
(Revised)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

- i) Q.No.1 and Q.No.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.

Section A

- Q.1 Attempt the following (Any five). 10
- Define the rank of matrix.
 - For $A = \begin{pmatrix} 1 & 1 \\ 2 & 3 \end{pmatrix}$, find A^{-1}
 - Check the linear independence and dependence for the vectors (1,2,3), (2,-2,6).
 - Find the characteristics roots of the matrix $\begin{pmatrix} 1 & 0 \\ 0 & 4 \end{pmatrix}$
 - Find the locus of Z if $|z|=3$.
 - If $z = \tan \alpha + i$, find $|z|$ and $\text{amp } z$.
 - If $\cos(\alpha + i\beta) = x + iy$ then prove that $\frac{x^2}{\cos^2 \alpha} - \frac{y^2}{\sin^2 \alpha} = 1$
 - Find the value of $\frac{(\cos \theta + i \sin \theta)^5 (\cos 4\theta - i \sin 4\theta)^4}{(\cos 3\theta + i \sin 3\theta)^{-5} (\cos 2\theta - i \sin 2\theta)^{-5}}$
- Q.2 A 05
- a) Find the rank of matrix by reducing it to normal form $A = \begin{bmatrix} 3 & 4 & 1 & 1 \\ 2 & 4 & 3 & 6 \\ -1 & -2 & 6 & 4 \\ -1 & -1 & 2 & -3 \end{bmatrix}$.
- b) Find the Eigen values and corresponding Eigen vectors for the largest Eigen value of the matrix $\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$ 05
- c) If z_1 & z_2 are any two complex numbers such that $[z_1 + z_2] = [z_1 - z_2]$, prove that the difference of their amplitude is $\frac{\pi}{2}$. 05
- Q.3 05
- a) Find the values of a and b if the following system has i) No solution, ii) Unique Solution, iii) Infinitely many solution $x + y + z = 6$; $x + 2y + 3z = 10$; $x + 2y + az = b$.
- b) State Cayley-Hamilton theorem and verify it for the matrix $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ 05
- c) Show that the continued product of all the values of $(1 + i)^{\frac{1}{5}}$ is $1 + i$ 05
- Q.4 05
- a. Solve $x + y + 3z = 0$; $x + y + z = 0$; $-x + 2z = 0$. 05
- b. If $\cos\left(\frac{\pi}{4} + ia\right) \cos h\left(b + i\frac{\pi}{4}\right) = 1$, a and b are real numbers then show that $2b = \pm \log(2 + \sqrt{3})$ 05
- c. Separate $\sec(x + iy)$ into real and imaginary parts. 05

- Q.5 a) Find the inverse transformation of $x_1=y_1+2y_2+5y_3$; $x_2=-y_2+2y_3$; $x_3=2y_1+4y_2+11y_3$ 05
 b) If $\tan(x+iy)=\sin(u+iv)$ then prove that $\frac{\tan u}{\tanh v} = \frac{\sin 2x}{\sinh 2y}$ 05
 c) Prove that $\cos\left[i\log\left(\frac{a-ib}{a+ib}\right)\right] = \frac{a^2-b^2}{a^2+b^2}$ 05

Section B

- Q.6 Attempt the following (Any five). 10
 a. If $y=\frac{1}{x^2-1}$ then find y_n
 b. Derive the series for $\sinh 2x$.
 c. Evaluate $\lim_{x \rightarrow 0} x^x$.
 d. State the Cauchy's root test.
 e. If $u=x^2+y^2$ where $x=\sin t$, $y=\cos t$ then find $\frac{du}{dt}$.
 f. If $u=\frac{x^3y^3z^3}{x^2+y^2+z^2}$ then find $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}$.
 g. If $x=r \cos \theta$, $y=r \sin \theta$ then find J .
 h. Find the stationary points of the function $f(x,y)=x^2+y^2-2ax$.
- Q.7 a) If $y=e^{3x}\sin 3x \cos x$ then find y_n . 05
 b) If $z=f(x+2y)+\Phi(x-2y)$ then prove that $\frac{\partial^2 z}{\partial y^2}=4\frac{\partial^2 z}{\partial x^2}$ 05
 c) If $x=2(u+v)$, $y=2(u-v)$ and $u=r^2 \cos 2\theta$, $v=r^2 \sin 2\theta$, $v=r^2 \sin 2\theta$ then find $\frac{\partial(x,y)}{\partial(r,\theta)}$ 05
- Q.8 a. Evaluate $\lim_{x \rightarrow 0} \left(\frac{2^x+3^x+4^x}{3}\right)^{\frac{1}{x}}$ 05
 b. Show that $JJ'=1$ if $x=e^v \sec u$, $y=e^v \tan u$. 05
 c. If $u=\sin^{-1}\sqrt{x^2+y^2}$ then find $x^2u_{xx}+2xyu_{xy}+y^2u_{yy}$. 05
- Q.9 a. Expand $\log x$ in powers of $(x-3)$. 05
 b. Prove that $(1+x)^x=1+x^2\frac{x^3}{2}$ 05
 c. If $z=f(u,v)$, $u=x^2+y^2$, $v=2xy$ then show that $x\frac{\partial z}{\partial x}-y\frac{\partial z}{\partial y}=2\sqrt{u^2-v^2}\frac{\partial z}{\partial u}$ 05
- Q.10 a. Expand $\sinh x$ in ascending powers of x . 05
 b. Test the convergences of $\sum_{n=1}^{\infty} \frac{n!}{4^n}$ 05
 c. A rectangular box open at the top is to have volume of 256 cubic feet, determine the dimensions of the box required least. 05

- Q.8 Front view and top view of an object are given in Figure 2.
- Draw sectional front view along the section line A-A
 - Redraw Top View
 - Left Hand Side View

13

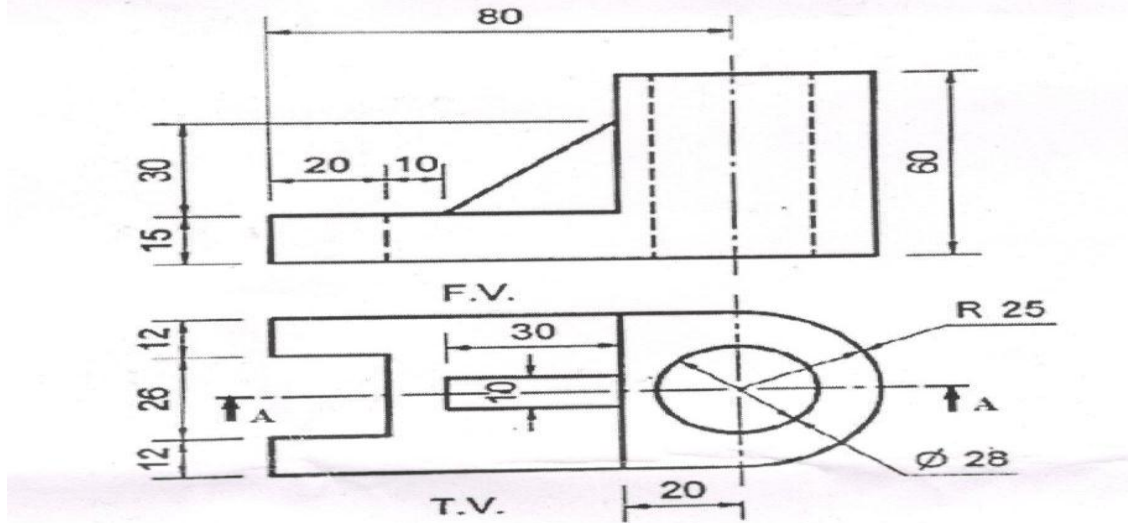


Figure 2

- Q.9 Draw the isometric view of the object whose front view and Top View are given in Figure 3.

13

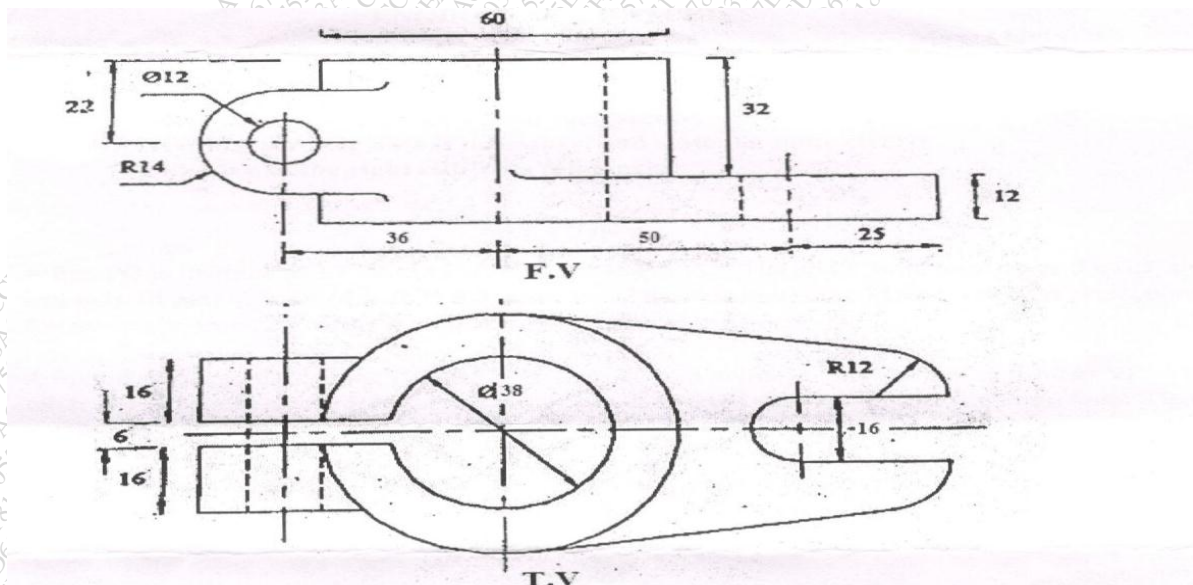


Figure 3

- Q.10 Draw the free-hand sketches of the following (Any Three)
- a) Hexagonal Nut
 - b) square Head Bolt
 - c) Gib Head Kay
 - d) Eye Foundation Bolt
 - e) Sellers Thread

SUBJECT CODE NO:- P-27
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) (CGPA) Examination May/June 2017
Engineering Graphics
(Revised)

[Time: Four Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

- 1) Solve any three questions from each section.
- 2) Assume suitable data if necessary and mention it clearly.
- 3) Figures to right indicate full marks.

Section A

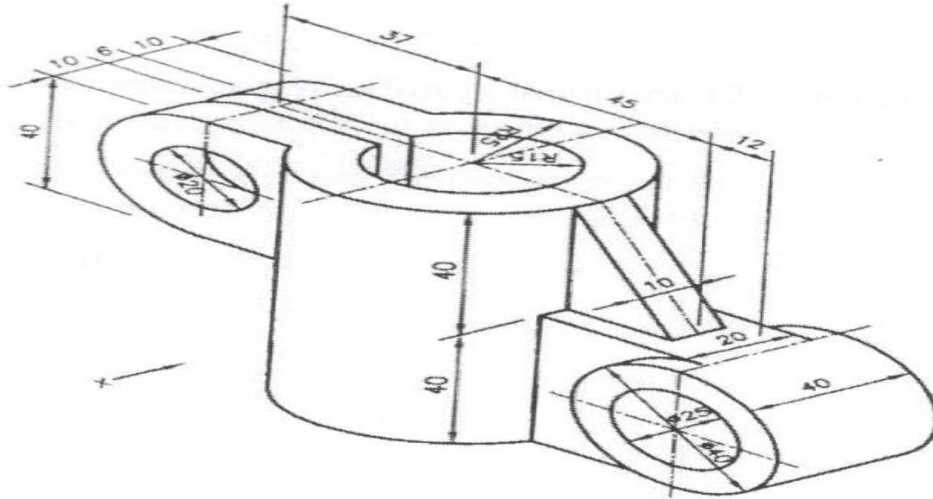
- Q.1 The distance between end projectors of straight line AB is 35 mm. Its end A is 10mm above HP & 20 mm in front of VP. The other end B is 45 mm above of HP & 70 mm in front of VP. Draw the projections of line AB find its inclination with HP & VP. 13
- Q.2 Line MN is inclined at 30° to F.R.P. End M is in H.P. It has its front view length of 70mm and top view length of 60mm. The H.T. is 25 mm behind V.P. Draw the projections of line MN, when the line is in third quadrant. Find true length and true inclination with H.P. Locate V.T. 13
- Q.3 A thin rectangular plate of side 60×30 mm has its shorter side in the VP & inclined at 30° to the H.P. Draw the projection if its front view is square of 30 mm long side. 13
- Q.4 A right circular cone diameter of base circle 70mm and axis 100mm long rests on a point of its rim of base circle on H.P. With the apex 65mm above H.P. The axis of the cone makes an angle of 45° with the V.P. Draw the projection when the apex is towards V.P. 14
- Q.5 A pentagonal pyramid side of base 50mm and axis 90mm, rests with its base on H.P. and one of the edges of the base perpendicular to V.P. it is cut by a section plane inclined at 45° to H.P. and perpendicular to V.P. and cutting the axis at a point 25mm from the apex. Draw its F.V., sectional T.V and true shape of the section. 13

Section B

Q.6 Pictorial view of an object is shown in Fig. 6.1. Draw its:

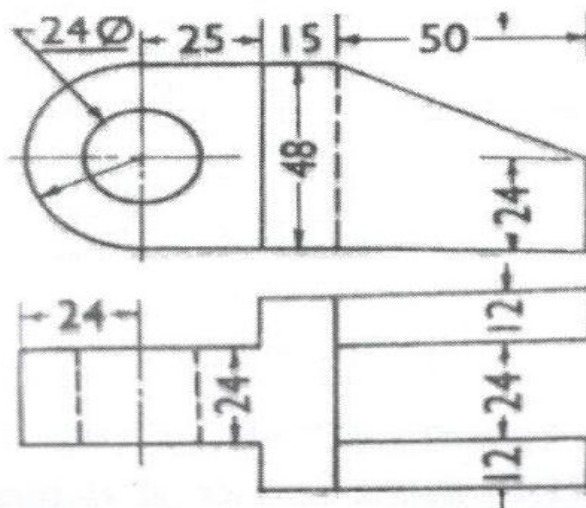
- Front view in the direction 'X'
- Top view and
- Side view from right.

13

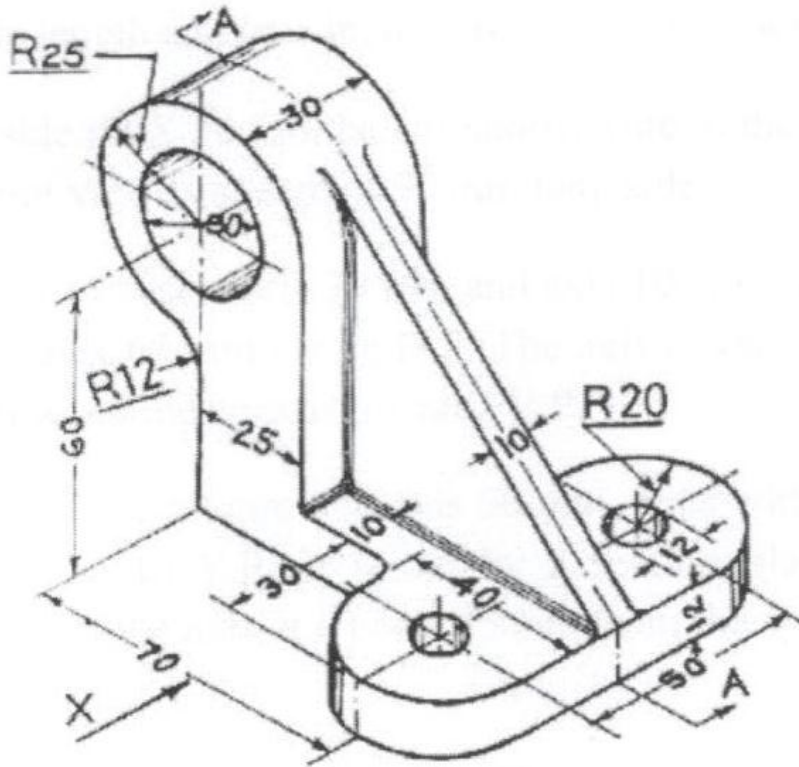


Q.7 Fig 7.1 shows the F.V and T.V of an Object, draw its Isometric view.

13



- Q.8 Pictorial view of an object is shown in fig. 8.1. Draw its:
- Sectional F.V. along A – A in the direction 'X'
 - Top view and
 - Side view from right.



- Q.9 Solve any two of the following
- Construct an ellipse whose eccentricity is $\frac{3}{4}$ and distance of focus directrix is 70mm. Also draw tangent and normal at any point on the curve.
 - A ball thrown up in the air reaches a maximum height of 120 mm and travels a horizontal distance of 80mm. Trace the path of the ball, assuming it to be parabolic.
 - Draw a curve traced out by a point P on the circumference for one complete revolution of the circle. This circle of diameter 45mm rolls along a straight line without slipping.
- Q.10 Draw free hand sketches of the following machine parts (any three)
- British association thread
 - Eye foundation bolt
 - Acme thread
 - Hexagonal nut and bolt
 - Rag foundation bolt

SUBJECT CODE NO:- P-58
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) Examination May/June 2017
Elements of Electrical Engineering
[OLD]

[Time: Two Hours]

[Max.Marks:40]

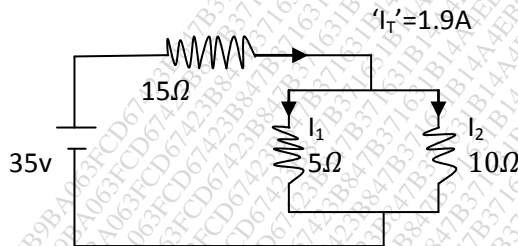
Please check whether you have got the right question paper.

- N.B
- i) Q. No. 1 is compulsory.
 - ii) Solve any two questions from Question no.2 to 5
 - lii) Assume suitable data is if required.

Q.1 Solve any five from the following

10

- a. Derive the expression for the resistance at $t^{\circ}\text{C}$
- b. State the effect of temperature on resistance of pure metals and Alloys
- c. Define resistivity and state its Expression
- d. Define magnetic flux density, MMF
- e. Define permeability and reluctance
- f. Determine the value of " I_1 " & " I_2 "



- g. State the effect of temperature on Insulator and semiconductor
- h. State Maximum power transfer theorem.

Q.2 a. Prove

05

$$\alpha_t = \frac{\alpha_0}{1 + \alpha_0 t}$$

- b. Derive the Discharging equation of the capacitor
- c. State and Explain with neat fig. Mutually induced EMF.

05

05

Q.3 a. Comparison between Electric circuit and magnetic circuit

05

- b. Explain Hysteresis and Eddy Current Loss
- c. Explain Magnetic Leakage and Magnetic Fringing.

05

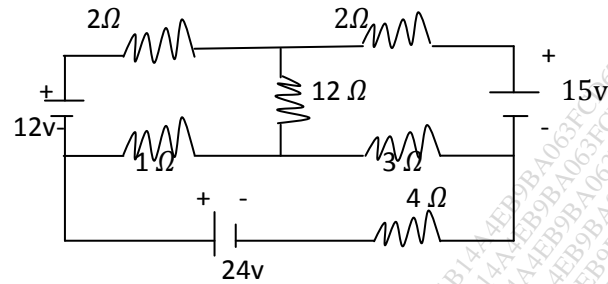
05

Q.4

Find the current flowing through ' 4Ω ' resistance by using Mesh or loop'

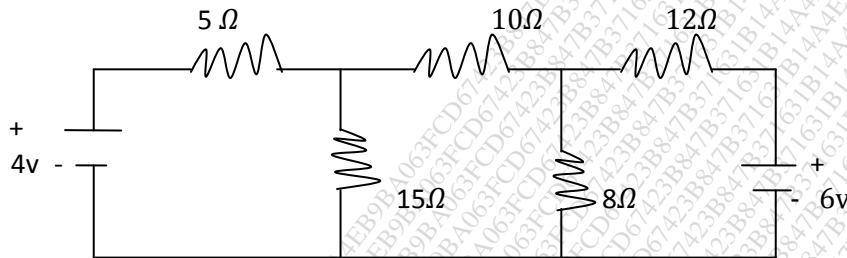
05

A . Analysis



b. Find, by superposition theorem, the current flowing in ' 8Ω ' resistance in the circuit show in fig.

05



c. State and Explain maximum power transfer theorem.

05

Q.5

a. A capacitor having a capacitance of $5\mu\text{F}$ is connected in series with a resistance of $2\text{M}\Omega$ across 200 V

05

d. c. supply. Find

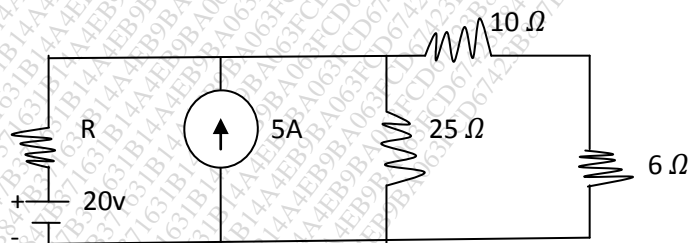
1. The time constant

2. The Initial charging current

3. The time taken by capacitor to raise up to 160V.

b. Find the value of Unknown resistance ' R ' that maximum power will be transferred to load. Hence find maximum power.

05



c. State and explain the Thevenin's Theorem.

05

SUBJECT CODE NO:- P-59
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) (CGPA) Examination May/June 2017
Basic Electrical Engineering
(Revised)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

- i. Q.5 and Q.10 are compulsory.
- ii. Attempt total three questions from each section.
- iii. Make suitable assumption where necessary, stating the same.

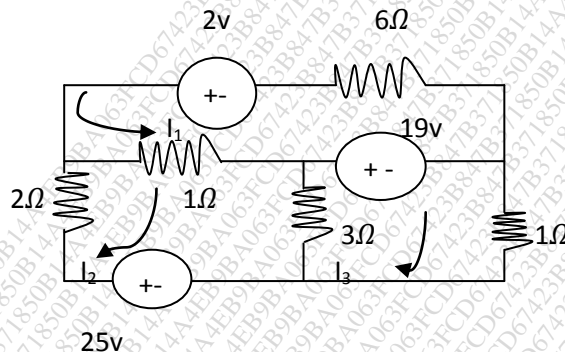
Section A

- Q.1 a. Explain discharging of capacitor through resistance when a fully charged capacitor is disconnected from the supply. Derive equation for discharge current and voltage 06
- b. Explain the terms capacity and efficiency in connection with battery.
- c. Define temperature coefficient of resistance and prove that 04

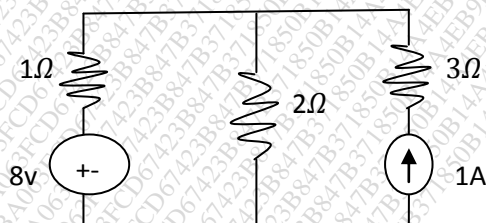
$$\alpha_t = \frac{\alpha_o}{1 + \alpha_o t}$$

Where symbol have their usual meanings 04

- Q.2 A. for the circuit shown below Find I_1 , I_2 , I_3 using loop- current analysis. Hence find I_{AB} . 05

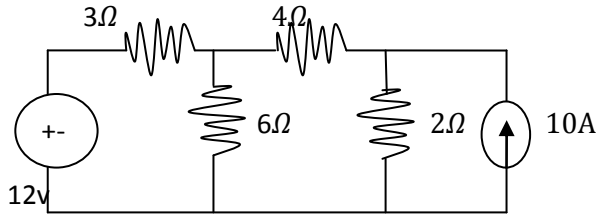


- b. For the network shown below, find current flowing through 2Ω resistor using superposition Theorem. 04



- c. derive an expression for conversion of delta-connected resistance network into an equivalent star connected network. 05

- Q.3 a. State and prove Maximum power transfer Theorem 05
- b. Find the current flowing through 4Ω resistor using Thevenin's Theorem. 05



c. Define the following terms and state their units.

i. MMF ii. Reluctance iii. Flux iv. Permeability.

Q.4 a. Draw, series magnetic circuit with an air gap and explain method of calculation of total ampere-turns required to produce flux. 05

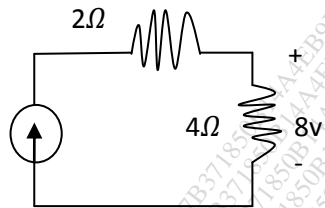
b. Derive the relationship between mutual inductance and self-Inductance of two mutually coupled coils. 05

c. Explain why hysteresis and eddy current losses occur in magnetic materials when changing magnetic flux passes through the material on what factors these losses depend? 04

Q.5 Answer the following (Any six) 12

Show calculation wherever necessary.

a. In the fig. Shown below, find the value of current source and power dissipated in 2Ω resistor.



b. Three equal resistance of 9Ω are connected in delta. Calculate resistances of equivalent star connection.

c. Define leakage flux. What is leakage factor

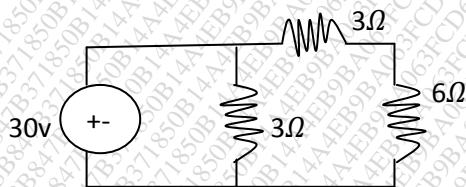
d. What is the effect of temperature on resistance of following

i) Alloys ii) semiconductors.

e. State Thevenin's Theorem.

f. In a three branch parallel circuit 10A current flows in each branch .If one of the branch opens, what is the current in each of other branches.

g. Calculate voltage drop across 6Ω resistor.



h. Define Time constant of RC circuit.

Section-B

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

b. The waveforms of voltage and current of a circuit are given by $v=150 \sin 314t$ and $i=10\sin (314t+\pi/4)$ find the values of circuit components which are connected in series to form the circuit. 05

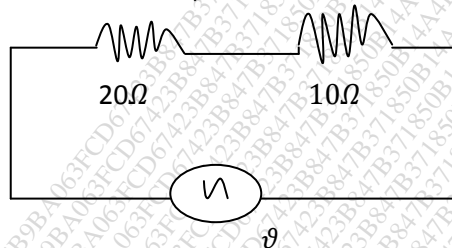
c. A coil having an inductance of 50mH and resistance of 10Ω is connected in series with a 25uf capacitor across a 200v a. c. Supply. Calculate : 05

i. frequency at resonance ii. Current at resonance iii. Quality factor iv. Voltage across capacitor and inductors

Q.7 a. Give comparison between series resonance and parallel resonance. 07

b. A coil of resistance 15Ω and inductance 0.05H is connected in parallel with a non inductive resistor of 20Ω find 07

- i. The current in each branch
 ii. The total current supplied.
 iii. The phase angle of combination when a voltage of 200v at 50 Hz is applied. Draw vector diagram.
- Q.8 a. Explain principal of working of Transformer. 05
 b. A single phase transformer has 400 primary and 1000 secondary turns. The net cross sectional area of core is 60 cm^2 . If the primary is connected to a 50Hz, 500v supply. Determine 05
 i. The peak value of flux density in the core and
 ii. Voltage induced in the secondary winding
 c. Write short note on 'Transformer losses'. 04
- Q.9 a. Explain construction and working of Metal halide lamp 05
 b. Write short note on 'Multimeter' 05
 c. Explain various safety measures adopted in an Electrical installation. 04
- Q.10 Answer the following questions in short. show calculations wherever necessary (Any six) 12
 a. In a particular circuit, the applied voltage leads current by 90° , What type of circuit is this? What is the p. f.
 b. How are transformers classified based on their construction. Give any two points of comparison.
 c. A 115/230v, 1KVA transformer gives secondary voltage of 225v at a particular load. Calculate voltage regulation at the load.
 d. 'If frequency of the applied alternating voltage is doubled, The inductive reactance offered by a pure coil remains constant' correct the statement if necessary and explain.
 e. For the circuit shown below, calculate the value of conductance and susceptance.



- f. The apparent power drawn by a. c. Circuit is 10 KVA and active power is 8KW. What is the reactive power in the circuit? What is the p. f. Of the circuit.
 g. Where is the fuse placed in supply system? Why?
 h. What is a power plant? Name different types of conventional plants.

SUBJECT CODE NO:- P-91
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) Examination May/June 2017
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.No.6 | Attempt any five:- | 10 |
| | i) Define filtration and irrigation. | |
| | ii) Define geodetic surveying and sedimentation. | |
| | iii) Draw labeled diagram of soak Pit. | |
| | iv) Define screening and watershed. | |
| | v) Enlist different methods of population precasting. | |
| | vi) Write formula for Arithmetic linear method. | |
| | vii) Write down benefits of watershed management. | |
| Q.No.7 | a) Explain whole circle bearing and reduced bearing. | 05 |
| | b) The following consecutive readings were taken with a dumpy level & 4m. Leveling staff on a continuously sloping ground.
0.755, 1.15, 1.95, 2.955, 3.250, 3.555, 3.925, 3.995, 3.965, 3.98, 3.995. First reading was taken on a B.M of R.L =100.00 m. Calculate R.L's of various points by H.I method. | 10 |
| Q.No.8 | a) Write down temporary adjustment of dumpy level. | 05 |
| | b) State the objectives of surveying. | 05 |
| | c) Explain the working of prismatic compass. | 05 |
| Q.No9 | a) Explain sedimentation with coagulation with neat sketches. | 05 |
| | b) Explain rain water harvesting with neat sketch. | 05 |
| | c) State the benefits of irrigation. | 05 |

SUBJECT CODE NO:- P-92
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) (CGPA) Examination May/June 2017
Basic Civil Engineering
(Revised)

[Time: Two Hours]

[Max.Marks:40]

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 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 FSI and Carpet area.
 - ii) Enlist the properties of cement.
 - iii) What are the loads coming on the structures?
 - iv) What are the objectives of surveying?
 - v) Define Fore bearing and back bearing.
 - vi) What is Domestic Water demand.
 - vii) Enlist the population forecasting methods.
 - viii) What is necessity of Irrigation.
- Q.2 a) What are the points to be considered for selection of site for residential building. 07
- b) Explain the technical terms used in stair along with a neat sketch. 08
- Q.3 a) Define foundation and explain in detail functions of foundation. 07
- b) Draw a neat labelled sketch of c/s of road in embankment. 08
- Q.4 a) Give Comparison between WCB and RB system along with neat sketch. 05
- b) The following consecutive readings were taken with a dumpy level and 4m leveling staff on a continuously sloping ground. 10
- 1.625, 1.820, 1.995, 2.005, 1.720, 1.980, 2.150, 2.320, 2.455, 2.500
- The instrument was shifted after taking 5th and 7th reading. Calculate Reduced levels of all points. If RL of BM is 131.700m. Use H.I method. Give Arithmetical Check.
- Q.5 a) Find the population of a city after One, two and three decades from the last known decade by Geometric increase method. Refer data from table.1 07
- b) Explain roof top rainwater harvesting along with neat sketch. 08

Year	1950	1960	1970	1980	1990
Population	26000	29000	35000	43000	48000

Table:1 [Q.No.5a)]

SUBJECT CODE NO:- P-126
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) Examination May/June 2017
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 the 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) What is the action of NaCl in regeneration of zeolite? | |
| | b) What are salts responsible for temporary and permanent hardness? | |
| | c) What are the impurities observed in coal? | |
| | d) Give the composition of Petroleum? | |
| | e) Give the name of monomer and polymer of natural rubber along with its chemical structure. | |
| | f) What are the raw materials used to prepare styrene rubber? | |
| | g) Why hardness is expressed in terms of equivalent amount of calcium carbonate? | |
| | h) Distinguish between liquid fuels and gaseous fuels. | |
| Q.2 | a) Define hardness of water. How hardness of water can be determined by EDTA method? | 06 |
| | b) Explain Ion Exchange Process of water softening | 05 |
| | c) Give the applications of conductometer | 04 |
| Q.3 | a) What is ultimate analysis? How carbon and hydrogen can be estimated? Give their significance in the coal | 06 |
| | b) 0.72 gm of fuel containing 80% carbon when burnt in a Bomb Calorimeter, increased the temperature of water from 27.3°C to 29.1°C. If the calorimeter contains 250 gm of water and its water equivalent is 150 gm. Calculate the HCV of fuel. | 05 |
| | c) Define the terms i) Knocking ii) Octane number iii) Cetane number iv) calorific value | 04 |
| Q.4 | a) Give the preparation, properties and applications of PMMA | 06 |
| | b) Discuss the vulcanization of rubber | 05 |
| | c) Define elastomers. Discuss the structures of elastomer | 04 |
| Q.5 | a) What are the problems during steam generation in boiler ? Explain how they can be minimized? | 05 |
| | b) Define alkalinity? Give its disadvantages. | 04 |
| | c) Distinguish between addition and condensation polymerization. | 03 |
| | d) Give the classification of coal ? Mention the uses of all coals. | 03 |

SUBJECT CODE NO:- P-127
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) (CGPA) Examination May/June 2017
Computer Fundamentals - I
(Revised)

[Time: Two Hours]

[Max.Marks:40]

Please check whether you have got the right question paper.

N.B Question no.1 is compulsory and solve any two Questions from the remaining.

- | | | |
|------|---|----|
| Q.1 | i) What is an array? | 02 |
| | ii) Define Secondary storage device. | 02 |
| | iii) What is a compiler? | 02 |
| | iv) Write syntax of for loop with example. | 02 |
| | v) Explain any 4 keywords in C Language. | 02 |
| Q.2. | a) What is a programming Language? Explain different types of programming Languages | 05 |
| | b) Explain C tokens with appropriate examples | 05 |
| | c) State errors, if any in the following and write correct statements | 05 |
| | i) Scanf ("% d", number); | |
| | ii) Scanf ("%f", & total); | |
| | iii) printf ("How is the paper" \n); | |
| | iv) printf ("Smart City"); | |
| | v) Scanf ("%C, & name); | |
| Q.3 | a) Write a C Program to read a number and check whether it is prime number or not | 08 |
| | b) What is a user defined function in C? Explain general form of function with an example. | 07 |
| Q.4 | a) Explain the syntax of while loop with suitable example | 05 |
| | b) Write a C program to read a number and check whether it is positive or negative | 05 |
| | c) What is the output of the following | 05 |
| | <pre># include <stdio.h> main() {int x; for (x=1; x<=7; x++) { if (x ==3) break; printf ("%d", x); } }</pre> | |
| Q.5 | a) What is a two dimensional array? Explain how to take input and display the 2-D array. | 07 |
| | b) Write a C program to sort 10 numbers using bubble sort method. | 08 |

SUBJECT CODE NO:- P-186
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) (CGPA) Examination May/June 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 from the following. | 10 |
| | <ol style="list-style-type: none"> a) State Beth's law. Write its formula. b) What is velocity selector? Write its function? c) What is Compton Effect? d) Explain diffraction of x-Rays. e) What are constructive and destructive interference? f) Define the terms <ol style="list-style-type: none"> i) Optical activity ii) Specific rotation g) What is isotope effect? h) Write any four applications of magnetic materials. | |
| Q.2 | <ol style="list-style-type: none"> a) Discuss Thomson's parabolic method. to determine q'/m' of positive rays, where q' and m' are charge and mass of positive rays respectively. b) State and explain Bragg's Law c) The spacing between the principal planes of NaCl crystal is 2.82 \AA. What is the wave length of x-rays, when the first order Bragg's reflection is observed at an angle of 10° ? | <p>07</p> <p>05</p> <p>03</p> |
| Q.3 | <ol style="list-style-type: none"> a) Obtain an expression for diameter of n^{th} dark and bright ring b) Explain theory of plane transmission grating c) Explain i) Quarter wave plate ii) half wave plate | <p>06</p> <p>05</p> <p>04</p> |
| Q.4 | <ol style="list-style-type: none"> a) Give the salient points of BCS theory b) State and explain Meissner effect. c) What are parametric materials? Explain the important properties of parametric materials. | <p>05</p> <p>05</p> <p>05</p> |
| Q.5 | Write a short notes on | |
| | <ol style="list-style-type: none"> a) Bain bridge mass spectrograph. b) Michelson's interferometer. c) Hysteresis Loop | <p>05</p> <p>05</p> <p>05</p> |

Section B

Q.6	Attempt any five question from the following	10
	<ul style="list-style-type: none"> a) What is hall effect & write true formula for hall voltage. b) State Heisen berg's uncertainty principle. c) Distinguish between spontaneous and stimulated emission d) Define i) acceptance angle, ii) Numerical Aperture. e) Define absorption co-efficient. Write Sabine's formula. f) What are the properties of ultra-sonic waves g) What is CNT? h) Explain the use of Nano particles in space and defence. 	
Q.7	a) What is Fermi energy? Obtain an expression for Fermi level in intrinsic semiconductor.	06
	b) State and explain Raman effect	05
	c) Derive Schrodinger time Independent wave equation	04
Q.8	a) Explain the construction and working of Ruby Laser. Write its disadvantages.	06
	b) What are ultra-sonic waves? Explain the production of ultra-sonic waves by magnetostriction method	06
	c) A cinema hall of volume 2500 m^3 and have a reverberation time 2sec. If the absorbing surface in the hall is 1660 m^2 . Calculate the absorption co-efficient.	03
Q.9	a) Explain the sol-gel method for synthesis of nanoparticles.	05
	b) Explain the different properties of C N T	05
	c) Explain the use of nanotechnology in textile and cosmetics	05
Q.10	Write a short note on	15
	a) <u>Fermi-dirac distribution function</u>	
	b) Write a short note on <u>3-level and 4-level Pumping schemes</u>	
	c) Explain the important applications of CNT'S	

SUBJECT CODE NO:- P-195
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) (CGPA) Examination May/June 2017
Engineering Chemistry & Environmental Sci.
(Revised)

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

Please check whether you have got the right question paper.

- N.B
- i) Q.No.1 and Q.No.6 are compulsory.
 - ii) solve any two questions from the remaining questions in each section
 - iii) Figure to right indicate full marks

Section A

- | | | |
|-----|---|--|
| Q.1 | Answer the following question (any five) | 10 |
| | <ol style="list-style-type: none"> 1) Why does natural rubber need compounding? 2) PVC is soft and flexible ,whereas Bakelite is hard and brittle. Give reason. 3) What is resins? 4) Arrange norbide, carborundum, corundum, garnet in increasing order of hardness? 5) What will happen if gypsum is not added during grinding of clinkers? 6) Define the terms adherents? 7) What happens when temporary hard water is boiled (give equations) 8) What is alkalinity? 9) List the limitations of zeolite process. | |
| Q.2 | <ol style="list-style-type: none"> a) Write preparation ,properties and applications of Bakelite. b) Write a note on compounding of rubber c) Explain the effect of structure on properties of a polymer (any two) | 07
04
04 |
| Q.3 | <ol style="list-style-type: none"> a) What are various physical and chemical factors influencing the adhesive strength? b) What is cement? What are the constituents of cement? c) What are abrasives? give its applications | 07
04
04 |
| Q.4 | <ol style="list-style-type: none"> a) Outline the cause of hardness. A water sample on analysis give the following data
 $MgCl_2$ ----81ppm
 $MgSO_4$ ----60ppm
 $Mg(HCO_3)_2$ ---103ppm
 $Ca(HCO_3)_2$ -----92ppm
 $CaSO_4$ ---102ppm
 SiO_2 --- 40ppm
 H_2SO_4 ---120 ppm
 Calculate temporary, permanent and total hardness & above water sample b) Discuss caustic Embrittlement c) Give the application of conductometer. | 07

04
04 |
| Q.5 | <ol style="list-style-type: none"> a) What is vulcanisation of rubber? Why natural rubber need vulcanization? How is it carried out? b) Explain classification of cement c) Write a short not on R.O | 07
04
04 |

Section -B

Q.6	Answer the following (any five)	10
	1) Small anodic area results in intense corrosion. Give reason.	
	2) Define viscosity and viscosity index	
	3) Give any four characteristics of good lubricant	
	4) Write down classification of coal by rank	
	5) How does fuel cell differ from battery?	
	6) Write down cell reactions take place in acid –storage cell during discharging.	
	7) What are the gases responsible for green house effect?	
	8) Name any four important causes of pollution	
	9) Give the composition of atmosphere	
Q.7	a) Discuss the various factors affecting rate of corrosion	07
	b) Give an accounts of galvanizing	04
	c) Write a technical note on selection of Lubricants	04
Q.8	a) Define calorific value and ignition temp. How calorific value of solid flue determined by Bomb calorimeter	07
	b) Write a brief note on CNG	04
	c) What are the factors affecting on conductivity of electrolytes	04
Q.9	a) What are the different pollutants air and their effect on environment	07
	b) Give an account of Acid rain	04
	c) What is Ozone depletion? Explain its causes and ill effects	04
Q.10	a) How proximate analysis of coal is carried out in laboratory? Give its significance.	07
	b) Explain sacrificial anodic protection method controlling corrosion	04
	c) Write a note on soil pollution.	04

SUBJECT CODE NO:- P-208
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) Examination May/June 2017
Engineering Mathematics-II
[OLD]

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

- i) Q.No.1 and Q.No.6 are compulsory.
- ii) Attempt any two questions from the remaining 4 questions in each section
- iii) figures to the right indicate full marks
- iv) Assume suitable data if necessary.

Section A

- Q.1 Attempt any five of the following 10
- 1) Evaluate : $\int_0^{\pi} \sin^6 \theta \cos^4 \theta d\theta$
 - 2) Define Gamma function
 - 3) The surface area of the solid formed the revolution of the curve $X=g(y)$ about y-axis from $y=c$ & $y=d$
 - 4) The mean value of the function $y=x$ from $x=0$ to $x=1$
 - 5) Change to polar co-ordinate
- $$\int_0^a \int_0^{\sqrt{a^2-x^2}} f(x,y) dx dy$$
- 6) Evaluate : $\int_0^1 \int_0^{1-x} y dx dy$
- 7) Evaluate : $\int_0^1 t^{3/2} (1-t)^{-1/2} dt$
- 8) Evaluate : $\int_0^3 \int_0^1 \int_0^2 dx \cdot dy \cdot dz$
- Q.2 a) Evaluate : $\int_0^1 \frac{x^7}{\sqrt{1-x^4}} dx$ 05
- b) Evaluate : $\int_0^{\frac{b}{\sqrt{3}}} \int_0^{\sqrt{x^2+b^2}} \frac{x}{x^2+y^2+b^2} dx dy$ 05
- c) Find the volume bounded by the cylinder $x^2 + y^2 = 4$ and the plane $y+z=4$ and $z=0$ 05
- Q.3 a) Evaluate : $\int_0^{\infty} y^z e^{-h^2 y^2} dy$ 05
- b) Change the order of integration by showing the region of integration
- $$\int_0^1 \int_{x^2}^{\sqrt{2-x^2}} f(x,y) dx dy$$
- c) Find the area bounded by the parabola $y^2 = 4x$ & line $2x - y - 4 = 0$ 05
- Q.4 a) Show that : $\int_0^{\infty} \frac{x^{\frac{n}{2}-1}}{(1+x)^n} dx = \frac{1}{2} \beta\left(\frac{n}{2}, \frac{n}{2}\right)$ 05
- b) Change to polar co-ordinate and evaluate $\iint y^2 dx dy$ 05
- Over the area which lies outside the circle $x^2 + y^2 - ax = 0$ but inside the circle $x^2 + y^2 - 2ax = 0$
- c) Find the volume of the solid formed by revolution of the loop of the curve 05
- $$x = t^2, y = t - \frac{t^3}{3} \text{ about x-axis}$$

Q.5

- a) Prove that : $\beta(m, n) = \int_0^\infty \frac{t^{m-1}}{(1+t)^{m+n}} dt$ 05
- b) Evaluate : $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} xyz \, dx \, dy \, dz$ 05
- c) Find RMS value of the expression (a sinpt + b cospt) in the range (0, 2 π) 05

Section B

Q.6

Attempt any five of the following

- a) Define Fourier series for function f(x) in the interval (c, c+2L)
- b) If f(x) = πx ; $x \in (0, 2)$, then find Fourier coefficient a_0
- c) Define half range Fourier sine series of f(x) in (0, L)
- d) Check whether following function even or odd

$$f(x) = -x; -\pi < x < 0 \\ = x; 0 < x < \pi$$

- e) Find the rank of matrix A

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 8 & 12 \\ -1 & 7 & 3 \end{bmatrix}$$

- f) The system of equation

$$2x + 3y = 0 \\ ax + y = 0 ; \text{ has nontrivial solution if and only if } a = \text{---}$$

- g) Check the following vectors are linearly dependent or independent

$$x_1 = (1, 0, 0), x_2 = (0, 0, 0), x_3 = (3, 2, 1)$$

- h) Find the characteristics root of the matrix A

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

Q.7

- a) Find the Fourier series to represent $f(x) = \pi - x$ for $x \in (0, 2\pi)$ 05
- b) Find the rank of matrix 05

$$\begin{bmatrix} 3 & -2 & 0 & -1 \\ 0 & 2 & 2 & 7 \\ 1 & -2 & -3 & 2 \\ 0 & 1 & 2 & 1 \end{bmatrix}$$

- c) Discuss the consistency of the system of equation & solve if possible 05

$$4x - 2y + 6z = 8$$

$$x + y - 3z = -1$$

$$15x - 3y + 9z = 21$$

Q.8

- a) Find the half-range cosine series for the function 05

$$f(x) = 2x - 1; \quad 0 < x < 1$$

- b) Find eigen value and eigen vector corresponding to the highest eigen value of the matrix A 05

$$A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$$

- c) Find the Fourier series of sin h(ax) over (- π , π) 05

Q.9

- a) Using Cayley – Hamilton theorem, find the inverse of a matrix A 05

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

2017

- b) Find the Fourier series of
 $f(x) = x; \quad 0 < x < \pi$
 $= 2\pi - x; \quad \pi < x < 2\pi$
- c) Solve the equation

05

$$\begin{aligned} x + 3y + 2z &= 0 \\ 2x - y + 3z &= 0 \\ 3x - 5y + 4z &= 0 \\ x + 17y + 4z &= 0 \end{aligned}$$

05

Q.10

- a) Find Fourier series if
 $f(x) = x; \quad -1 < x < 0$
 $= x + 2; \quad 0 < x < 1$
- b) Find Fourier sine series of
 $f(x) = x; \quad 0 < x < 4$
 $= 8 - x; \quad 4 < x < 8$
- c) Find the inverse transformation of

05

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

05

05

SUBJECT CODE NO:- P-209
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) (CGPA) Examination May/June 2017
Engineering Mathematics-II
(Revised)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

- i. Questions 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) Reduce $\frac{dy}{dx} + \frac{2y}{x} = y^2 x^2$ to linear differential equation.
 - b) Find the integrating factor of differential equation $(1 + x^2) \frac{dy}{dx} + 2xy = 4x^2$.
 - c) If $f(x)$ is an even function defined in the interval $(-L, L)$ then write Fourier series and Fourier coefficient for $f(x)$.
 - d) If $f(x) = \left(\frac{\pi-x}{2}\right)^2$; $x \in (0, 2\pi)$ then find value of Fourier coefficient a_0 .
 - e) Verify whether the function $f(x) = \begin{cases} \frac{1}{2} + x; & -\frac{1}{2} < x < 0 \\ \frac{1}{2} - x; & 0 < x < \frac{1}{2} \end{cases}$ is an even or odd function.
 - f) Find the equation of asymptote to the curve $y^2(x + a) = x^2(3a - x)$.
 - g) Determine the points where the curve $r = a(1 - \cos\theta)$ meets the initial line.
 - h) Find the length of an arc curve $y = f(x)$ from $x = a$ to $x = b$.
- Q.2 05
- a) Solve $\frac{dy}{dx} = \frac{\tan y - 2xy - y}{x^2 - x \tan^2 y + \sec^2 y}$.
 - b) Find the Fourier series of the function $f(x) = \begin{cases} x; & 0 < x < \pi \\ 2\pi - x; & \pi < x < 2\pi \end{cases}$ 05
 - c) Trace the curve $r = a(1 + \sin\theta)$ with full justification. 05
- Q.3 05
- a) Solve $(x + 2y^3) \frac{dy}{dx} = y$.
 - b) Find the Fourier series of the function $f(x) = \frac{x(\pi^2 - x^2)}{12}$ in the interval $-\pi \leq x \leq \pi$. 05
 - c) Trace the curve $x^2 = y^3(a - y)$ with full justification. 05
- Q.4 05
- a) Find the current at any time $t > 0$ in a circuit having in series a resistor 10 ohm and an inductor 0.2 Henry given that initial current is zero. Find the current when $E = 40$ volt.
 - b) Find the half range sine series of $f(x) = \frac{100x}{l}$ over $0 < x < l$. 05
 - c) Trace the cycloid $x = a(t + \sin t)$, $y = a(1 + \cos t)$ with full justification. 05
- Q.5 05
- a) Find the Fourier series of $f(x) = \cos hax$ in the interval $(-\pi, \pi)$.
 - b) Trace the curve $4ay^2 = x(x - 2a)^2$ with full justification. 05
 - c) Find the total length of the cardioid $r = a(1 + \cos\theta)$. 05

Section B

- Q.6 Attempt the following (any five) 10
- Define Gamma function and Evaluate $\int_0^{\infty} e^{-x} x^{-1/2} dx$.
 - State the Reduction formula for $\int_0^{\pi/2} \sin^m \theta \cos^n \theta d\theta$.
 - Evaluate $\int_0^{\pi/2} \int_0^{a \cos \theta} r^4 dr d\theta$.
 - Change the order of integration of $\int_0^1 \int_0^y f(x, y) dx dy$.
 - Find the limits for $\iint f(x, y) dx dy$ over the area bounded by $y = x^2$ and $x = 1$.
 - State the formula to find surface area of the solid formed the revolution of the curve $x = g(y)$ about y -axis from $y = c$ to $y = d$.
 - Find the volume of the solid generated by the curve $y = \sin x$ between $x = 0$ and $x = \pi$.
 - State the formula to find the volume by using triple integration.
- Q.7 05
- Evaluate $\int_0^{2a} \frac{x^{7/2}}{\sqrt{(2a-x)}} dx$.
 - Evaluate $I = \int_0^1 \int_0^{\sqrt{1-x^2}} x^2 y^2 dx dy$. 05
 - Find the area by double integration bounded by the circles $r = 2 \cos \theta$ and $r = 4 \cos \theta$. 05
- Q.8 05
- Evaluate $\int_0^{\infty} x^7 e^{-2x^2} dx$.
 - Evaluate $\iint y dx dy$, over the area bounded by the curve $y = x^2, y = x$. 05
 - Find the surface of the solid generated by revolution of the curve $x = t^2; y = t \left(1 - \frac{t^2}{3}\right)$ about x -axis. 05
- Q.9 05
- Prove that $\beta(m, n) = \int_0^{\infty} \frac{t^{m-1}}{(1+t)^{m+n}} dt$.
 - Change the order of integration $I = \int_0^1 \int_{x^2}^{\sqrt{2-x^2}} f(x, y) dx dy$ 05
 - Evaluate $\int_1^3 \int_{1/x}^1 \int_0^{\sqrt{xy}} xyz dx dy dz$. 05
- Q.10 05
- Evaluate $\int_0^1 \sqrt{1-x^4} dx$.
 - Change to polar and evaluate $\int_0^2 \int_0^{\sqrt{2x-x^2}} \frac{x dx dy}{\sqrt{x^2+y^2}}$. 05
 - Find the volume bounded by cylinder $x^2 + y^2 = 4$ & $y + z = 3$ & $z = 0$. 05

SUBJECT CODE NO:- P-231
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) Examination May/June 2017
Engineering Mechanics
[OLD]

[Time: Two Hours]

[Max.Marks:40]

Please check whether you have got the right question paper.

N.B

- 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

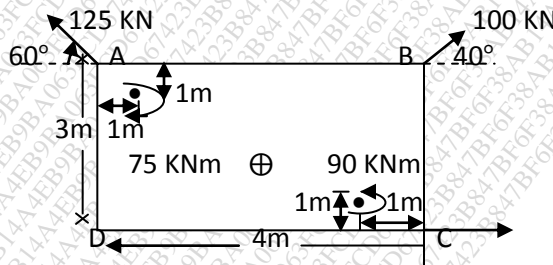
Explain the following terms (any five)

10

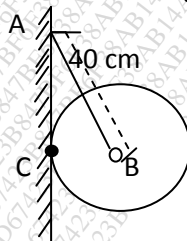
- i) State and explain the varignon's theorem.
- ii) Principle of equilibrium and force law of equilibrium
- iii) Principle of superposition
- iv) Polar moment of Inertia
- v) Coefficient of friction
- vi) Free body diagram and write its uses.

Q.2

a) Find the sum of the moment about centre 'O' of the force and couple acting on the rectangular plate as shown in fig. 08



b) A circular roller of weight 2000 N and radius 20 cm hangs by a tie rod AB = 40 cm and rests against a smooth vertical Wall at C as shown in fig. Determine the tension in the tie rod and reaction at point C. 07



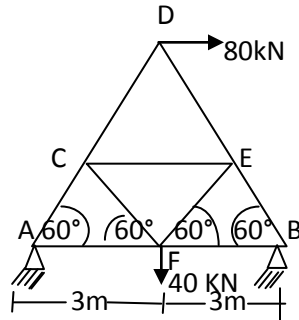
Q.3

a) A uniform ladder of 7m rests against a vertical wall with which it makes an angle of 45°. The coefficient of friction between the ladder and the wall is 1/3 and that between ladder and floor is 1/2. If a man whose weight is one-half of that of the ladder, ascends it, how high will it be when the ladder slips. 07

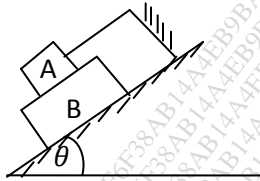
b) State and explain perpendicular axis theorem. 04

c) Explain principle of virtual work 04

Q.4 a) Determine the forces in all the members of the frame as shown in fig. Indicate the nature of the forces 08

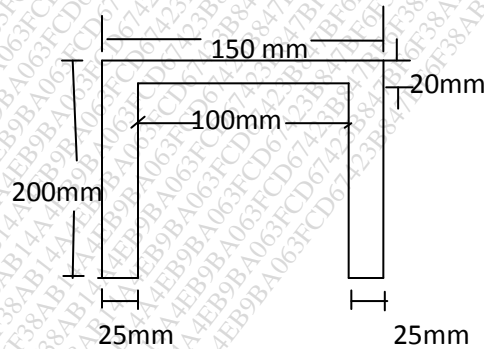


b) Two blocks A and B weighing 6 kN and 10 kN respectively are supported as shown in fig. Determine the angle of inclination of inclined plane formation to impend. Take co-efficient of static friction at all contact surfaces as 0.25 07



Q.5 a) Show that the moment of inertia of a rectangular section about x-x axis passing through C.G. of the section is $\frac{bd^3}{12}$ 06

b) Find the moment of Inertia for the following section about x-x axis as shown in fig. 09



SUBJECT CODE NO:- P-232
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) (CGPA) Examination May/June 2017
Engineering Mechanics
(Revised)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- i) Question numbers one and six are compulsory
 - ii) Attempt any two questions from each section from remaining.
 - iii) Figures to the right indicates full marks
 - iv) Assume suitable data if necessary

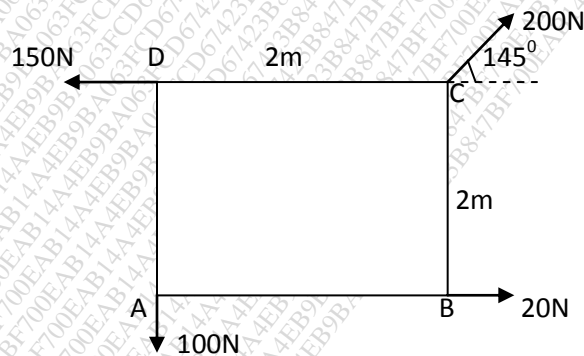
Section A

Q.1 Attempt any five from the following

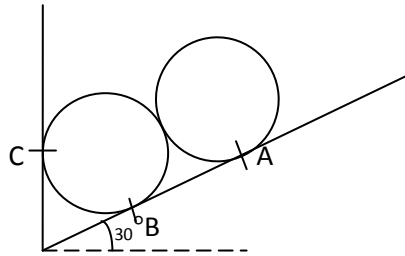
10

1. State law of parallelogram of forces
2. Explain classification of coplanar force system
3. State Lami's theorem
4. Define limiting frictional force
5. State principle of virtual work
6. State parallel axis theorem
7. Define angle of friction
8. Enlist type of loads on beams

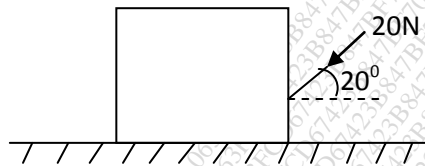
Q.2 a) Find magnitude, direction and position of resultant force for the force system shown in figure from point A. 07



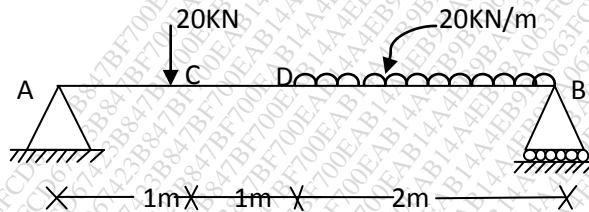
b) Two identical rollers each of weight 500N are supported by inclined plane and vertical wall as shown in fig.08 find reaction at the points A,B and C for the equilibrium given



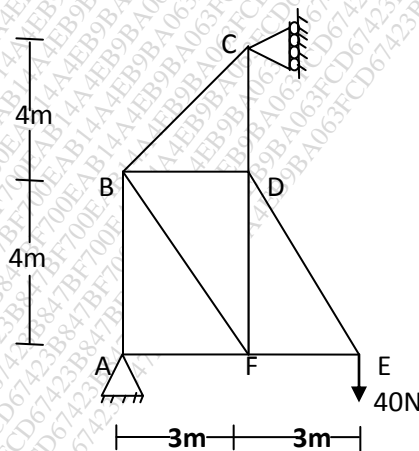
- Q.3 a) A body of weight 70N is placed on a rough horizontal plans to just move the body on the horizontal plane, 09
A push of 20N inclined at 20° to the horizontal plane is required find coefficient of friction



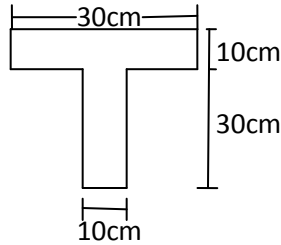
- b) Determine the reaction at the support A and B of the beam loaded as shown in fig. use principle virtual 06
work method



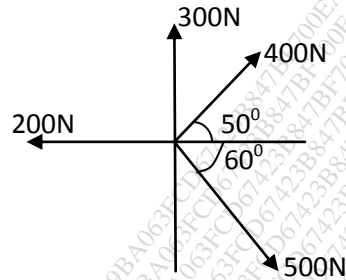
- Q.4 a) Write down the assumptions in analysis of truss. 03
b) Determine the forces in all members of a truss shown in fig. 12



- Q.5 a) Find the moment of inertia of a T-section shown in figure. About x-axis and y axis through the centroid of 08
the section



b) A concurrent force system is shown in the figure. Find the resultant of the force system.



Section B

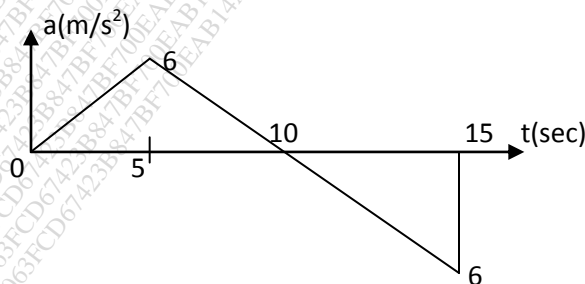
Q.6 Attempt any five questions from the following

1. Define velocity of projection and angle of projection
2. State D' Alembert's principle
3. State law of conservation of momentum
4. Define a) work b) power
5. The initial velocity of a body moving with a retardation of 4m/s^2 is 40 m/s body comes to rest in 10 sec. find the distance travelled in given time interval
6. Define work-energy principle
7. Explain types of impact

Q.7 a) A stone dropped into a well is heard to strike the water in 5 sec. find the depth of the well assuming the velocity of sound to be 300m/s

- b) The equation of motion of a particle moving in straight line is given by the equation $S = 20t - 4t^2 + 2t^3$ where 'S' is the distance covered. Find
1. Velocity and acceleration at start
 2. Time when particle reaches its maximum velocity
 3. Maximum velocity of particle

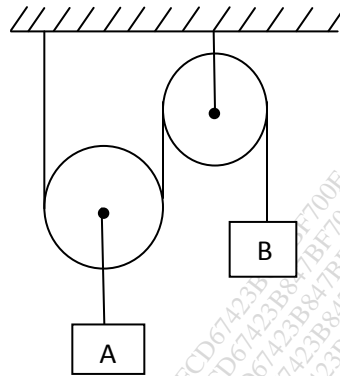
Q.8 a) Particle starting from rest moves in straight line with a-t relationship as shown fig. draw v-t and s-t diagram.



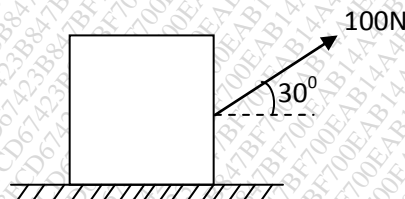
b) A bullet is fired from a gun with an initial velocity of 250m/s to hit a target. The target is located at a horizontal distance of 3750m and 625m above the gun. Determine minimum angle of projection so that

the bullet will hit the target.

- Q.9 a) Determine tension in the string and acceleration of the blocks A and B having weights 2100N and 700N respectively, connected by an inextensible string shown in fig. Assume pulleys are frictionless and weightless 08



- b) Direct central impact occurs between a 30kg body moving to the right with the velocity of 6m/s and 15kg body moving to the left with velocity of 10m/s. find the velocity of each body after impact if $e=0.8$ 07
- Q.10 a) A block having $W=2500\text{N}$ rest on a horizontal plane for which $\mu = 0.2$. Block is pulled by a force as shown in figure. Find velocity of block after it moves 30m starting from rest. If 1000N force shown in figure is then removed how much further it will move. Use work-energy principle. 08



- b) A car starts from rest on a curve road of 250m radius and acc^n at constant tangent acc^n is 0.6m/s^2 . Determine the distance and time for which car will travel if the magnitude of total acc^n is 0.75m/s^2 07

SUBJECT CODE NO:- P-262
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) Examination May/June 2017
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 remaining
 - iii) Assume suitable data where ever necessary.
 - iv) Figures to the right indicate full marks.
 - v) use of non-programmable calculator is allowed.

Section A

- | | | |
|-----|--|----|
| Q.1 | Solve any five of the following | 10 |
| | <ul style="list-style-type: none">a) State and explain in brief the first Law of thermodynamic for closed system.b) Define renewable energy sources? Enlist any two.c) State any four advantages of solar energyd) State Charles's Law and Boyle's Law.e) 'work' is called as path function, explain in brief.f) Represent adiabatic process on P-V and T-S diagramg) Define working substance? Name any twoh) State sign conventions for the heat and work | |
| Q.2 | A) Explain Bourdon pressure gauge with neat sketch? | 08 |
| | B) Explain constant volume process with P-V and T-S plot? | 07 |
| Q.3 | A) State and explain different modes of heat transfer | 08 |
| | B) Compare S.I engine and C.I engines | 07 |
| Q.4 | A) Explain thermal power plant with neat sketch | 10 |
| | B) Differentiate between renewable and nonrenewable energy sources | 05 |
| Q.5 | A) Explain similarities between heat and work. | 05 |
| | B) Explain M.P.F.I. system for modern automobile engine | 05 |
| | C) Explain household refrigerator | 05 |

SUBJECT CODE NO:- P-263
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) (CGPA) Examination May/June 2017
Basic Mechanical Engineering
(Revised)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- i) Q.No.1 and Q.No.6 are compulsory.
 - ii) Attempt any two questions from the remaining questions in each section A & B
 - iii) Assume suitable data if necessary and mention it clearly .
 - iv) Figure to right indicate full marks.

Section A

- | | | |
|-----|---|----|
| Q.1 | Solve any five | 10 |
| | <ol style="list-style-type: none"> a) Define Thermodynamics . b) State Zeroth law of thermodynamics and give its application c) Show constant pressure process on PV and TS plane d) Write four application of compressed air e) Define Boyle's law of ideal gases f) Define intensive property g) Define TDC & BDC h) Define Refrigeration | |
| Q.2 | 1) Define thermodynamic system. Explain different types of systems | 08 |
| | 2) State & explain the modes of Heats Transfer | 07 |
| Q.3 | a) Derive equation of state for an ideal gas. | 08 |
| | b) A certain gas occupies a volume of 0.3 m^3 at a pressure of 2 bars. The temperature of the gas at this state is 77°C .The gas undergoes a thermodynamic constant volume process until the pressure rises to 7 bars. Determine the temperature at the end of process ,work done, heat transfer, change in internal energy change in enthalpy and change in entropy . $C_v=0.712 \text{ KJ/Kg K}$, $R= 0.287 \text{ KJ/ Kg}$
Also represent the process on PV and TS plane | 07 |
| Q.4 | a) Explain with neat sketch working of four stroke SI engine | 08 |
| | b) Explain with the help of neat sketch the working of Domestic Refrigerator | 07 |
| Q.5 | a) Explain Pdv work | 08 |
| | b) Write short note on reciprocating compressor | 07 |

Section B

- | | | |
|-----|--|----|
| Q.6 | Solve any five | 10 |
| | <ol style="list-style-type: none"> a) Define shaft b) State the function of flux in joining process c) State the function of clutch d) Define Tempering e) Define composites f) State function of cross slide g) State working principle of drilling machine h) Define soldering | |
| Q.7 | a) Explain with neat sketch working of internal expanding shoe brake | 08 |
| | b) If the gear ratio is 5 in a pair of spur gear with 100 teeth gear rotating at a speed of 500rpm. Find circular pitch, diametral pitch, pitch circle diameter of gear, pitch circle diameter of pinion ,velocity ratio and Centre distance | 07 |

- Q.8 a) State and explain the selection criteria for Engineering Materials 08
b) Explain with the help of neat sketch following operations performed on milling machine 07
a) Plain milling b) Gang milling c) Angular milling d) face milling
- Q.9 a) Explain with neat sketch any four operations performed on lathe machine 08
b) Explain with neat sketch sensitive drilling machine 07
- Q. 10 a) Explain arc welding operation in detail 08
b) Define forging ,explain press forging and Drop forging 07

SUBJECT CODE NO:- P-294
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) Examination May/June 2017
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) Figures to right indicate full marks.
 - iv) Assume suitable data wherever necessary.
- Q.1 Solve any five. 10
- a) Define Resistance. Write its equation.
 - b) Enlist the various types of capacitors.
 - c) Write colour codes for the following resistances
 - i) $1.5k\Omega$, $\pm 20\%$
 - ii) 220Ω , $\pm 5\%$
 - d) Explain 79xx series of voltage regulator IC's.
 - e) What are different types of filters?
 - f) Write 1's complement for following.
 - i) 10101101
 - ii) 10011010
 - g) Write any two Boolean equations.
 - h) Draw the symbols for following devices.
 - i) NPN transistor
 - ii) SCR
 - iii) LED
 - iv) N-channel JFET
- Q.2 a) Differentiate between BJT & FET. 07
- b) Draw the construction of BJT and explain working of NPN transistor. 08
- Q.3 a) Explain transistorized series voltage regulator in detail. 07
- b) With neat diagram, explain half wave rectifier in detail. Also draw the input and output waveforms. 08
- Q.4 a) What is universal gate? Explain NOR gate as universal logic gate. 07
- b) Perform the following conversions of number systems. 08
- i) $(248)_{16} = (?)_2 = (?)_8$
 - ii) $(244)_{10} = (?)_8 = (?)_2$
- Q.5 Write a short note on 15
- a) Opto-coupler
 - b) LM 337
 - c) De Morgans theorems.

SUBJECT CODE NO:- P-295
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) (CGPA) Examination May/June 2017
Basic Electronics 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) Assume suitable data if required.

Q.1	Solve any five	10
	a) Find the color code for the following:- 1) 4.4 k Ω 2) 200 k Ω with $\pm 5\%$ tolerance.	
	b) How depletion layer is formed?	
	c) Draw the symbols for PN Junction diode SCR, TRIC, DZAC.	
	d) What are the different types of capacitors?	
	e) State the need for voltage regulation.	
	f) What is the difference between Zener diode & normal PN junction diode?	
	g) Draw the symbol and truth table for NAND gate and 'AND' gate.	
Q.2	a) What are the different types of MOSFET? Explain any one in detail.	08
	b) Explain construction working principles of SCR device.	07
Q.3	a) Why there is need of filter? Explain any one filter with its input and output wave form.	08
	b) Explain any one fixed IC Voltage regulator with its suitable example.	07
Q.4	a) Describe hexadecimal, octal number system with suitable example.	08
	b) Explain AND, OR, and NOT gate with their truth table.	07
Q.5	Write a short note on following (any three)	15
	a) JFET device	
	b) MOSFET construction	
	c) Regulated DC power supply	
	d) Universal gates	
	e) Applications of rectifiers.	

SUBJECT CODE NO:- P-359
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) Examination May/June 2017
Engineering Physics
[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) Figure to be right indicates full marks.
- iv) Use of non-programmable calculator is allowed.

Q.1	Attempt <u>any five</u> question from the following	10
	<ol style="list-style-type: none"> 1) State Compton Effect. 2) Draw block diagram of CRO. 3) Write important applications of X-rays 4) What are positive rays? State their important properties. 5) Define specific rotation & optical activity. 6) What is diffraction of light? State the type of diffraction of light. 7) Define the term 1) Nuclear fission 2) Nuclear fusion 8) What is SQUID? explain its functioning 	
Q.2	a) Derive an expression for Compton shift in wavelength	06
	b) Explain construction and working of cathode ray tube	05
	c) Calculate the longest wavelength that can be analyzed by rock salt crystal of spacing 0.282\AA in the first order	04
Q.3	a) Explain construction and working of Michelson's interferometer.	06
	b) Explain the theory of plane transmission grating.	05
	c) In a Newton's ring experiment the diameter of 15 th dark ring was found to be 0.590 cm and that of 5 th ring was 0.336 cm. If the radius the lens is 100cm calculate the wavelength of light used.	04
Q.4	a) Explain the term 1) P-P cycle 2) C-N cycle	05
	b) Explain liquid drop model of Nucleus.	05
	c) Explain the construction and working of Nuclear Reactor.	05
Q.5	a) Write a short note on Bragg's x-ray spectrometer.	05
	b) Write a short note on QWP and HWP.	05
	c) Write a short note on nuclear chain reaction.	05

SUBJECT CODE NO:- P-360
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) (CGPA) Examination May/June 2017
Computer Fundamentals - II
(Revised)

[Time: Two Hours]

[Max.Marks:40]

Please check whether you have got the right question paper.

N.B

- 1) Q1 is compulsory.
- 2) Solve any two from remaining questions

Q.1 Solve any five questions:

10

- a) What is the use of address operator (&) and indirection operator (*)?
- b) Define strings.
- c) What is union? Give example.
- d) How does structure differ from array?
- e) Explain two ways of string variable initialization.
- f) What is a file?
- g) What is wrong in the following structure declaration?

```
struct {  
    int number;  
    float price;  
}  
main ( )  
{  
    _____  
    _____  
    _____  
}
```

Q.2 a) Write a C program for putting strings together without strcat () function.

07

b) Write syntax of following & explain in brief:

08

- i. gets ()
- ii. puts ()
- iii. getchar ()
- iv. putchar ()

Q.3 a) Write a program using array of structure for storing information of three books & print the same on terminal.

08

b) Explain command line argument.

07

Q.4 a) What is free software? Explain with four types of freedom for free software.

07

b) Explain the various principles of open source.

08

Q.5 a) Write a C program for call by reference.

08

b) Explain mode of operation for file.

07

SUBJECT CODE NO:- P-360
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) (CGPA) Examination May/June 2017
Computer Fundamentals - II
(Revised)

[Time: Two Hours]

[Max.Marks:40]

Please check whether you have got the right question paper.

N.B

- 1) Q1 is compulsory.
- 2) Solve any two from remaining questions

Q.1 Solve any five questions:

10

- a) What is the use of address operator (&) and indirection operator (*)?
- b) Define strings.
- c) What is union? Give example.
- d) How does structure differ from array?
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- f) What is a file?
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}  
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{  
    _____  
    _____  
    _____  
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