

(4)

5. When a series combination of Inductance and resistances are connected with a 10 V, 50 Hz source, a current of 1 A flows in the circuit. The voltage leads the current by a phase angle of 60° . Calculate the values of

(i) Resistance and Inductance

(ii) Draw the power triangle indicating different values of powers. 10

6. A 4 pole DC shunt generator with a shunt field resistance of $100\ \Omega$ has 378 wave connected conductors in its armature. The flux per pole is 0.02 Wb. If a load resistance of $10\ \Omega$ is connected across the armature terminals and the generator is driven at 1000 rpm, calculate the current drawn by the load. Resistance of armature is $1\ \Omega$. 10

7. Describe briefly about the principle, operation and uses of single phase capacitor start and run Induction motor. 10

II/SEM/COMMON/2018(S)(W)NEW

BASIC ELECTRICAL ENGG.

(BET - 101)

Full Marks : 80

Time : 3 hours

Answer any five questions including Q.Nos.1 & 2.

The figures in the right-hand margin indicate marks

1. Answer all questions: 2×10

- (a) Define cycle.
- (b) Mention two applications of D.C series motor.
- (c) Which type of wiring is most expensive and why?
- (d) Draw the connection diagram of wattmeter.
- (e) Draw the V-I graph of Ohm's law.
- (f) State Thevenin's theorem.
- (g) Mention two main parts of 3-phase Induction motor.

(2)

- (h) Draw the phasor diagram of a purely Inductive circuit.
- (i) Show the relation between line voltage and phase voltage in case of star network.
- (j) State the uses of PMMC instruments.

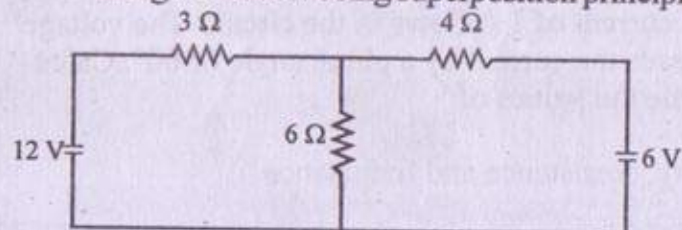
2. Answer any five of the following:

6 × 5

- (a) A coil has an Inductance of 0.7 henry and connected in series with a resistance of 22 Ω . Calculate the current and power consumption in the circuit when an alternating emf of 220 volt at 50 cycles per second is applied to it.
- (b) State and explain Faraday's laws of electromagnetic Induction.
- (c) Explain why starter is necessary for DC motor ?
- (d) Discuss briefly about different types of torques in measuring instrument.
- (e) Explain the working principle of DC motor.

(3)

- (f) Find the current in 6 Ω resistance for the circuit given below using superposition principle.



- 3. With a neat diagram explain the working of Nuclear power plant. 10
- 4. Calculate the electricity bill for the month of May of a domestic Installation with the following loads: 10
 - (i) 4 nos. CFL of 25 W each running for 5 hours/day.
 - (ii) 6 nos. ceiling fans of 60 W each running for 8 hours/day.
 - (iii) 4 nos. Fluorescent tubes of 40 W each running for 8 hours/day.
 - (iv) One airconditioner of 2 kW running for 10 hours/day and cost of energy @ Rs 3.00 per unit.

II/SEM/COMMON/2018 (W)/
NEW

BASIC ELECTRONICS ENGINEERING

(BET - 102)

Full Marks : 80

Time : 3 hours

Answer any five questions including Q.Nos. 1 & 2.

The figures in the right-hand margin indicate marks.

1. Answer *all* the questions : 2 × 10

(a) Define Electronics. Give two examples of electronics devices.

(b) Define and classify extrinsic semiconductor.

(c) What do you mean by Doping ? Give two examples of impurities.

(d) What is LED and write down two uses of it.

(e) What is need of rectifier ?

(f) Define Ripple Factor and write its value for half-wave and full-wave rectifier.

(g) Define and classify transistor biasing.

(Turn Over)

(2)

(h) What is filter in rectifier circuit ? Give two examples of it.

(i) Define transducer and give any two applications.

(j) What are the essential components of a CRT ?

2. Answer any six questions : 5 × 6

(a) Explain the difference between P-type and N-type semiconductors.

(b) What is Electron Emission and discuss each type of Emission ?

(c) Distinguish between avalanche breakdown and Zener breakdown with a suitable diagram.

(d) State the relation between α , β and γ .

(e) Differentiate between analog and digital multimeter.

(f) What is thermocouple ? Explain operation of a thermocouple and give some of its use.

(g) Explain the communication system with the help of block diagram.

(3)

3. Classify Solids. Explain each with respect to their energy band diagram. 10

4. With neat circuit diagram and waveforms, explain the working of full wave bridge rectifier and mention its merits and demerits. What is the PIV value of this rectifier ? 10

5. What is Biasing ? Explain the forward and reverse bias condition of $p-n$ junction. 10

6. Define a transistor. What are the different configurations of bipolar transistor ? Explain each with suitable circuit diagram. 10

7. Explain the working of LED with a neat circuit diagram and give its applications. 10

COMMUNICATIVE ENGLISH - II

(Code : HMT-201)

Full Marks : 80

Time : 3 hours

Answer **all** questions from Group-A and Group-B

Figures in the right-hand margin indicate marks

SET - 2

GROUP -A

[Marks : 48]

Choose the *correct* answer from the given options.

Each *correct* answer carries one mark

1. The _____ that the private space provides is of beyond comparison.
 - (a) Intimacy
 - (b) Privacy
 - (c) Intimacy and privacy
 - (d) None

(Turn Over)

2. Personal space offers a distance of _____ between speaker and listener.
- (a) 18 inches
 - (b) $01\frac{1}{2}$ feet
 - (c) 04 feet
 - (d) 18 inches to 04 feet
3. _____ does not provide scope for close interaction and frequent use of the body language.
- (a) Public space
 - (b) Social space
 - (c) Private space
 - (d) None
4. Visual signs fail to convey _____ messages.
- (a) Complicated
 - (b) Straight
 - (c) Simple
 - (d) None
5. Visual sign draw _____ response from its viewers.
- (a) Late
 - (b) Average
 - (c) Negligible
 - (d) Fast

6. _____ signals are the most effective channels of warning against dangers.
- (a) Visual (b) Sound
(c) Symbolic (d) None
7. The director writing a formal letter to the sales manager is an example of _____
- (a) Upward communication
(b) Downward communication
(c) Parallel communication
(d) None
8. Periodical proposals, appraisals and reports are some forms of _____
- (a) Upward communication
(b) Downward communication
(c) Parallel communication
(d) None
9. Upward communication does not facilitate _____
- (a) Team work

- (b) Open-door policy
- (c) Centralisation of power
- (d) None

10. Mutual consultation and sharing of information are not possible in _____ communication.

- (a) Grapevine
- (b) Lateral
- (c) Horizontal
- (d) Parallel

11. Which stream of communication does give rise to interpersonal problems among equals in relation to their skill and reward ?

- | | |
|---------------|---------------|
| (a) Lateral | (b) Up-ward |
| (c) Down-ward | (d) Grapevine |

12. Which stream of communication keeps no accountability of the information shared ?

- | | |
|---------------|---------------|
| (a) Lateral | (b) Up-ward |
| (c) Down-ward | (d) Grapevine |

13. Which communication may slacken the chain of control in subordinate level ?

- | | |
|---------------|---------------|
| (a) Lateral | (b) Up-ward |
| (c) Down-ward | (d) Grapevine |

14. Speediest business transaction is possible in which stream of communication

- | | |
|---------------|---------------|
| (a) Lateral | (b) Up-ward |
| (c) Down-ward | (d) Grapevine |

15. A standard formal letter follows a _____ pattern.

- | | |
|-------------------|----------------|
| (a) Indented | (b) Semi-block |
| (c) Half-indented | (d) Block |

16. Subject of a letter carries _____ at its end.

- | | |
|--------------|--------------------|
| (a) a comma | (b) a full stop |
| (c) a hyphen | (d) no punctuation |

17. A letter of _____ is self-explanatory in providing the writer's introduction, purpose and goal for starting a communication process in business.

- | | |
|-------------|-----------|
| (a) order | (b) offer |
| (c) enquiry | (d) None |

18. A letter of _____ must elaborately specify quality and quantity of product.

- (a) Placing and order
- (b) Execution
- (c) Enquiry
- (d) Cancellation of an order

19. A letter of complaint may be drafted in which of the following situations ?

- (a) Delay in despatch
- (b) Receiving damaged goods
- (c) Short supply
- (d) In all the situations stated under a, b and c

20. A quotation is one type of letter of _____
(asking for quotation)

- | | |
|-------------|-----------|
| (a) enquiry | (b) order |
| (c) offer | (d) None |

21. A job application is incomplete without a _____ .

- (a) Forwarding letter (b) Bio-data
(c) Photo (d) None

22. Investigative details are the essentials of _____.

- (a) a news report (b) an annual report
(c) an event report (d) None

23. A letter of congratulation is a _____ letter.

- (a) Personal (b) Official
(c) Business (d) Social

24. Application to obtain driving licence is an/a _____ letter.

- (a) Personal (b) Official
(c) Business (d) Social

25. Softlook and undisturbed eyebrows convey the message of _____.

- (a) Dominance (b) Kindness
(c) Surprise (d) None

26. There is an old saying that face is the _____ of mind.

- (a) Space
- (b) House
- (c) Chamber
- (d) Mirror

27. Movements of body while sitting, standing and walking are called as

- (a) Postures
- (b) Gestures
- (c) Both Postures and Gestures
- (d) None

28. "Proxemics" is the study of _____.

- (a) Body language
- (b) Spatial language
- (c) Language of signs and symbols
- (d) None

29. "Kinesics" is the study of _____.

- (a) Body language
- (b) Spatial language
- (c) Language of signs and symbols
- (d) None

30. Bias-free form of Red-Indian is _____

- (a) African-American (b) American
(c) Native-American (d) None

31. In appropriate body language may lead to _____ barrier.

- (a) Cultural (b) Environmental
(c) Individual (d) Psychological

32. "Barrier of perception" may lead to _____ barrier.

- (a) Cultural (b) Environmental
(c) Individual (d) Psychological

33. Wrong utilisation of time and inappropriate spacing between sender and receiver create _____ barrier.

- (a) Environmental
(b) Situational
(c) Physical
(d) Psychological

34. "Noise" can be _____
- (a) Physical (b) Technical
(c) Psychological (d) All
35. Over-loading of information results in _____
- (a) Faster communication
(b) Speedier transaction
(c) Delayed communication
(d) None
36. Unclarified assumptions of a message may give rise to _____ barrier
- (a) Semantic (b) Syntactic
(c) Physical (d) None
37. Communication works on the principle of _____
- (a) Information loss
(b) Information gap
(c) Both Information loss and Information gap
(d) None

38. Communication fails when _____

- p. Sender is inefficient
- q. Receiver is inattentive
- r. Channel is weak
- s. Noise is over-powering

- (a) p and q
- (b) q and r
- (c) r and s
- (d) All p, q, r, s

39. A command or instruction is _____ communication model.

- (a) an one-way
- (b) a two-way
- (c) a sub-way
- (d) None

40. _____ is the disturbance of any kind that affects communication at any stage.

- (a) Feedback
- (b) Mis-transmission
- (c) Noise
- (d) None

41. A set of symbols conveying a particular idea is called _____ in communication science.

- (a) Code
- (b) Ideation
- (c) Transmission
- (d) None

42. We applied the term(s) _____ to describe what the sender and the receiver perform during communication
- (a) Symbolising
 - (b) Encoding and decoding
 - (c) Translating
 - (d) None
43. When a message is made open to people at different places either at one point of time or at different points of time, it is called
- (a) Group-interaction
 - (b) Im-personal communication
 - (c) Mass communication
 - (d) None
44. Oxford Dictionary described or explained "communication" as
- (a) the science of expression
 - (b) business of ideation
 - (c) art of conveying
 - (d) None

45. One of the problem areas in business communication is

- (a) Intra-personal communication
- (b) Cross-cultural communication
- (c) Mass communication
- (d) None

46. English is _____ in many countries of the world because of its international standard.

- (a) Second-language
- (b) Window-language
- (c) Pop-language
- (d) None

47. Communication through english both in writing and speaking sets for _____ standard in an organisation

- (a) Royal
- (b) International
- (c) Business
- (d) None

48. Communication followed by a constructive feedback makes the process _____.

- (a) Cyclic and complete
- (b) Cyclic and incomplete
- (c) Incomplete
- (d) None

GROUP – B

[Marks : 32]

1. Answer any *two* of the following : 5 × 2

- (a) Define body language ? Describe gestures and postures with diagram and the message they convey.
- (b) What does it mean by barrier to communication ? How we can overcome these barriers ?
- (c) What is a grapevine communication ? Describe its merits and demerits.

2. Answer any *two* of the following : 5 × 2

(a) Your friend is failed in annual examination. Write a letter of consolation and encouragement.

(b) Your library card has expired. Write an application to the librarian for renewal of your library card.

(c) You are Sruti Book store, Nayabazar, Cuttack. Place an order with Suman Distributors, Rourkela-9 for supply of 50 pcks of Reynold blue ball point pen, 50 pcks of Link Jotter blue and 80 pcks of link fillers.

3. Answer any *one* of the following : 5 × 1

(a) Prepare a report on "Clean India Green India" campaign you observed in your institute and submit it to your principal.

(b) Describe your favourite holiday spot/place.

4. Following is an advertisement. Read it carefully : 7

Apple India
07/39, 7th Phase
2nd Lane,
Golden Thresh-hold
Hyderabad-34

No. 09/BMT/18

Dt.02/12/2018

Ours is one of the leading publishers in India. We publish all sorts of books starting from academic to pleasure reading. For our printing section 02 nos. of junior engineers are wanted. Qualification : Diploma in Print technology, Experience : not rigidly considered (fresh candidates can apply with outstanding career graph), Age : not more than 26 as on 01.06.2018 salary : negotiable.

Apply within 10 days of publication of this advertisement to the undersign with details.

Sd/

Manager

Recruitment and Training cell

Reply to the above advertisement with your bio-data/C.V.

**II/SEM/COMMON/2018 (W)/
NEW**

COMPUTER APPLICATION

(BET - 104)

Full Marks : 80

Time : 3 hours

Answer any **five** questions including Q.Nos. 1 & 2.

The figures in the right-hand margin indicate marks.

1. Answer the following :

2 × 10

(a) Write four output devices.

(b) Define line printer.

(c) Define GUI.

(d) What are four major resources of a computer which are managed by the operating system ?

(e) Define computer network.

(f) What do you mean by function in C programming language ?

(g) Name four internet service providers in India.

(Turn Over)

- (h) Define data capture.
- (i) Define escape sequence character constant.
Give two examples.
- (j) Define protocol.

2. Answer any *five* questions :

6 × 5

- (a) Draw a flow chart to find the sum of first n natural numbers.
- (b) Write a program in C to find whether a number is prime or not.
- (c) Write the difference between compiler and interpreter.
- (d) Define data processing and explain various method of data processing.
- (e) Write on different mode of data transmission based on direction of data flow.
- (f) Explain the main features of the various types of memory present at different levels of memory hierarchy.

- (g) Give an account of classification of computers based on how they work.
3. Draw a flow chart and write a program in C to get the factorial of a given number. 10
4. Discuss about the generation of computers. Explain the key features of computers of each generation. 10
5. Discuss about various types of operating system used in computer. 10
6. What do you mean by Network topologies ? Write on major types of network topologies. 10
7. Write short notes on (any two) : 5×2
- (a) Features of windows operating system
- (b) How to detect virus ?
- (c) Central Processing Unit (CPU).
-

II/SEM/COMMON/2018 (W)/Old
COMPUTER APPLICATION

(BET - 104)

Full Marks : 70

Time : 3 hours

Answer any five questions.

The figures in the right-hand margin indicate marks.

1. (a) What do you mean by compiler ? 2
(b) Make a comparative study between first and second generation computer. 5
(c) Describe the function of different parts of computer with a neat block diagram of computer. 7
2. (a) State and difference between analog and digital computer. 2
(b) Give a brief idea about different types of network. 5
(c) Describe the characteristics of different types of memories used in a computer. 7

(Turn Over)

3. (a) What is a system software ? 2
- (b) Make a comparative study between DOS and WINDOWS. 5
- (c) What is a computer virus ? How does a virus spread and what are the symptoms of virus attack ? How can you prevent virus attacks ? 7
4. (a) What is protocol ? 2
- (b) Explain the different types of network devices. 5
- (c) Write an algorithm and draw a flow chart to convert temperature from degree Celsius to Farenheit. 7
5. (a) What are the four basic data types available in C language ? 2
- (b) State the features of different file accessing methods. 5
- (c) Discuss about the various application areas of internet. 7
6. (a) What is pointer ? 2

- (b) What is E-mail ? Explain the features of E-mail. 5
- (c) Write a program in C find the sum of odd numbers between 1 to 100. 7
7. (a) What is www? 2
- (b) Write short notes on printer. 5
- (c) What are built-in functions ? Give some example of these functions. 7
-

**II/SEM/COMMON/2018 (W)/
New**

ENGG. CHEMISTRY

(BST - 102)

Full Marks : 80

Time : 3 hours

Answer any five questions including Q.Nos. 1 & 2.

The figures in the right-hand margin indicate marks.

1. Answer all questions : 2 × 10

(a) Define concentration and refining of ore.

(b) What are primary and secondary pollutants ?

(c) Write the average composition and calorific value of air dried wood.

(d) What are unsaturated hydrocarbons ? Give structures of two such compounds.

(e) Define decinormal and molal solutions.

(f) State Aufbau principle and write electronic configuration of Ca^{2+} .

(Turn Over)

(g) Define hard water and hardness of water.

(h) What are aerosols and smogs ?

(i) What are flux and slag ?

(j) Calculate equivalent weight of $\text{Al}_2(\text{CO}_3)_3$ and acetic acid.

2. Answer any six questions :

5 × 6

(a) 15.9 gms of soda ash is present in 750 ml of its solution. If the density of solution is 1.01 gm/ml, then calculate normality and molality of solution.

(b) Explain, the process of Zinc plating and Chrome plating .

(c) State and explain Faraday's 2nd law of electrolysis.

(d) Write the properties of alloys.

(e) Write the advantages of hot lime soda process over cold lime soda process.

(f) Write the sources of water pollution.

(g) How Bohr rectified the defect of Rutherford atomic model ?

(h) Write structures of following compounds :

(i) iso-pentyl chloride

(ii) 2-methyl pent-3-en-2-ol

(iii) 3-bromomethyl-4-chloromethyl hexane

(iv) 3,4-dibromo-2,5-dichloro Hex-1-ene

(v) 2-methyl propan-2-ol.

(i) Calculate the molality and pH of 2 litres of KOH solution which contains 11.2 gms of solute.

3. (a) Explain the formation of NaCl molecule. 5

(b) Give a comparison between LPG and CNG. 5

4. (a) Write a short note on global warming. 5

(b) What are salts ? Explain various types of salts. 5

5. (a) What are greases ? Write the components of greases. 3

(b) Give a comparison between inorganic and organic compounds. 7

II—Sem/COMMON/2018(W)
(New/Old)

ENGINEERING DRAWING

(Code : BEP-105)

Full Marks : 100

Time : 4 hours

Answer any six questions including Q.No. 8

Figures in the right-hand margin indicate marks

1. Answer all questions :

(i) Draw the following lines : 3

Cutting plane line, long break line, centre line.

(ii) Draw an arrow head with all specific proportion. 2

(iii) What are the values of eccentricity of

(a) ellipse

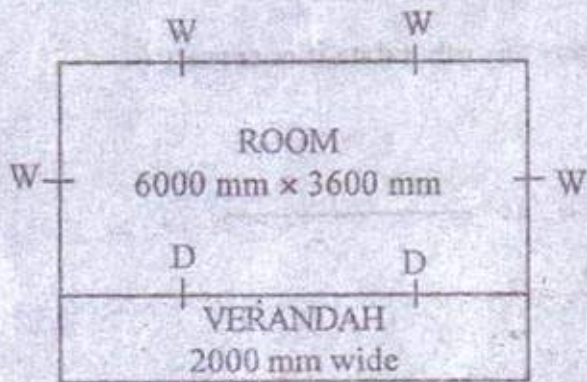
(b) parabola. 2

(Turn Over)

- (iv) Draw the projection of point 'A' which is 30 mm about H.P and 50 mm in front of V.P. 3
- (v) What are the numbers of trends and rise required for 600 mm plinth height? 3
- (vi) Draw the symbol of 1st angle projection. 2

2. Draw a diagonal scale of $RF = \frac{1}{300}$ showing meters, decimeters and centimeters, and to measures upto 5 meters. Show the length of 3.69 meters on it. 15
3. Draw an ellipse in concentric circle method when the major axis is 120 mm and minor axis is 80 mm. 15
4. A line AB 75 mm long has its end A 15 mm above the HP and 10 mm in front of the VP. The end B is 30 mm above the HP and 45 mm in front of VP. Draw the projections of AB and measure its inclination with HP and the V.P. 15
5. A regular pentagonal plate of side 50 mm lies on H.P. with one of its side perpendicular to the V.P. The plate is lying 20 mm in front of V.P. and 45° inclined to HP. Draw the projections of the plane and its traces. 15

6. A cone of base 60 mm diameter and height 70 mm rests with its base on HP. A section plane perpendicular to VP and inclined at 30° to HP bisects the axis of the cone. Draw the developments of the lateral surface of the truncated cone. 15
7. Draw the isometric drawing of a cylinder of base dia 50 mm and axis 70 mm. The cylinder is resting on its base on HP and parallel to VP. 15
8. Draw the following views of a panchayat office (line diagram given) from the specification given below with a suitable scale.
- (a) Plan at window sill level.
- (b) Front elevation. 25



Specification :

- (i) Wall thickness = 300 mm
- (ii) Plinth height = 450 mm
- (iii) Size of pillar = 300×300
- (iv) Ceiling ht = 3000 mm
- (v) Height of the verandah = 2000 mm
- (vi) R.C.C slab = 120 mm
- (vii) Steps, trend = 300 mm, rise = 150 mm
- (viii) Plinth projector = 100 mm
- (ix) Door = D = (1200×2100) Window =
W = (1000×1500)

Assume any other data if necessary.

II/SEM/COMM/2018 (W)/NEW

ENGG. MATH-II

(BST - 201)

Full Marks : 80

Time : 3 hours

Answer any **five** questions including Q.Nos. 1 & 2.

The figures in the right-hand margin indicate marks.

1. Answer *all* questions :

2 × 10

(a) Evaluate $\lim_{x \rightarrow 1} \left(\frac{x^2 - 2x + 1}{x^2 - x} \right)$.

(b) For what values of K

$$f(x) = \begin{cases} \frac{\sin 2x}{2x} & \text{if } x \neq 0 \\ K & \text{if } x = 0 \end{cases}$$

is continuous at $x = 0$?

(c) If $z = \sin\left(\frac{x}{y}\right)$, find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$.

(d) Find $\int_0^1 \frac{1}{\sqrt{1-x^2}} dx$.

(Turn Over)

(2)

- (e) Find the order and degree of the differential equation

$$\left(\frac{dy}{dx}\right)^2 + y^3 = \frac{d^2y}{dx^2}$$

- (f) Find the equation of the sphere with centre (3,2,5) and radius is y.

- (g) Integrate $\int(\sqrt{1-\cos 2x})dx$.

- (h) Find the derivative of $\cos^{-1}x$ w.r.t. $\tan^{-1}x$.

- (i) Find the image of the point (6, 3, -4) w.r.t. XY plane.

- (j) If the direction cosines of a line are $\left(\frac{2}{7}, \frac{3}{7}, \frac{K}{7}\right)$. What is the value of K?

2. Answer any six questions :

5 × 6

- (a) Find $\frac{dy}{dx}$ if $x = 3\cos t - 2\cos^3 t$ and $y = 3\sin t - 2\sin^3 t$

(3)

- (b) Evaluate $\lim_{x \rightarrow \frac{\pi}{2}} \left(\frac{\pi}{2} - x\right) \tan x$.

- (c) Integrate $\int \frac{e^x + e^{-x}}{e^x - e^{-x}} dx$

- (d) Find the maximum and minimum values of the function

$$Y = 2x^3 - 15x^2 - 36x + 18$$

- (e) Solve : $\frac{dy}{dz} = \frac{\sqrt{1-y^2}}{\sqrt{1-z^2}}$.

- (f) Find the angle between the planes

$$x + 3y - 5z + 1 = 0 \text{ and}$$

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

- (g) Determine the area bounded by the curve

$$y^2 = x, x = 0, y = 1.$$

- (h) Evaluate $\int_0^{\pi/2} \frac{\sin x}{\sin x + \cos x} dx$.

3. Differentiate $y = \cos^2 \left(\cot^{-1} \sqrt{\frac{1+x}{1-x}} \right)$.

10

4. If

$$f(x) = \begin{cases} ax^2 + b, & \text{if } x < 1 \\ 1, & \text{if } x = 1 \\ 2ax - b, & \text{if } x > 1 \end{cases}$$

is continuous at $x = 1$, then find a and b . 10

5. Solve: $(1+x^2)\frac{dy}{dx} + 2xy = x^3$. 10

6. Find the equation of the sphere which passes through the points $(0,0,0)$, $(0,1,0)$, $(1,0,0)$ and $(0,0,1)$. 10

7. If $x = \sin t$, $y = \sin(pt)$, then show that

$$(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} + p^2y = 0. \quad 10$$

II/SEM/COMMON/2018 (W)/Old
ENGG. MECHANICS

(BET - 103)

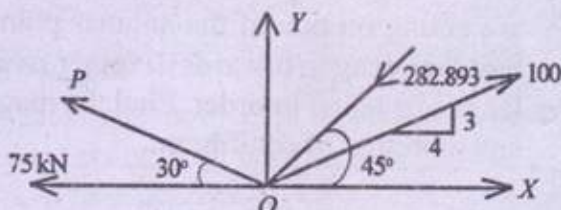
Full Marks : 70

Time : 3 hours

Answer any five questions.

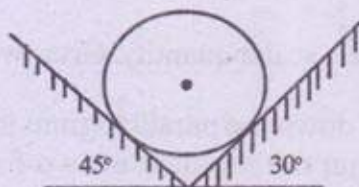
The figures in the right-hand margin indicate marks.

1. (a) Define a scalar quantity. Give two examples. 2
- (b) Write down the parallelogram law of forces.
Find out the resultant of two forces P & Q
acting at a point with angle θ in between them. 5
- (c) If five forces act on a particle as shown on
Figure and the algebraic sum of horizontal
component of all these forces is -324.904
kN, calculate the magnitude of p and the
resultant of all forces. 7



(Turn Over)

2. (a) What is meant by 'moment of a force'? Show it mathematically. 2
- (b) State and explain polygon law of forces. 5
- (c) A heavy spherical ball of weight 12 kN rests on a V-trench as shown in Figure. Find the reactions assuming the contact surfaces to be smooth. 7



3. (a) What is the meaning and 'three force principle' for equilibrium? 2
- (b) State and prove Lami's theorem. 5
- (c) The forces 16 N, 24 N, 32 N, 40 N and 48 N are acting on one of the angular points of a regular hexagon towards the other five angular points taken in order. Find the magnitude and direction of equilibrant. 7
4. (a) Define 'Angle of Friction'. 2

- (b) Find out the minimum force which will keep the body in equilibrium when it is at the point of sliding downwards on an inclined rough plane. 5
- (c) A ladder 5 m long rests on a horizontal ground and leans against a smooth vertical wall at an angle 70° with the horizontal. The weight of the ladder is 900 N and acts at its middle. The ladder is at the point of sliding, when a man weighting 750 N stands on a rung 1.5 m from the bottom of the ladder. Calculate the coefficient of friction between the ladder and the floor. 7
5. (a) Define 'centre of gravity'. 2
- (b) An I-section has the following dimention in mm :
Bottom Flange = 300×100
Top Flange = 150×50
Web = 300×50
Determine mathematically the position of centre of gravity/centroid of the section. 5
- (c) Find out the moment and inertia of a rectangular section with breadth (b) and height (h) about two centroidal axes $X-X$ and $Y-Y$ (from 1st principle). 7

6. (a) What do you mean by 'self-locking machine'? 2
- (b) In a certain weight lifting machine, an effort of 25 N can lift a load of 315 N. If the velocity ratio of the m/c is 14, find the effort lost in friction and the friction load. 5
- (c) Draw the sketch of a single purchase crab winch and find out the efficiency mathematically. 7
7. (a) Define statics and dynamics. 2
- (b) At a certain instant, a body of mass 10 kg falling freely under the force of gravity was found to be falling at the rate of 20 m/s. What force will stop the body in (i) 2 seconds and (ii) 2 metres ? 5
- (c) Derive an expression for the maximum height and range of a projectile traversed by a stone thrown with an initial velocity u and an inclination of α . 7
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**II/SEM/COMMON/2018 (W)/
New**

ENGINEERING PHYSICS

(BST - 101)

Full Marks : 80

Time : 3 hours

Answer any five questions including Q.Nos. 1 & 2.

The figures in the right-hand margin indicate marks.

1. Answer all questions : 2 × 10

(a) How many centimeter are there in one nano-meter (nm) and one Gigameter (Gm) ?

(b) State parallelogram law of vector addition.

(c) Define positive work and negative work.

(d) Mention two methods to reduce friction.

(e) State Joule's mechanical equivalent of heat.

(f) Draw a ray diagram for refraction through a prism.

(Turn Over)

(g) State two applications of Ultrasonics.

(h) State Ohm's law.

(i) State the principle of LASER.

(j) State Lenz's law.

2. Answer any *six* questions :

5 × 6

(a) State the principle of Homogeneity. Check

the correctness of the formula, $F = \frac{mv^2}{r}$,

where m = mass, v = velocity, r = radius.

(b) What is the relation between linear and angular velocity and linear and angular acceleration.

(c) Find the rectangular components of a velocity of 10 m/sec, when one of the component makes an angle of 60° with the resultant.

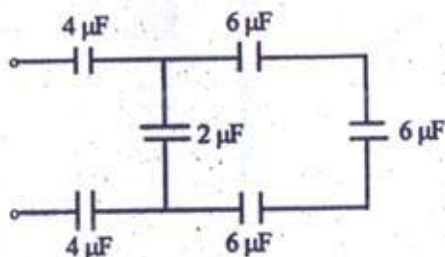
(d) State Kepler's laws of Planetary motion.

(e) Distinguish between transverse wave and longitudinal wave.

(f) State and explain 1st law of Thermodynamics.

(g) State Fleming's Right Hand Rule.

(h) Find the equivalent capacitance between A and B .



3. Find expression for equation of trajectory, time of flight, maximum height and horizontal range for a projectile fired at an angle θ with the horizontal. 10
4. Establish the relation between g and G . The earth's mass is 80 times that of Moon and their diameter are in the ratio 4:1. What will be the value of g on Moon ? (g on earth = 9.8 m/sec^2) 6+4
5. Define Specific Heat and Latent Heat. Calculate the amount of heat required to convert 10 gm of ice at -5°C to water at 50°C . 4+6
6. State Kirchhoff's laws and obtain balanced condition of Wheatstone's bridge. 6+4

(4)

7. Find an expression for force acting on a current carrying conductor placed in a uniform magnetic field. State Fleming's Left Hand Rule. 6 + 4
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